Biological Opinion

National Marine Fisheries Service
Endangered Species Act Section 7 Consultation
Biological Opinion and Conference Biological Opinion

Agency:	United States Army Corps of Engineers
Activities Considered:	Authorization of discharges of dredged and fill material or other structures or work into waters of the United States under the Corps' Nationwide Permit Program
Consultation Conducted by:	Endangered Species Act Interagency Cooperation Division of the Office of Protected Resources, National Marine Fisheries Service
Approved by:	Donna S Wieting
Date:	NOV 24 2014

Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA; 16 United States Code (U.S.C.) 1536 (a)(2)) requires Federal agencies to insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When a Federal agency's action "may affect" a protected species, that agency is required to consult formally with the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS), depending on the particular endangered species, threatened species, or designated critical habitat that may be affected by the action (50 Code of Federal Regulations (CFR) 402.14(a)). Federal agencies are exempt from this general requirement if they have concluded that an action "may affect, but is not likely to adversely affect" endangered species, threatened species, or designated critical habitat, and NMFS or the USFWS concur with that conclusion (50 CFR 402.14(b)).

The U.S. Army Corps of Engineers (Corps) initiated formal consultation with NMFS on the Corps' proposal to reauthorize 48 existing Nationwide Permits (Nationwide Permits) and establish two new Nationwide Permits that authorize the discharge of dredged or fill material into waters of the United States through 2017. This document represents NMFS' programmatic Biological Opinion on the Corps' Nationwide Permits Program for the remainder of the permit term. As an assessment of a national program of categories of activities and its procedures for administration and implementation, this Biological Opinion does not assess the effects of individual discharges authorized by one or more of these permits to discharge dredged or fill materials into waters of the United States. Instead, this Biological Opinion results from the national-level consultation on a program, which includes a series of actions affecting many species over all or a major portion of the United States and its territories, as described in the Interagency Endangered Species Consultation Handbook (USFWS and NMFS 1998). As contemplated by the general conditions to the Nationwide Permits, specific uses of these proposed permits will be addressed in subsequent consultations between the Corps and NMFS for any activity may affect NMFS listed species or their designated critical habitat.

This Opinion is based on the following:

- Our review of the previous Biological Opinion we issued in February 2012;
- Corps' environmental assessments, Biological Evaluation and supplemental information the Corps provided for the Nationwide Permits;
- Recovery plans for threatened and endangered species under NMFS' jurisdiction;
- ESA listed species status reviews; reports on the status and trends of wetlands and deepwater habitats in the United States that have been prepared by the USFWS' National Wetlands Inventory;
- Past and current research and population dynamics modeling efforts;
- Monitoring reports;
- Biological Opinions on similar activities;
- Published and unpublished scientific information on the biology and ecology of threatened and endangered species under NMFS' jurisdiction in the action area; and
- Other sources of information gathered and evaluated during the consultation on the proposed permits.

This Biological Opinion has been prepared in accordance with section 7 of the ESA, associated implementing regulations, and agency policy and guidance (50 CFR 402; USFWS and NMFS 1998).

Table of Contents

Consultation History

- On March 30, 2011, the Corps provided NMFS with a copy of its February 16, 2011, Federal Register notice in which the Corps proposed to reissue and modify Nationwide Permits. On April 1, 2011, the Corps provided NMFS with copies of the *Decision* documents for the Nationwide Permits the Corps planned to issue.
- In a series of telephone calls in May of 2011, NMFS asked the Corps for data on the number of activities that had been authorized by Nationwide Permits since 2007 (when they were last reissued), the acreage that was estimated to have been impacted by those authorizations, and the amount of mitigation the Corps had required. Those data were necessary to assess the potential effects of the Nationwide Permits on endangered and threatened species under NMFS' jurisdiction and critical habitat that had been designated for those species.
- Between May 13 and June 7, 2011, the Corps provided the data NMFS had requested. We initiated formal consultation on June 7, 2011.
- On August 31, 2011, NMFS provided the Corps with a copy of its draft Biological Opinion on the proposed issuance, reissuance and modification of the Corps' Nationwide Permits. The Corps provided comments on the draft Biological Opinion on December 30, 2011.
- On February 15, 2012, NMFS issued its final programmatic Biological Opinion on the Corps' Nationwide Permit Program. The opinion found that the Corps' program jeopardized endangered and threatened species under the jurisdiction of NMFS and resulted in the destruction or adverse modification of critical habitat that has been designated for these species due to a lack of adequate measures and procedures to protect such species and critical habitat (particularly with consideration of the aggregate impacts[1] of individual permits). In the programmatic opinion, NMFS identified a Reasonable and Prudent Alternative (RPA) that would avoid the likelihood of jeopardizing the continued existence of listed species or result in the destruction or adverse modification of critical habitat.
- On March 16, 2012, the Corps submitted comments to NMFS on the RPA identified in the programmatic Biological Opinion and NMFS provided responses to those comments.
- On March 19, 2012, the 46 pre-existing Nationwide Permits, two modified Nationwide Permits and two new Nationwide Permits issued by the Corps on February 13, 2012 went into effect.
- On March 27, 2012, the Corps issued a letter to NMFS outlining concerns with the RPA identified in the programmatic Biological Opinion. The Corps requested that NMFS

[1] See section 2.4 *Treatment of "Aggregate Impacts"* of this Biological Opinion for a description of these impacts.

engage in discussions with the Corps to develop options for potential revisions to the RPA and to discuss the aggregate impacts analysis used in the programmatic Biological Opinion.

- On March 30, 2012, the Corps requested reinitiation of formal consultation. In response to the Corps' concerns, NMFS met several times with the Corps to discuss their concerns and clarify expectations of how the RPA would be implemented.
- On July 27, 2012, NMFS agreed that reinitiation of formal ESA section 7 consultation was appropriate given that the Corps modified the action and proposed additional changes that collectively may cause effects to listed species and critical habitat not previously considered in the original Biological Opinion. NMFS requested that the Corps discuss the scope and process, time frame for concluding consultation, and additional information needed in order to conduct the consultation effectively.
- On October 4, 2012, NMFS provided the Corps with a Draft Analysis Plan and a Draft Consultation Framework for the Reinitiated Programmatic section 7(a)(2) Consultation on the Corps Nationwide Permit Program. NMFS also met with the Corps to discuss and finalize both documents. On October 17, 2012, the Corps provided comments on those documents. NMFS and the Corps agreed that the reinitiated consultation would consider existing Regional Conditions developed by Districts to implement the 2012 Nationwide Permits as well as other existing local protective measures which had not been considered in the original consultation, the development of Regional Conditions, and additional conservation and protective procedures and measures designed to avoid adverse effects to listed species and critical habitat. NMFS and Corps headquarters staff agreed to coordinate amongst their Regional and District staff, respectively, on the development of Regional Conditions and/or other conservation and protective measures as appropriate and agreed to meet regularly until the updated draft programmatic Biological Opinion was issued. They also agreed to consider changes at the national program level to address issues, such as aggregate impacts. The Corps agreed to provide a description of the modified action by November 5, 2012 and NMFS agreed to provide a draft programmatic Biological Opinion by January 31, 2013 and a final programmatic Biological Opinion by February 28, 2013.
- On October 15, 2012, the Corps issued a letter to NMFS clarifying the Corps' legal position regarding compliance with the ESA. In the letter, the Corps determined that the reissuance/issuance of the Nationwide Permits results in "no effect" to listed species or critical habitat, and therefore does not require ESA section 7 consultation. Notwithstanding the "no effect" determination, the Corps stated they intend to continue ESA section 7(a)(2) consultation on the 2012 Nationwide Permits on a voluntary basis to develop measures to further ensure that activities authorized by any of the Nationwide Permits do not and will not adversely affect listed species or critical habitat.
- On November 6, 2012, the Corps provided a draft description of the action for the reinitiated consultation on the Corps' Nationwide Permit Program.
- After meeting on December 4, 2012, and January 10, 2013, to discuss the progress on the

reinitiated consultation and the remaining work to be done to properly complete the consultation and finalize a draft programmatic Biological Opinion, NMFS and the Corps mutually agreed to extend the date of completion. The Corps agreed to provide a Biological Evaluation (BE) to NMFS by January 31, 2013 while NMFS agreed to provide a draft programmatic Biological Opinion by May 31, 2013 and a final by June 28, 2013.

- On February 5, 2013, the Corps provided NMFS with a Biological Evaluation (BE) to inform the reinitiated section 7 consultation on the anticipated effects to listed species and designated critical habitat.
- From February-May, 2013, NMFS and the Corps met regularly to address each element of the RPA identified in the original programmatic Biological Opinion. NMFS issued a draft Biological Opinion to the Corps on June 10, 2013.
- Between June 12, 2013 and March 6, 2014, NMFS and the Corps had multiple meetings to discuss modifications to the Nationwide Permit Program.
- On July 30, 2013, the Corps issued a letter to NMFS providing comments on its draft Biological Opinion.
- On August 16, 2013, the Corps sent NMFS information on the Corps Regulatory Program's approach to cumulative effects analysis.
- On September 5, 2013, the Corps sent NMFS comments on the data analysis provided in its draft Biological Opinion dated June 10, 2013.
- In September 2013, and in January 2014, the Corps sent NMFS updated and corrected data after an analysis and quality check of its data revealed some data entry errors for numbers and impacts of the activities that were authorized under the Nationwide Permit Program between 2010 and 2012.
- On March 6, 2014 Assistant Secretary of the Army Jo-Ellen Darcy sent a letter to then Acting Administrator of NOAA Kathryn Sullivan modifying the Corps' proposed action. The letter included the following description:

  The protective measures incorporated into the proposed action are summarized below:

  - The Corps will develop information packages for prospective users of the Nationwide Permits to facilitate compliance with Nationwide Permit General Condition 18, Endangered Species.
  - The Corps will require that a list of information be provided in Nationwide Permit preconstruction notifications.
  - The Corps will conduct consultation with NMFS Regional Offices to identify new or modified regional conditions for Nationwide Permits in a particular region.
  - The Corps will provide NOAA with semi-annual reports on Regulatory Program permitting activities, which will include locations of authorized

activities as well as proposed and authorized impacts, required compensatory mitigation, and compliance activities. This will include activity-specific information on acres of permanent impacts, in addition to other authorized impacts such as acres of temporary impacts and linear foot impacts, authorized by all types of Department of Army permits, including the 2012 Nationwide Permits. More specifically, the Corps will provide the following information in its semi-annual reports:

    - Data from its existing ORM2 automated information system informing NOAA of activities authorized by all forms of DA permits.
    - Data on permanent fill authorized under the Nationwide Permit will be separately identified for each Nationwide Permit.
    - For other Department of Army permit authorized fills, data on the authorized permanent fill for each activity and the total amount of permanent fill authorized in the applicable watershed.
    - Data informing NOAA of the total amount of permanent fill authorized by all types of Department of Army permits for each 10-digit [Hydrologic Unit Code] HUC watershed inhabited by listed species and designated critical habitat under NMFS' jurisdiction.

- The Corps will utilize the discretion provided by Nationwide Permit General Condition 23, Mitigation, to require compensatory mitigation for wetland losses of less than 1/1 0-acre, if the reasonable and prudent measures or reasonable and prudent alternatives in Biological Opinions for activity specific or regional programmatic ESA section 7 consultations for proposed Nationwide Permit activities require wetland compensatory mitigation for losses of less than 1/10-acre.
- The Corps will issue guidance to its districts and divisions on conducting cumulative effects analyses for the purposes of the National Environmental Policy Act, Clean Water Act Section 404(b)(1) Guidelines, and the ESA.
- The Corps will issue guidance to its districts to include a Special Condition to Nationwide Permit verification letters[2], to require permittees to report incidents where any individuals of fish, marine mammals, abalone, coral or marine plant species listed under the ESA appear to be injured or killed as a result of discharges of dredged or fill material into waters of the United States or structures or work in navigable waters of the United States authorized by a Nationwide Permit.

[2] In cases where a PCN is required, if the activity complies with the terms and conditions of the Nationwide Permit, a verification letter will be sent to the perspective permittee. The verification may include additional case specific conditions.

After comments were provided on the June 2013 draft Biological Opinion, and as a result of subsequent meetings, the Corps now agrees to add additional protective measures to the proposed action. The first two measures apply generally to the Nationwide Permit Program, and the remaining measures apply only to eight Nationwide Permits, more precisely Nationwide Permit #12, #13, #14, #29, #31, #33, #36 and #39. These additional protective measures are:

- Within 30 days after a semi-annual report… is provided to the NMFS Regional office, there will be a mandatory meeting between Corps district staff and NMFS Regional staff to discuss the data in the semi-annual report and to determine whether additional permit conditions, consultations, or other protective measures are necessary to address specific types of activities or stressors that affect listed species or designated critical habitat in the watersheds within the Corps district and NMFS Region.
- In early 2013 and again on September 20, 2013, the Corps provided NOAA with corrected data for Nationwide Permit verifications issued in FY 2010-2012. The Corps will provide its Regulatory Project Managers with additional training and guidance to ensure accurate data entry into the Regulatory Program's automated information system, ORM2, which is used to produce the semi-annual reports discussed above. The Corps will also increase its quality assurance/quality control efforts for the ORM2 data to improve its accuracy.
- The Corps will conduct rulemaking to modify Nationwide Permits 12, 13, 14, and 36 to require pre-construction notification for proposed activities in waters of the United States in watersheds inhabited by listed species and designated critical habitat under NMFS' jurisdiction if those proposed activities are constructed with impervious materials and would thus add to impervious surface cover in a watershed. The Corps already requires PCNs for all activities under Nationwide Permits 29, 31, 33 and 39.
- The Corps will provide NMFS with the baseline impervious surface cover as of 2006 (or using the most current data) for each 10-digit HUC watershed inhabited by listed species and designated critical habitat under NMFS' jurisdiction.
- With respect to NMFS' concerns related to increases in impervious surface cover, the Corps will include in its semi-annual report (discussed on page 3): the amount of actual impervious surface cover that will result from the activities authorized by the eight Nationwide Permits as well as other [Department of Army] DA permits for each 10-digit HUC watershed inhabited by listed species and designated critical habitat under NMFS' jurisdiction, the ratio of that additional impervious surface cover to the baseline impervious surface cover for the referenced watersheds, and a notation of those watersheds where the ratio is 1% or greater. If the total amount of actual impervious surface cover authorized by Nationwide Permits

and other DA permit activities is greater than 1% of the baseline impervious surface cover in a particular watershed, the Corps will consider that information (as well as other pertinent information) when making its ESA section 7 effect determinations for Nationwide Permit preconstruction notifications associated with these eight Nationwide Permits[3]. If section 7 consultation is initiated, the Corps will also consider this information and include it in preparing a biological assessment.

- On March 6, 2014 NMFS and the Corps concluded ESA section 7(a)(2) consultation
- On July 7, 2014, NMFS sent a draft no-jeopardy Biological Opinion to the Corps.
- On October 16, 2014, the Corps provided its comments on the draft Biological Opinion.
- On October 29, 2014, NMFS met with the Corps and discussed their comments and agreed to look at some further information that the Corps wished to provide.
- On November 7, 2014 the Corps provided the information discussed in the October 29, 2014 meeting to NMFS for consideration.

[3] While the scope of the proposed action subject to this consultation is limited to the remaining term of the 2012 Nationwide Permit Program, the Corps will, when processing other permits in a watershed where the 1% threshold has been reached (as discussed above), consider this information when making its ESA section 7 effect determinations. If section 7 consultation is initiated, the Corps will also consider this information and include it in preparing a biological assessment.

1.0 Description of the Proposed Action

On March 19, 2012, the Corps Nationwide Permit Program went into effect. The Corps issued 46 pre-existing Nationwide Permits, modified two pre-existing Nationwide Permits and issued two new Nationwide Permits. This Biological Opinion addresses the Nationwide Permit Program for the remainder of the current Nationwide Permit Program term and considers those actions already authorized by the 2012 – 2017 Nationwide Permit Program to be part of the environmental baseline (see section 4 of this Biological Opinion).

The Clean Water Act (CWA) prohibits the discharge of any dredged or fill material into waters of the United States, which includes wetlands, without a permit. Discharges of these materials into jurisdictional wetlands and other waters of the United States are regulated by section 404 of the CWA, which is administered by the U.S. Army Corps of Engineers (the Corps) with oversight by the U.S. Environmental Protection Agency (EPA). The Corps employs three primary kinds of permits to authorize discharges or fill materials into waters of the United States and other activities under the CWA section 404 program:

1. *Standard or Individual Permits* receive the highest level of scrutiny by the Corps. Before it can issue an individual permit, the Corps must establish that the discharge or other activity is in the public's interest. To help the Corps make that determination, it provides public notice to all known interested persons and evaluates comments and information it receives before it makes a final decision on an application. The Corps' review process is also intended to insure that proposed authorizations comply with CWA section 404(b)(1) guidelines, the National Environmental Policy Act (NEPA), which can require the Corps to prepare environmental impact statements, consultations with NMFS and the USFWS under ESA section 7, and compliance with other sections of the CWA, among many of the Federal, State, and local laws the Corps must consider. Depending on the data source, year and the Corps District, standard permits represent between 7 and 19% of the authorizations the Corps issues each year. Over the 2010-2012 permitting period, Standard or Individual Permits accounted for 3.3 to 3.6% of Corps authorized actions (the Corps 2013 Biological Evaluation).

2. *Letters of Permission* are authorizations issued through abbreviated processing procedures that include coordination with Federal and State environmental agencies and a public interest evaluation, but do not require the Corps to publish a public notice. The Corps normally uses letters of permission for activities that occur in navigable waters when objections are not likely and when the activity does not qualify for a General Permit. Based on historical data, Letters of Permission typically represented less than 1% of the authorizations the Corps issues. According to the 2013 the Corps Biological Evaluation, Letters of Permission accounted for just fewer than 3% of the authorizations

issued over the 2010-2012 permitting period.

3. *General Permits* are specifically authorized by CWA section 404(e) (33 U.S.C. section 1344(e)) which allows the Secretary of the Army to “issue general permits on a State, regional, or nationwide basis for any category of activities involving discharges of dredged or fill material if the Secretary of the Army determines that the activities in such category are similar in nature, will cause only minimal adverse environmental effects when performed separately and will have only minimal cumulative adverse effect on the environment.”

   These include Regional General Permits and Nationwide Permits and have been the most common mechanism for authorizing placement of dredged or fill material into waters of the United States, representing between 80 and 92% of all authorizations (the Corps 1995, Martin *et al.* 2006; see also Figure 5.2). Permits issued over 2010 to 2012 indicate that this group of permits accounts for nearly 94% of all Corps authorizations.

   a. *Nationwide Permits*, which are a type of general permit, are an essential part of the Corps’ regulatory program, and according to the Corps 2013 Biological Evaluation, Nationwide Permits are used to authorize approximately 54% of the activities authorized by general permits. The Corps established Nationwide Permits to authorize discharges of dredged or fill material and other activities in 1977 (42 FR 37122, July 19, 1977). They were intended to allow the Corps to manage its section 404 regulatory program and to allow it to focus its efforts on reviewing projects with greater potential for ecologically significant, adverse effects on waters of the United States.

   b. *Regional General Permits* are issued regionally and represent the remainder of activities authorized by general permits. These permits contain specific provisions to protect natural and cultural resources, many of which are unique to their region. These permits can be used to modify or take the place of Nationwide Permits.

A basic premise of the Corps’ permitting program is that no discharge shall be permitted if: (1) a practicable alternative exists that is less damaging to the aquatic environment; or (2) the discharge would cause the nation’s waters to be significantly degraded.

In order for a project to be permitted, it must be demonstrated that, to the extent practicable:

- Steps have been taken to avoid impacts to wetlands and other aquatic resources;
- Potential impacts have been minimized; and
- Compensation will be provided for any remaining unavoidable impacts.

The Corps reissued 46 pre-existing Nationwide Permits, modified and re-issued two pre-existing Nationwide Permits, and issued two new Nationwide Permits. Those Nationwide Permits went into effect on March 19, 2012, and will expire on March 18, 2017. There are also 31 General Conditions that apply to these Nationwide Permits. On July 27, 2012, NMFS reinitiated ESA section 7 consultation on this Federal action since the Corps proposed additional changes to the action that collectively may cause effects to listed species and critical habitat not previously considered in the original Biological Opinion — a trigger for reinitiation reflected in the

February 2012 Opinion. The purpose of the Nationwide Permit Program is to provide timely authorizations for the regulated public while protecting the Nation's aquatic resources. The Corps issues Nationwide Permits under the authorities of section 404(e) of the CWA (33 U.S.C. 1344) and section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

The following narratives are summarized from information provided by the 2013 Biological Evaluation provided by the Corps.

1.1 Nationwide Permits

The following narratives present each of the Nationwide Permits[4], the scope of activities each permit authorizes, specific conditions attached to each permit, and the authorities for the permit (which are presented in parentheses at the end of each narrative).

Nationwide Permit 1: Aids to Navigation

This Nationwide Permit authorizes the placement of aids to navigation and regulatory markers that are approved by and installed in accordance with the requirements of the U.S. Coast Guard (see 33 CFR, chapter I, subchapter C, part 66) (Rivers and Harbors Act section 10).

Nationwide Permit 2: Structures in Artificial Canals

This Nationwide Permit authorizes structures constructed in artificial 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)) (Rivers and Harbors Act section 10).

Nationwide Permit 3: Maintenance

This Nationwide Permit authorizes:

- 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. Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, or current construction codes or safety standards that are necessary to make the repair, rehabilitation or replacement are authorized. Any stream channel modification is limited to the minimum necessary for the repair, rehabilitation or replacement of the structure or fill; such modifications must be immediately adjacent to the project.
    - This Nationwide Permit also authorizes the repair, rehabilitation, or replacement of those structures or fills destroyed or damaged by storms, floods, fire or other

[4] The Corps will conduct rulemaking to modify Nationwide Permits 12, 13, 14, and 36 to require PCN for proposed activities in waters of the United States in watersheds inhabited by listed species and designated critical habitat under NMFS' jurisdiction if those proposed activities are constructed with impervious materials and would thus add to impervious surface cover in a watershed.

discrete events, provided the repair, rehabilitation, or replacement is commenced, or is under contract to commence, within two years of the date of their destruction or damage. In cases of catastrophic events, such as hurricanes or tornadoes, this two-year limit may be waived by the District Engineer, provided the permittee can demonstrate funding, contract, or other similar delays.

  - This Nationwide Permit also authorizes the removal of accumulated sediments and debris in the vicinity of and within 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 immediate vicinity of the structure to the approximate dimensions that existed when the structure was built, but cannot extend further than 200 feet in any direction from the structure. This 200-foot limit does not apply to maintenance dredging to remove accumulated sediments blocking or restricting outfall and intake structures or to maintenance dredging to remove accumulated sediments from canals associated with outfall and intake structures.
    - All dredged or excavated materials must be deposited and retained in an upland area unless otherwise specifically approved by the District Engineer under separate authorization. The placement of riprap must be the minimum necessary to protect the structure or to ensure the safety of the structure. Any bank stabilization measures not directly associated with the structure will require a separate authorization from the District Engineer.

- This Nationwide Permit 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. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.
- This Nationwide Permit does not authorize maintenance dredging for the primary purpose of navigation. This Nationwide Permit does not authorize beach restoration. This Nationwide Permit does not authorize new stream channelization or stream relocation projects.

Notification: For activities authorized by paragraph (b) of this Nationwide Permit, the permittee must submit a pre-construction notification to the District Engineer prior to commencing the activity (see General Condition 31). The pre-construction notification (PCN) must include information regarding the original design capacities and configurations of the outfalls, intakes, small impoundments and canals (Rivers and Harbors Act section 10 and CWA section 404).

Note: This Nationwide Permit authorizes the repair, rehabilitation, or replacement of any previously authorized structure or fill that does not qualify for the CWA section 404(f) exemption for maintenance.

Nationwide Permit 4. Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities

This Nationwide Permit authorizes fish and wildlife harvesting devices and activities such as pound nets, crab traps, crab dredging, eel pots, lobster traps, duck blinds, and clam and oyster digging, and small fish attraction devices such as open water fish concentrators (sea kites, etc.). This Nationwide Permit does not authorize artificial reefs or impoundments and semi-impoundments of waters of the United States for the culture or holding of motile species such as lobster, or the use of covered oyster trays or clam racks (Rivers and Harbors Act section 10 and CWA section 404).

Nationwide Permit 5. Scientific Measurement Devices

This Nationwide Permit authorizes devices whose purpose is to measure and record scientific data, such as staff gages, tide and current gages, meteorological stations, water recording and biological observation devices, water quality testing and improvement devices and similar structures. Small weirs and flumes constructed primarily to record water quantity and velocity are also authorized provided the discharge is limited to 25 cubic yards. Upon completion of the study, the measuring device and any other structures or fills associated with that device (e.g., anchors, buoys, lines, etc.) must be removed and, to the maximum extent practicable, the site must be restored to pre-construction elevations (Rivers and Harbors Act section 10 and CWA section 404).

Nationwide Permit 6. Survey Activities

This Nationwide Permit authorizes survey activities, such as core sampling, seismic exploratory operations, plugging of seismic shot holes and other exploratory-type bore holes, exploratory trenching, soil surveys, sampling, and historic resources surveys. For the purposes of this Nationwide Permit, the term ‘‘exploratory trenching’’ means mechanical land clearing of the upper soil profile to expose bedrock or substrate, for the purpose of mapping or sampling the exposed material. The area in which the exploratory trench is dug must be restored to its pre-construction elevation upon completion of the work and must not drain a water of the United States. In wetlands, the top 6 to 12 inches of the trench should normally be backfilled with topsoil from the trench. This Nationwide Permit authorizes the construction of temporary pads, provided the discharge does not exceed 1⁄10-acre in waters of the United States discharges and structures associated with the recovery of historic resources are not authorized by this Nationwide Permit. Drilling and the discharge of excavated material from test wells for oil and gas exploration are not authorized by this Nationwide Permit; the plugging of such wells is authorized.

Fill placed for roads and other similar activities is not authorized by this Nationwide Permit. The Nationwide Permit does not authorize any permanent structures. The discharge of drilling mud and cuttings may require a permit under CWA section 402 (Rivers and Harbors Act section 10 and CWA section 404).

Nationwide Permit 7. Outfall Structures and Associated Intake Structures

This Nationwide Permit authorizes activities related to the construction or modification of outfall structures and associated intake structures, where the effluent from the outfall is authorized, conditionally authorized, or specifically exempted by, or that are otherwise in compliance with regulations issued under the National Pollutant Discharge Elimination System Program (CWA section 402). The construction of intake structures is not authorized by this Nationwide Permit, unless they are directly associated with an authorized outfall structure.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity (See General Condition 31 and Rivers and Harbors Act section 10 and CWA section 404).

Nationwide Permit 8. Oil and Gas Structures on the Outer Continental Shelf

This Nationwide Permit authorizes structures for the exploration, production and transportation of oil, gas and minerals on the outer continental shelf within areas leased for such purposes by the Department of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement. Such structures shall not be placed within the limits of any designated shipping safety fairway or traffic separation scheme, except temporary anchors that comply with the fairway regulations in 33 CFR 322.5(l). The District Engineer will review such proposals to ensure compliance with the provisions of the fairway regulations in 33 CFR 322.5(l). Any Corps review under this Nationwide Permit will be limited to the effects on navigation and national security in accordance with 33 CFR 322.5(f). Such structures will not be placed in established danger zones or restricted areas as designated in 33 CFR part 334, nor will such structures be permitted in EPA or the Corps designated dredged material disposal areas.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity (See General Condition 31 and Rivers and Harbors Act section 10).

Nationwide Permit 9. Structures in Fleeting and Anchorage Areas

This Nationwide Permit authorizes 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.

Nationwide Permit 10. Mooring Buoys

This Nationwide Permit authorizes non-commercial, single-boat, mooring buoys (Rivers and Harbors Act section 10)

Nationwide Permit 11. Temporary Recreational Structures

This Nationwide Permit authorizes temporary buoys, markers, small floating docks and similar structures placed for recreational use during specific events such as water skiing competitions and boat races or seasonal use, provided that such structures are removed within 30 days after use has been discontinued. At Corps of Engineers reservoirs, the reservoir manager must approve each buoy or marker individually (Rivers and Harbors Act section 10)

Nationwide Permit 12. Utility Line Activities

This Nationwide Permit authorizes activities required for the construction, maintenance, repair and removal of utility lines and associated facilities in waters of the United States, provided the activity does not result in the loss of greater than 1⁄2-acre of waters of the United States for each single and complete project.

- Utility lines: This Nationwide Permit authorizes the construction, maintenance, or repair of utility lines, including outfall and intake structures, and the associated excavation, backfill, or bedding for the utility lines, in all waters of the United States, provided there is no change in pre-construction contours. A "utility line" is defined as any pipe or pipeline for the transportation of any gaseous, liquid, liquescent, or slurry substance, for any purpose, and any cable, line, or wire for the transmission for any purpose of electrical energy, telephone, and telegraph messages, and radio and television communication. The term "utility line" does not include activities that drain a water of the United States, such as drainage tile or French drains, but it does apply to pipes conveying drainage from another area. Material resulting from trench excavation may be temporarily sidecast into waters of the United States for no more than three months, provided the material is not placed in such a manner that it is dispersed by currents or other forces. The District Engineer may extend the period of temporary side casting for no more than a total of 180 days, where appropriate. In wetlands, the top 6 to 12 inches of the trench should normally be backfilled with topsoil from the trench. The trench cannot be constructed or backfilled in such a manner as to drain waters of the United States (e.g., backfilling with extensive gravel layers, creating a French drain effect). Any exposed slopes and stream banks must be stabilized immediately upon completion of the utility line crossing of each waterbody.
- Utility line substations: This Nationwide Permit authorizes the construction, maintenance, or expansion of substation facilities associated with a power line or utility line in non-tidal waters of the United States, provided the activity, in combination with all other activities included in one single and complete project, does not result in the loss of greater than 1⁄2-acre of waters of the United States. This Nationwide Permit does not authorize discharges into non-tidal wetlands adjacent to tidal waters of the United States to construct, maintain or expand substation facilities.
- Foundations for overhead utility line towers, poles and anchors: This Nationwide Permit authorizes the construction or maintenance of foundations for overhead utility line towers, poles and anchors in all waters of the United States, provided the foundations are the minimum size necessary and separate footings for each tower leg (rather than a larger single pad) are used where feasible.
- Access roads*:* This Nationwide Permit authorizes the construction of access roads for the construction and maintenance of utility lines, including overhead power lines and utility line substations, in non-tidal waters of the United States, provided the activity, in combination with all other activities included in one single and complete project, does not cause the loss of greater than 1⁄2-acre of non-tidal waters of the United States. This Nationwide Permit does not authorize discharges into nontidal wetlands adjacent to tidal waters for access roads. Access roads must be the minimum width necessary (see Note 2, below). Access roads must be constructed so that the length of the road minimizes any

adverse effects on waters of the United States and must be as near as possible to pre-construction contours and elevations (e.g., at grade corduroy roads or geotextile/gravel roads). Access roads constructed above pre-construction contours and elevations in waters of the United States must be properly bridged or culverted to maintain surface flows.

This Nationwide Permit may authorize utility lines in or affecting navigable waters of the United States even if there is no associated discharge of dredged or fill material (See 33 CFR Part 322). Overhead utility lines constructed over Rivers and Harbors Act section 10 waters and utility lines that are routed in or under Rivers and Harbors Act section 10 waters without a discharge of dredged or fill material require a Rivers and Harbors Act section 10 permit. This Nationwide Permit also authorizes temporary structures, fills and work necessary to conduct the utility line 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. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity if any of the following criteria are met: (1) The activity involves mechanized land clearing in a forested wetland for the utility line right-of-way; (2) a Rivers and Harbors Act section 10 permit is required; (3) the utility line in waters of the United States, excluding overhead lines, exceeds 500 feet; (4) the utility line is placed within a jurisdictional area (i.e., water of the United States), and it runs parallel to a stream bed that is within that jurisdictional area; (5) discharges that result in the loss of greater than 1⁄10-acre of waters of the United States; (6) permanent access roads are constructed above grade in waters of the United States for a distance of more than 500 feet; or (7) permanent access roads are constructed in waters of the United States with impervious materials (see General Condition 31 and Rivers and Harbors Act section 10 and CWA section 404).

Note 1: Where the proposed utility line is constructed or installed in navigable waters of the United States (i.e., Rivers and Harbors Act section 10 waters) within the coastal United States, the Great Lakes, and United States territories, copies of the PCN and Nationwide Permit verification will be sent by the Corps to NOAA's National Ocean Service, for charting the utility line to protect navigation.

Note 2: Access roads used for both construction and maintenance may be authorized, provided they meet the terms and conditions of this Nationwide Permit. Access roads used solely for construction of the utility line must be removed upon completion of the work, in accordance with the requirements for temporary fills.

Note 3: Pipes or pipelines used to transport gaseous, liquid, liquescent, or slurry substances over navigable waters of the United States are considered to be bridges, not utility lines, and may require a permit from the U.S. Coast Guard under section 9 of the Rivers and Harbors Act of 1899. However, any discharges of dredged or fill material into waters of the United States associated with such pipelines will require a CWA section 404 permit (see Nationwide Permit 15).

Note 4: For overhead utility lines authorized by this Nationwide Permit, a copy of the PCN and Nationwide Permit verification will be provided to the Department of Defense Siting Clearinghouse, which will evaluate potential effects on military activities [see General Condition 31 in Section 1.2 of this Biological Opinion].

Nationwide Permit 13. Bank Stabilization

This Nationwide Permit authorizes bank stabilization activities necessary for erosion prevention, provided the activity meets all of the following criteria:

- No material is placed in excess of the minimum needed for erosion protection;
- 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;
- 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 the discharge will result in minimal adverse effects;
- 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;
- No material is of the type, or is placed in any location, or in any manner, to impair surface water flow into or out of any water of the United States;
- 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,
- The activity is not a stream channelization activity.

This Nationwide Permit also authorizes temporary structures, fills and work necessary to construct the bank stabilization 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. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity if the bank stabilization activity: (1) Involves discharges into special aquatic sites; or (2) is in excess of 500 feet in length; or (3) will involve the discharge of greater than an average of one cubic yard per running foot along the bank below the plane of the ordinary high water mark or the high tide line (see General Condition 31 and Rivers and Harbors Act section 10 and CWA section 404)

Nationwide Permit 14. Linear Transportation Projects

This Nationwide Permit authorizes activities required for the construction, expansion, modification or improvement of linear transportation projects (e.g., roads, highways, railways trails, airport runways and taxiways) in waters of the United States. For linear transportation projects in non-tidal waters, the discharge cannot cause the loss of greater than 1⁄2-acre of waters of the United States. For linear transportation projects in tidal waters, the discharge cannot cause the loss of greater than 1⁄3-acre of waters of the United States. Any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project.

This Nationwide Permit also authorizes temporary structures, fills and work necessary to construct the linear transportation project. 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. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate. This Nationwide Permit cannot be used to authorize non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, and train stations or aircraft hangars.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity if: (1) The loss of waters of the United States exceeds 1⁄10-acre; or (2) there is a discharge in a special aquatic site, including wetlands (see General Condition 31 and Rivers and Harbors Act section 10 and CWA section 404)

Note: Some discharges for the construction of farm roads or forest roads, or temporary roads for moving mining equipment, may qualify for an exemption under CWA section 404(f) (see 33 CFR 323.4).

Nationwide Permit 15. U.S. Coast Guard Approved Bridges

This Nationwide Permit authorizes discharges of dredged or fill material incidental to the construction of a bridge across navigable waters of the United States, including cofferdams, abutments, foundation seals, piers, and temporary construction and access fills, provided the construction of the bridge structure has been authorized by the U.S. Coast Guard under section 9 of the Rivers and Harbors Act of 1899 and other applicable laws. Causeways and approach fills are not included in this Nationwide Permit and will require a separate CWA section 404 permit (Rivers and Harbors Act section 10 and CWA section 404)

Nationwide Permit 16. Return Water from Upland Contained Disposal Areas

This Nationwide Permit authorizes return water from an upland contained dredged material disposal area. The return water from a contained disposal area is administratively defined as a discharge of dredged material by 33 CFR 323.2(d), even though the disposal itself occurs on the upland and does not require a CWA section 404 permit. This Nationwide Permit satisfies the technical requirement for a CWA section 404 permit for the return water where the quality of the return water is controlled by the State through the section 401 certification procedures. The dredging activity may require a CWA section 404 permit (33 CFR 323.2(d)), and will require a Rivers and Harbors Act section 10 permit if located in navigable waters of the United States.

Nationwide Permit 17. Hydropower Projects

This Nationwide Permit authorizes discharges of dredged or fill material associated with hydropower projects having: (a) Less than 5,000 kW of total generating capacity at existing reservoirs, where the project, including the fill, is licensed by the Federal Energy Regulatory Commission (FERC) under the Federal Power Act of 1920, as amended; or (b) a licensing exemption granted by the FERC under section 408 of the Energy Security Act of 1980 (16 U.S.C. 2705 and 2708) and section 30 of the Federal Power Act, as amended.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31 and section 404).

Nationwide Permit 18. Minor Discharges

This Nationwide Permit authorizes minor discharges of dredged or fill material into all waters of the United States, provided the activity meets all of the following criteria:

- The quantity of discharged material and the volume of area excavated do not exceed 25 cubic yards below the plane of the ordinary high water mark or the high tide line;
- The discharge will not cause the loss of more than 1/10-acre of waters of the United States; and
- The discharge is not placed for the purpose of stream diversion.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity if: (1) The discharge or the volume of area excavated exceeds 10 cubic yards below the plane of the ordinary high water mark or the high tide line, or (2) the discharge is in a special aquatic site, including wetlands (see General Condition 31 and Rivers and Harbors Act section 10 and CWA section 404).

Nationwide Permit 19. Minor Dredging

This Nationwide Permit authorizes 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., Rivers and Harbors Act section 10 waters). This Nationwide Permit 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)) (Rivers and Harbors Act section 10 and CWA section 404).

Nationwide Permit 20. Response Operations for Oil and Hazardous Substances.

This Nationwide Permit authorizes activities conducted in response to a discharge or release of oil and hazardous substances that are subject to the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR part 300) including containment, cleanup, and mitigation efforts, provided that the activities are done under either:

- The Spill Control and Countermeasure Plan required by 40 CFR 112.3;
- The direction or oversight of the Federal on scene coordinator designated by 40 CFR part 300; or
- Any approved existing state, regional or local contingency plan provided that the Regional Response Team (if one exists in the area) concurs with the proposed response efforts.

This Nationwide Permit also authorizes activities required for the cleanup of oil releases in waters of the United States from electrical equipment that are governed by EPA's polychlorinated biphenyl spill response regulations at 40 CFR part 761. This Nationwide Permit also authorizes the use of temporary structures and fills in waters of the United States for spill response training exercises (Rivers and Harbors Act section 10 and CWA section 404)

Nationwide Permit 21. Surface Coal Mining Activities

This Nationwide Permit authorizes discharges of dredged and fill material into waters of the United States associated with surface coal mining and reclamation operations.

- Previously Authorized Surface Coal Mining Activities. Surface coal mining activities that were previously authorized by the Nationwide Permit 21 issued on March 12, 2007 (see 72 FR 11092), are authorized by this Nationwide Permit, provided the following criteria are met:
    - The activities are already authorized, or are currently being processed by States with approved programs under Title V of the Surface Mining Control and Reclamation Act of 1977 or as part of an integrated permit processing procedure by the Department of Interior, Office of Surface Mining Reclamation and Enforcement;
    - The permittee must submit a letter to the District Engineer requesting re-verification of the Nationwide Permit 21 authorization. The letter must describe any changes from the previous Nationwide Permit 21 verification. The letter must be submitted to the District Engineer by February 1, 2013;
    - The loss of waters of the United States is not greater than the loss of waters of the United States previously verified by the District Engineer under the Nationwide Permit 21 issued on March 12, 2007 (i.e., there are no proposed expansions of surface coal mining activities in waters of the United States);
    - The District Engineer provides written verification that those activities will result in minimal individual and cumulative adverse effects and are authorized by Nationwide Permit 21, including currently applicable Regional Conditions and any activity-specific conditions added to the Nationwide Permit authorization by the District Engineer, such as compensatory mitigation requirements; and
    - If the permittee does not receive a written verification from the District Engineer prior to March 18, 2013, the permittee must cease all activities until such verification is received. The District Engineer may extend the February 1, 2013 deadline by so notifying the permittee in writing, but the permittee must still cease all activities if he

or she has not received written verification from the Corps by March 18, 2013, until such verification is received.

- Other Surface Coal Mining Activities. Surface coal mining activities that were not previously authorized by the Nationwide Permit 21 issued on March 12, 2007, are authorized by this Nationwide Permit, provided the following criteria are met:
  - The activities are already authorized, or are currently being processed by States with approved programs under Title V of the Surface Mining Control and Reclamation Act of 1977 or as part of an integrated permit processing procedure by the Department of Interior, Office of Surface Mining Reclamation and Enforcement;
  - The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States, including the loss of no more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the District Engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in minimal individual and cumulative adverse effects. This Nationwide Permit does not authorize discharges into tidal waters or non-tidal wetlands adjacent to tidal waters; and
  - The discharge is not associated with the construction of valley fills. A "valley fill" is a fill structure that is typically constructed within valleys associated with steep, mountainous terrain, associated with surface coal mining activities

Notification: For activities under paragraph (b) of this Nationwide Permit, the permittee must submit a PCN to the District Engineer and receive a written authorization prior to commencing the activity (see General Condition 31 and Rivers and Harbors Act section 10 and CWA section 404).

Nationwide Permit 22: Removal of Vessels

This Nationwide Permit authorizes temporary structures or minor discharges of dredged or fill material required for the removal of wrecked, abandoned or disabled vessels, or the removal of manmade obstructions to navigation. This Nationwide Permit does not authorize maintenance dredging, shoal removal or riverbank snagging.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity if: (1) The vessel is listed or eligible for listing in the National Register of Historic Places; or (2) the activity is conducted in a special aquatic site, including coral reefs and wetlands (See General Condition 31). If condition 1 above is triggered, the permittee cannot commence the activity until informed by the District Engineer that compliance with the ''Historic Properties'' General Condition is completed (Rivers and Harbors Act section 10 and CWA section 404)

Note 1: If a removed vessel is disposed of in waters of the United States, a permit from the EPA may be required (see 40 CFR 229.3). If a Department of the Army permit is required for vessel disposal in waters of the United States, separate authorization will be required.

Note 2: Compliance with General Condition 19, Endangered Species, and General Condition 20, Historic Properties, is required for all Nationwide Permits. The concern with historic properties is emphasized in the notification requirements for this Nationwide Permit because of the likelihood that submerged vessels may be historic properties.

Nationwide Permit 23. Approved Categorical Exclusions

This Nationwide Permit authorizes activities undertaken, assisted, authorized, regulated, funded, or financed, in whole or in part, by another Federal agency or department where:

1. That agency or department has determined, pursuant to the Council on Environmental Quality's implementing regulations for the National Environmental Policy Act (40 CFR part 1500 et seq.), that the activity is categorically excluded from environmental documentation, because it is included within a category of actions, which neither individually nor cumulatively have a significant effect on the human environment; and
2. The Office of the Chief of Engineers (Attn: CECW–CO) has concurred with that agency's or department's determination that the activity is categorically excluded and approved the activity for authorization under Nationwide Permit 23.

The Office of the Chief of Engineers may require additional conditions, including pre-construction notification, for authorization of an agency's categorical exclusions under this Nationwide Permit.

Notification: Certain categorical exclusions approved for authorization under this Nationwide Permit require the permittee to submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31). The activities that require a PCN are listed in the appropriate Regulatory Guidance Letters (Rivers and Harbors Act section 10 and CWA section 404).

The agency or department may submit an application for an activity believed to be categorically excluded to the Office of the Chief of Engineers (Attn: CECW–CO). The Office of the Chief of Engineers will solicit public comment before approving authorization under this Nationwide Permit of any agency's activity. As of the date of issuance of this Nationwide Permit, agencies with approved categorical exclusions are the Bureau of Reclamation, the Federal Highway Administration, and the U.S. Coast Guard. Activities approved for authorization under this Nationwide Permit as of the date of this notice are found in the Corps Regulatory Guidance Letter 05–07, which is available at: http://www.usace.army.mil/Portals/2/docs/civilworks/RGLS/rgl05-07.pdf. Any future approved categorical exclusions will be announced in Regulatory Guidance Letters and posted on this same web site.

Nationwide Permit 24. Indian Tribe or State Administered Section 404 Programs

This Nationwide Permit authorizes any activity permitted by a State or Indian Tribe administering its own CWA section 404 permit program pursuant to 33 U.S.C. 1344(g)–(l) is permitted pursuant to section 10 of the Rivers and Harbors Act of 1899).

Note 1: As of the date of the promulgation of this Nationwide Permit, only New Jersey and Michigan administer their own CWA section 404 permit programs.

Note 2: Those activities that do not involve an Indian Tribe or State CWA section 404 permit are not included in this Nationwide Permit, but certain structures will be exempted by section 154 of Public Law 94–587, 90 Stat. 2917 (33 U.S.C. 591; see 33 CFR 322.4(b)).

Nationwide Permit 25. Structural Discharges

This Nationwide Permit authorizes discharges of material such as concrete, sand, rock, etc., into tightly sealed forms or cells where the material will be used as a structural member for standard pile supported structures, such as bridges, transmission line footings, and walkways, or for general navigation, such as mooring cells, including the excavation of bottom material from within the form prior to the discharge of concrete, sand, rock, etc. This Nationwide Permit does not authorize filled structural members that would support buildings, building pads, homes, house pads, parking areas, storage areas and other such structures. The structure itself may require a Rivers and Harbors Act section 10 permit if located in navigable waters of the United States

Nationwide Permit 26. [Reserved]

Nationwide Permit 27. Aquatic Habitat Restoration, Establishment, and Enhancement Activities

This Nationwide Permit authorizes activities in waters of the United States associated with the restoration, enhancement, and establishment of tidal and non-tidal wetlands and riparian areas and the restoration and enhancement of nontidal streams and other non-tidal open waters, provided those activities result in net increases in aquatic resource functions and services. To the extent that a Corps permit is required, activities authorized by this Nationwide Permit include, but are not limited to:

The removal of accumulated sediments; the installation, removal, and maintenance of small water control structures, dikes, and berms; the installation of current deflectors; the enhancement, restoration, or establishment of riffle and pool stream structure; the placement of in-stream habitat structures; modifications of the stream bed and/or banks to restore or establish stream meanders; the backfilling of artificial channels and drainage ditches; the removal of existing drainage structures; the construction of small nesting islands; the construction of open water areas; the construction of oyster habitat over unvegetated bottom in tidal waters; shellfish seeding; activities needed to reestablish vegetation, including plowing or disking for seed bed preparation and the planting of appropriate wetland species; mechanized land clearing to remove non-native invasive, exotic, or nuisance vegetation; the removal of small dams; and other related activities. Only native plant species should be planted at the site.

This Nationwide Permit authorizes the relocation of non-tidal waters, including non-tidal wetlands and streams, on the project site provided there are net increases in aquatic resource functions and services. Except for the relocation of non-tidal waters on the project site, this Nationwide Permit does not authorize the conversion of a stream or natural wetlands to another aquatic habitat type (e.g., stream to wetland or vice versa) or uplands. Changes in wetland plant communities that occur when wetland hydrology is more fully restored during wetland rehabilitation activities are not considered conversion to another aquatic habitat type. This Nationwide Permit does not authorize stream channelization. This Nationwide Permit does not authorize the relocation of tidal waters or the conversion of tidal waters, including tidal wetlands, to other aquatic uses, such as the conversion of tidal wetlands into open water impoundments.

Compensatory mitigation is not required for activities authorized by this Nationwide Permit since these activities must result in net increases in aquatic resource functions and services.

Reversion. For enhancement, restoration, and establishment activities conducted:

1. in accordance with the terms and conditions of a binding stream or wetland enhancement or restoration agreement, or a wetland establishment agreement, between the landowner and the U.S. Fish and Wildlife Service, the Natural Resources Conservation Service, the Farm Service Agency, NMFS, the National Ocean Service, U.S. Forest Service, or their designated State cooperating agencies;
2. as voluntary wetland restoration, enhancement, and establishment actions documented by the Natural Resources Conservation Service or U.S. Department of Agriculture Technical Service Provider pursuant to Natural Resources Conservation Service Field Office Technical Guide standards; or
3. on reclaimed surface coal mine lands, in accordance with a Surface Mining Control and Reclamation Act permit issued by the Office of Surface Mining Reclamation and Enforcement (OSMRE) or the applicable State agency.

This Nationwide Permit also authorizes any future discharge of dredged or fill material associated with the reversion of the area to its documented prior condition and use (i.e., prior to the restoration, enhancement, or establishment activities).

The reversion must occur within five years after expiration of a limited term wetland restoration or establishment agreement or permit, and is authorized in these circumstances even if the discharge occurs after this Nationwide Permit expires. The five-year reversion limit does not apply to agreements without time limits reached between the landowner and the U.S. Fish and Wildlife Service, Natural Resources Conservation Service, Farm Service Agency, NMFS, National Ocean Service, U.S. Forest Service, or an appropriate State cooperating agency. This Nationwide Permit also authorizes discharges of dredged or fill material in waters of the United States for the reversion of wetlands that were restored, enhanced, or established on prior-converted cropland or on uplands, in accordance with a binding agreement between the landowner and Natural Resources Conservation Service, Farm Service Agency, U.S. Fish and Wildlife Service, or their designated State cooperating agencies (even though the restoration, enhancement, or establishment activity did not require a CWA section 404 permit). The prior condition will be documented in the original agreement or permit, and the determination of return to prior conditions will be made by the Federal agency or appropriate State agency executing the agreement or permit. Before conducting any reversion activity, the permittee or the appropriate Federal or State agency must notify the District Engineer and include the documentation of the prior condition. Once an area has reverted to its prior physical condition, it will be subject to whatever the Corps' Regulatory requirements are applicable to that type of land at the time. The requirement that the activity result in a net increase in aquatic resource functions and services does not apply to reversion activities meeting the above conditions. Except for the activities described above, this Nationwide Permit does not authorize any future discharge of dredged or fill material associated with the reversion of the area to its prior condition. In such cases, a separate permit would be required for any reversion.

Reporting: For those activities that do not require PCN, the permittee must submit to the District Engineer a copy of: (1) The binding stream enhancement or restoration agreement or wetland enhancement, restoration, or establishment agreement, or a project description, including project plans and location map; (2) documentation from the Natural Resources Conservation Service or U.S. Department of Agriculture Technical Service Provider for voluntary stream enhancement or restoration action or wetland restoration, enhancement, or establishment action; or (3) the SMCRA [Surface Mining Control and Reclamation Act of 1977] permit issued by Office of Surface Mining Reclamation and Enforcement (OSMRE) or the applicable State agency. The report must also include information on baseline ecological conditions on the project site, such as delineation of wetlands, streams and/or other aquatic habitats. These documents must be submitted to the District Engineer at least 30 days prior to commencing activities in waters of the United States authorized by this Nationwide Permit in waters of the United States.

Notification. The permittee must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31), except for the following activities:

1. Activities conducted on non- Federal public lands and private lands, in accordance with the terms and conditions of a binding stream enhancement or restoration agreement or wetland enhancement, restoration, or establishment agreement between the landowner and the U.S. Fish and Wildlife Service, Natural Resources Conservation Service, Farm Service Agency, NMFS, National Ocean Service, U.S. Forest Service or their designated State cooperating agencies;
2. Voluntary stream or wetland restoration or enhancement action, or wetland establishment action, documented by the Natural Resources Conservation Service or U.S. Department of Agriculture Technical Service Provider pursuant to Natural Resources Conservation Service Field Office Technical Guide standards; or
3. The reclamation of surface coalmine lands, in accordance with an SMCRA permit issued by the OSMRE or the applicable State agency. However, the permittee must submit a copy of the appropriate documentation (Rivers and Harbors Act section 10 and CWA section 404)

Note: This Nationwide Permit can be used to authorize compensatory mitigation projects, including mitigation banks and in-lieu fee projects. However, this Nationwide Permit does not authorize the reversion of an area used for a compensatory mitigation project to its prior condition, since compensatory mitigation is generally intended to be permanent.

Nationwide Permit 28. Modifications of Existing Marinas

This Nationwide Permit authorizes 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 Nationwide Permit (Section 10).

Nationwide Permit 29. Residential Developments

This Nationwide Permit authorizes discharges of dredged or fill material into non-tidal waters of the United States for the construction or expansion of a single residence, a multiple unit residential development, or a residential subdivision. This Nationwide Permit authorizes the construction of building foundations and building pads and attendant features that are necessary for the use of the residence or residential development. Attendant features may include but are not limited to roads, parking lots, garages, yards, utility lines, storm water management facilities, septic fields and recreation facilities such as playgrounds, playing fields and golf courses (provided the golf course is an integral part of the residential development).

The discharge must not cause the loss of greater than 1⁄2-acre of non-tidal waters of the United States, including the loss of no more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the District Engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in minimal adverse effects. This Nationwide Permit does not authorize discharges into nontidal wetlands adjacent to tidal waters.

Subdivisions: For residential subdivisions, the aggregate total loss of waters of United States authorized by this Nationwide Permit cannot exceed 1⁄2-acre. This includes any loss of waters of the United States associated with development of individual subdivision lots.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31 and Rivers and Harbors Act section 10 and CWA section 404).

Nationwide Permit 30: Moist Soil Management for Wildlife

Discharges of dredged or fill material into non-tidal waters of the United States and maintenance activities that are associated with moist soil management for wildlife for the purpose of continuing ongoing, site specific, wildlife management activities where soil manipulation is used to manage habitat and feeding areas for wildlife. Such activities include, but are not limited to, plowing or disking to impede succession, preparing seed beds, or establishing fire breaks. Sufficient riparian areas must be maintained adjacent to all open water bodies, including streams to preclude water quality degradation due to erosion and sedimentation. This Nationwide Permit does not authorize the construction of new dikes, roads, water control structures, or similar features associated with the management areas. The activity must not result in a net loss of aquatic resource functions and services. This Nationwide Permit does not authorize the conversion of wetlands to uplands, impoundments or other open water bodies (CWA section 404).

Note: The repair, maintenance or replacement of existing water control structures or the repair or maintenance of dikes may be authorized by Nationwide Permit 3. Some such activities may qualify for an exemption under CWA section 404(f) (see 33 CFR 323.4).

Nationwide Permit 31. Maintenance of Existing Flood Control Facilities

This Nationwide Permit authorizes discharges of dredged or fill material resulting from activities associated with the maintenance of existing flood control facilities, including debris basins, retention/ detention basins, levees, and channels that: (i) Were previously authorized by the Corps by individual permit, general permit, or 33 CFR 330.3, or did not require a permit at the time they were constructed; or (ii) were constructed by the Corps and transferred to a non-Federal sponsor for operation and maintenance. Activities authorized by this Nationwide Permit are limited to those resulting from maintenance activities that are conducted within the "maintenance baseline," as described in the definition below. Discharges of dredged or fill materials associated with maintenance activities in flood control facilities in any watercourse that have previously been determined to be within the maintenance baseline are authorized under this Nationwide Permit.

To the extent that a Corps permit is required, this Nationwide Permit authorizes the removal of vegetation from levees associated with the flood control project. This Nationwide Permit does not authorize the removal of sediment and associated vegetation from natural water courses except when these activities have been included in the maintenance baseline. All dredged material must be placed in an upland site or an authorized disposal site in waters of the United States, and proper siltation controls must be used.

- Maintenance Baseline: The maintenance baseline is a description of the physical characteristics (e.g., depth, width, length, location, configuration or design flood capacity, etc.) of a flood control project within which maintenance activities are normally authorized by Nationwide Permit 31, subject to any case-specific conditions required by the District Engineer. The District Engineer will approve the maintenance baseline based on the approved or constructed capacity of the flood control facility, whichever is smaller, including any areas where there are no constructed channels but which are part of the facility. The prospective permittee will provide documentation of the physical characteristics of the flood control facility (which will normally consist of as-built or approved drawings) and documentation of the approved and constructed design capacities of the flood control facility. If no evidence of the constructed capacity exists, the approved capacity will be used. The documentation will also include best management practices to ensure that the impacts to the aquatic environment are minimal, especially in maintenance areas where there are no constructed channels. (The Corps may request maintenance records in areas where there has not been recent maintenance.) Revocation or modification of the final determination of the maintenance baseline can only be done in accordance with 33 CFR 330.5. Except in emergencies as described below, this Nationwide Permit cannot be used until the District Engineer approves the maintenance baseline and determines the need for mitigation and any regional or activity-specific conditions. Once determined, the maintenance baseline will remain valid for any subsequent reissuance of this Nationwide Permit. This Nationwide Permit does not authorize maintenance of a flood control facility that has been abandoned. A flood control facility will be considered abandoned if it has operated at a significantly reduced capacity without needed maintenance being accomplished in a timely manner.
- Mitigation: The District Engineer will determine any required mitigation onetime only for impacts associated with maintenance work at the same time that the maintenance baseline is approved. Such one-time mitigation will be required when necessary to ensure that adverse environmental impacts are no more than minimal, both individually and cumulatively. Such mitigation will only be required once for any specific reach of a flood control project. However, if one-time mitigation is required for impacts associated with maintenance activities, the District Engineer will not delay needed maintenance, provided the District Engineer and the permittee establish a schedule for identification,

approval, development, construction and completion of any such required mitigation. Once the one-time mitigation described above has been completed, or a determination made that mitigation is not required, no further mitigation will be required for maintenance activities within the maintenance baseline. In determining appropriate mitigation, the District Engineer will give special consideration to natural water courses that have been included in the maintenance baseline and require compensatory mitigation and/or best management practices as appropriate.

- Emergency Situations: In emergency situations, this Nationwide Permit may be used to authorize maintenance activities in flood control facilities for which no maintenance baseline has been approved. Emergency situations are those that would result in an unacceptable hazard to life, a significant loss of property or an immediate, unforeseen, and significant economic hardship if action is not taken before a maintenance baseline can be approved. In such situations, the determination of mitigation requirements, if any, may be deferred until the emergency has been resolved. Once the emergency has ended, a maintenance baseline must be established expeditiously, and mitigation, including mitigation for maintenance conducted during the emergency, must be required as appropriate.

Notification: The permittee must submit a PCN to the District Engineer before any maintenance work is conducted (see General Condition 31). The PCN may be for activity-specific maintenance or for maintenance of the entire flood control facility by submitting a five-year (or less) maintenance plan. The PCN must include a description of the maintenance baseline and the dredged material disposal site (Rivers and Harbors Act section 10 and CWA section 404)

Nationwide Permit 32. Completed Enforcement Actions

This Nationwide Permit authorizes any structure, work, or discharge of dredged or fill material remaining in place or undertaken for mitigation, restoration or environmental benefit in compliance with either:

- The terms of a final written the Corps non-judicial settlement agreement resolving a violation of CWA section 404 and/or section 10 of the Rivers and Harbors Act of 1899; or the terms of an EPA 309(a) order on consent resolving a violation of CWA section 404, provided that:
    - The unauthorized activity affected no more than 5 acres of non-tidal waters or 1 acre of tidal waters;
    - The settlement agreement provides for environmental benefits, to an equal or greater degree, than the environmental detriments caused by the unauthorized activity that is authorized by this Nationwide Permit; and
    - The District Engineer issues a verification letter authorizing the activity subject to the terms and conditions of this Nationwide Permit and the settlement agreement, including a specified completion date; or
- The terms of a final Federal court decision, consent decree, or settlement agreement resulting from an enforcement action brought by the United States under CWA section 404 and/or section 10 of the Rivers and Harbors Act of 1899; or

- The terms of a final court decision, consent decree, settlement agreement, or non-judicial settlement agreement resulting from a natural resource damage claim brought by a trustee or trustees for natural resources (as defined by the National Contingency Plan at 40 CFR subpart G) under CWA section 311, section 107 of the Comprehensive Environmental Response, Compensation and Liability Act, section 312 of the National Marine Sanctuaries Act, section 1002 of the Oil Pollution Act of 1990, or the Park System Resource Protection Act at 16 U.S.C. 19jj, to the extent that a Corps permit is required.

Compliance is a condition of the Nationwide Permit itself. Any authorization under this Nationwide Permit is automatically revoked if the permittee does not comply with the terms of this Nationwide Permit or the terms of the court decision, consent decree or judicial/non-judicial settlement agreement. This Nationwide Permit does not apply to any activities occurring after the date of the decision, decree or agreement that are not for the purpose of mitigation, restoration or environmental benefit. Before reaching any settlement agreement, the Corps will ensure compliance with the provisions of 33 CFR part 326 and 33 CFR 330.6(d)(2) and (e) (Rivers and Harbors Act section 10 and CWA section 404)

Nationwide Permit 33. Temporary Construction, Access, and Dewatering

This Nationwide Permit authorizes temporary structures, work and discharges, including cofferdams, necessary for construction activities or access fills or dewatering of construction sites, provided that the associated primary activity is authorized by the Corps or the U.S. Coast Guard. This Nationwide Permit also authorizes temporary structures, work and discharges, including cofferdams, necessary for construction activities not otherwise subject to the Corps or U.S. Coast Guard permit requirements. Appropriate measures must be taken to maintain near normal downstream flows and to minimize flooding. Fill must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. The use of dredged material may be allowed if the District Engineer determines that it will not cause more than minimal adverse effects on aquatic resources. Following completion of construction, temporary fill must be entirely removed to upland areas, dredged material must be returned to its original location and the affected areas must be restored to pre-construction elevations. The affected areas must also be revegetated, as appropriate. This permit does not authorize the use of cofferdams to dewater wetlands or other aquatic areas to change their use. Structures left in place after construction is completed require a separate Rivers and Harbors Act section 10 permit if located in navigable waters of the United States (see 33 CFR part 322).

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31). The PCN must include a restoration plan showing how all temporary fills and structures will be removed and the area restored to pre-project conditions (Rivers and Harbors Act section 10 and CWA section 404)

Nationwide Permit 34. Cranberry Production Activities

This Nationwide Permit authorizes discharges of dredged or fill material for dikes, berms, pumps, water control structures or leveling of cranberry beds associated with expansion, enhancement, or modification activities at existing cranberry production operations. The cumulative total acreage of disturbance per cranberry production operation, including but not limited to, filling, flooding, ditching or clearing, must not exceed 10 acres of waters of the United States, including wetlands. The activity must not result in a net loss of wetland acreage. This Nationwide Permit does not authorize any discharge of dredged or fill material related to other cranberry production activities such as warehouses, processing facilities or parking areas. For the purposes of this Nationwide Permit, the cumulative total of 10 acres will be measured over the period that this Nationwide Permit is valid.

Notification: The permittee must submit a PCN to the District Engineer once during the period that this Nationwide Permit is valid, and the Nationwide Permit will then authorize discharges of dredge or fill material at an existing operation for the permit term, provided the 10-acre limit is not exceeded (see General Condition 31 and section 404).

Nationwide Permit 35. Maintenance Dredging of Existing Basins

This Nationwide Permit authorizes 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 upland site and proper siltation controls are used. (section 10)

Nationwide Permit 36. Boat Ramps

This Nationwide Permit authorizes activities required for the construction of boat ramps, provided the activity meets all of the following criteria:

- 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;
- 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;
- The base material is crushed stone, gravel or other suitable material;
- 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,
- No material is placed in special aquatic sites, including wetlands.

The use of unsuitable material that is structurally unstable is not authorized. If dredging in navigable waters of the United States is necessary to provide access to the boat ramp, the dredging must be authorized by another Nationwide Permit, a regional general permit or an individual permit.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity if: (1) The discharge into waters of the United States exceeds 50 cubic yards, or (2) the boat ramp exceeds 20 feet in width (see General Condition 31 and Rivers and Harbors Act section 10 and CWA section 404)

Nationwide Permit 37. Emergency Watershed Protection and Rehabilitation

This Nationwide Permit authorizes work done by or funded by:

- The Natural Resources Conservation Service for a situation requiring immediate action under its emergency Watershed Protection Program (7 CFR part 624);
- The U.S. Forest Service under its Burned-Area Emergency Rehabilitation Handbook (FSH 2509.13);
- The Department of the Interior for wildland fire management burned area emergency stabilization and rehabilitation (Department of the Interior Manual part 620, Ch. 3);
- The OSMRE, or States with approved programs, for abandoned mine land reclamation activities under Title IV of the Surface Mining Control and Reclamation Act (30 CFR Subchapter R), where the activity does not involve coal extraction; or
- The Farm Service Agency under its Emergency Conservation Program (7 CFR part 701).

In general, the prospective permittee should wait until the District Engineer issues a Nationwide Permit verification or 45 calendar days have passed before proceeding with the watershed protection and rehabilitation activity. However, in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur, the emergency watershed protection and rehabilitation activity may proceed immediately and the District Engineer will consider the information in the PCN and any comments received as a result of agency coordination to decide whether the Nationwide Permit 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

Notification: Except in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur, the permittee must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31) (Rivers and Harbors Act section 10 and CWA section 404)

Nationwide Permit 38. Cleanup of Hazardous and Toxic Waste

This Nationwide Permit authorizes specific activities required to effect the containment, stabilization or removal of hazardous or toxic waste materials that are performed, ordered or sponsored by a government agency with established legal or regulatory authority. Court ordered remedial action plans or related settlements are also authorized by this Nationwide Permit. This Nationwide Permit does not authorize the establishment of new disposal sites or the expansion of existing sites used for the disposal of hazardous or toxic waste.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31 and Rivers and Harbors Act section 10 and CWA section 404).

Note: Activities undertaken entirely on a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site by authority of CERCLA as approved or required by EPA, are not required to obtain permits under CWA section 404 or section 10 of the Rivers and Harbors Act.

Nationwide Permit 39. Commercial and Institutional Developments

This Nationwide Permit authorizes discharges of dredged or fill material into non-tidal waters of the United States for the construction or expansion of commercial and institutional building foundations and building pads and attendant features that are necessary for the use and maintenance of the structures. Attendant features may include, but are not limited to, roads, parking lots, garages, yards, utility lines, storm water management facilities and recreation facilities such as playgrounds and playing fields. Examples of commercial developments include retail stores, industrial facilities, restaurants, business parks and shopping centers. Examples of institutional developments include schools, fire stations, government office buildings, judicial buildings, public works buildings, libraries, hospitals and places of worship. The construction of new golf courses and new ski areas is not authorized by this Nationwide Permit.

The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States, including the loss of no more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the District Engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in minimal adverse effects. This Nationwide Permit does not authorize discharges into non-tidal wetlands adjacent to tidal waters.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31 and Rivers and Harbors Act section 10 and CWA section 404).

Note: For any activity that involves the construction of a wind energy generating structure, solar tower, or overhead transmission line, a copy of the PCN and Nationwide Permit verification will be provided to the Department of Defense Siting Clearinghouse, which will evaluate potential effects on military activities.

Nationwide Permit 40. Agricultural Activities

This Nationwide Permit authorizes discharges of dredged or fill material into non-tidal waters of the United States for agricultural activities, including the construction of building pads for farm buildings. Authorized activities include the installation, placement, or construction of drainage tiles, ditches, or levees; mechanized land clearing; land leveling; the relocation of existing serviceable drainage ditches constructed in waters of the United States; and similar activities.

This Nationwide Permit also authorizes the construction of farm ponds in non-tidal waters of the United States, excluding perennial streams, provided the farm pond is used solely for agricultural purposes. This Nationwide Permit does not authorize the construction of aquaculture ponds.

This Nationwide Permit also authorizes discharges of dredged or fill material into non-tidal waters of the United States to relocate existing serviceable drainage ditches constructed in non-tidal streams.

The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States, including the loss of no more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the District Engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in minimal adverse effects. This Nationwide Permit does not authorize discharges into non-tidal wetlands adjacent to tidal waters.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31 and CWA section 404).

Note: Some discharges for agricultural activities may qualify for an exemption under CWA section 404(f) (see 33 CFR 323.4). This Nationwide Permit authorizes the construction of farm ponds that do not qualify for the Clean Water Act section 404(f)(1)(C) exemption because of the recapture provision at section 404(f)(2).

Nationwide Permit 41. Reshaping Existing Drainage Ditches

This Nationwide Permit authorizes discharges of dredged or fill material into non-tidal waters of the United States, excluding non-tidal wetlands adjacent to tidal waters, to modify the cross-sectional configuration of currently serviceable drainage ditches constructed in waters of the United States, for the purpose of improving water quality by regrading the drainage ditch with gentler slopes, which can reduce erosion, increase growth of vegetation, and increase uptake of nutrients and other substances by vegetation. The reshaping of the ditch cannot increase drainage capacity beyond the original as-built capacity nor can it expand the area drained by the ditch as originally constructed (i.e., the capacity of the ditch must be the same as originally constructed and it cannot drain additional wetlands or other waters of the United States). Compensatory mitigation is not required because the work is designed to improve water quality.

This Nationwide Permit does not authorize the relocation of drainage ditches constructed in waters of the United States; the location of the centerline of the reshaped drainage ditch must be approximately the same as the location of the centerline of the original drainage ditch. This Nationwide Permit does not authorize stream channelization or stream relocation projects.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity, if more than 500 linear feet of drainage ditch will be reshaped (see General Condition 31 and section 404).

Nationwide Permit 42. Recreational Facilities

This Nationwide Permit authorizes discharges of dredged or fill material into non-tidal waters of the United States for the construction or expansion of recreational facilities. Examples of recreational facilities that may be authorized by this Nationwide Permit include playing fields (e.g., football fields, baseball fields), basketball courts, tennis courts, hiking trails, bike paths, golf courses, ski areas, horse paths, nature centers, and campgrounds (excluding recreational vehicle parks). This Nationwide Permit also authorizes the construction or expansion of small support facilities, such as maintenance and storage buildings and stables that are directly related to the recreational activity, but it does not authorize the construction of hotels, restaurants, racetracks, stadiums, arenas or similar facilities.

The discharge must not cause the loss of greater than 1⁄2-acre of non-tidal waters of the United States, including the loss of no more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the District Engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in minimal adverse effects. This Nationwide Permit does not authorize discharges into nontidal wetlands adjacent to tidal waters.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31 and section 404).

Nationwide Permit 43. Stormwater Management Facilities

This Nationwide Permit authorizes discharges of dredged or fill material into non-tidal waters of the United States for the construction of stormwater management facilities, including stormwater detention basins and retention basins and other stormwater management facilities; the construction of water control structures, outfall structures and emergency spillways; and the construction of low impact development integrated management features such as bioretention facilities (e.g., rain gardens), vegetated filter strips, grassed swales, and infiltration trenches. This Nationwide Permit also authorizes, to the extent that a CWA section 404 permit is required, discharges of dredged or fill material into non-tidal waters of the United States for the maintenance of stormwater management facilities. Note that stormwater management facilities that are determined to be waste treatment systems under 33 CFR 328.3(a)(8) are not waters of the United States, and maintenance of these waste treatment systems generally does not require a CWA section 404 permit.

The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States, including the loss of no more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the District Engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in minimal adverse effects. This Nationwide Permit does not authorize discharges into non-tidal wetlands adjacent to tidal waters. This Nationwide Permit does not authorize discharges of dredged or fill material for the construction of new stormwater management facilities in perennial streams.

Notification: For the construction of new stormwater management facilities, or the expansion of existing stormwater management facilities, the permittee must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31). Maintenance activities do not require a PCN if they are limited to restoring the original design capacities of the stormwater management facility.

Nationwide Permit 44. Mining Activities

This Nationwide Permit authorizes discharges of dredged or fill material into non-tidal waters of the United States for mining activities, except for coal mining activities. The discharge must not cause the loss of greater than 1⁄2-acre of nontidal waters of the United States, including the loss of no more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the District Engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in minimal adverse effects. This Nationwide Permit does not authorize discharges into non-tidal wetlands adjacent to tidal waters.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31). If reclamation is required by other statutes, then a copy of the reclamation plan must be submitted with the PCN (Rivers and Harbors Act section 10 and CWA section 404).

Nationwide Permit 45. Repair of Uplands Damaged by Discrete Events

This Nationwide Permit authorizes discharges of dredged or fill material, including dredging or excavation, into all waters of the United States for activities associated with the restoration of upland areas damaged by storms, floods or other discrete events. This Nationwide Permit authorizes bank stabilization to protect the restored uplands. The restoration of the damaged areas, including any bank stabilization, must not exceed the contours, or ordinary high water mark, that existed before the damage occurred. The District Engineer retains the right to determine the extent of the pre-existing conditions and the extent of any restoration work authorized by this Nationwide Permit. The work must commence, or be under contract to commence, within two years of the date of damage, unless this condition is waived in writing by the District Engineer. This Nationwide Permit cannot be used to reclaim lands lost to normal erosion processes over an extended period. This Nationwide Permit does not authorize beach restoration.

Minor dredging is limited to the amount necessary to restore the damaged upland area and should not significantly alter the pre-existing bottom contours of the waterbody.

Notification: The permittee must submit a PCN to the District Engineer (see General Condition 31) within 12-months of the date of the damage. The PCN should include documentation, such as a recent topographic survey or photographs, to justify the extent of the proposed restoration (Rivers and Harbors Act section 10 and CWA section 404)

Note: The uplands themselves that are lost as a result of a storm, flood or other discrete event can be replaced without a CWA section 404 permit, if the uplands are restored to the ordinary high water mark (in non-tidal waters) or high tide line (in tidal waters) (see also 33 CFR 328.5). This Nationwide Permit authorizes discharges of dredged or fill material into waters of the United States associated with the restoration of uplands.

Nationwide Permit 46. Discharges in Ditches

This Nationwide Permit authorizes discharges of dredged or fill material into non-tidal ditches that are: (1) Constructed in uplands (2) receive water from an area determined to be a water of the United States prior to the construction of the ditch (3) divert water to an area determined to be a water of the United States prior to the construction of the ditch, and (4) are determined to be waters of the United States. The discharge must not cause the loss of greater than one acre of waters of the United States.

This Nationwide Permit does not authorize discharges of dredged or fill material into ditches constructed in streams or other waters of the United States, or in streams that have been relocated in uplands. This Nationwide Permit does not authorize discharges of dredged or fill material that increase the capacity of the ditch and drain those areas determined to be waters of the United States prior to construction of the ditch.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31 and section 404).

Nationwide Permit 47. [Reserved]

Nationwide Permit 48. Existing Commercial Shellfish Aquaculture Activities

This Nationwide Permit authorizes discharges of dredged or fill material in waters of the United States or structures or work in navigable waters of the United States necessary for commercial shellfish aquaculture operations in authorized project areas. For the purposes of this Nationwide Permit, the project area is the area in which the operator is currently authorized to conduct commercial shellfish aquaculture activities, as identified through a lease or permit issued by an appropriate State or local government agency, a treaty, or any other easement, lease, deed, or contract which establishes an enforceable property interest for the operator. This Nationwide Permit authorizes the installation of buoys, floats, racks, trays, nets, lines, tubes, containers and other structures into navigable waters of the United States. This Nationwide Permit also authorizes discharges of dredged or fill material into waters of the United States necessary for shellfish seeding, rearing, cultivating, transplanting, and harvesting activities. Rafts and other floating structures must be securely anchored and clearly marked. This Nationwide Permit does not authorize:

- The cultivation of a nonindigenous species unless that species has been previously cultivated in the waterbody;
- The cultivation of an aquatic nuisance species as defined in the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990; or,
- Attendant features such as docks, piers, boat ramps, stockpiles, or staging areas, or the deposition of shell material back into waters of the United States as waste.

This Nationwide Permit also authorizes commercial shellfish aquaculture activities in new project areas, provided the project proponent has obtained a valid authorization, such as a lease or permit issued by an appropriate State or local government agency, and those activities do not directly affect more than 1/2-acre of submerged aquatic vegetation beds.

Notification: The permittee must submit a PCN to the District Engineer if: (1) dredge harvesting, tilling, or harrowing is conducted in areas inhabited by submerged aquatic vegetation; (2) the activity will include a species not previously cultivated in the waterbody; (3) the activity involves a change from bottom culture to floating or suspended culture; or (4) the activity occurs in a new project area (see General Condition 31).

In addition to the information required by paragraph (b) of General Condition 31, the PCN must also include the following information: (1) a map showing the boundaries of the project area, with latitude and longitude coordinates for each corner of the project area; (2) the name(s) of the cultivated species; and (3) whether canopy predator nets are being used (Rivers and Harbors Act section 10 and CWA section 404)

Note 1: The permittee should notify the applicable U.S. Coast Guard office regarding the project.

Note 2: To prevent introduction of aquatic nuisance species, no material that has been taken from a different waterbody may be reused in the current project area, unless it has been treated in accordance with the applicable regional aquatic nuisance species management plan.

Note 3: The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 defines “aquatic nuisance species” as “a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters.”

Nationwide Permit 49. Coal Remining Activities

This Nationwide Permit authorizes discharges of dredged or fill material into non-tidal waters of the United States associated with the remining and reclamation of lands that were previously mined for coal. The activities must already be authorized, or they must currently be in process as part of an integrated permit processing procedure, by the OSMRE, or by States with approved programs under Title IV or Title V of the Surface Mining Control and Reclamation Act (SMCRA) of 1977. Areas previously mined include reclaimed mine sites, abandoned mine land areas, or lands under bond forfeiture contracts.

As part of the project, the permittee may conduct new coal mining activities in conjunction with the remining activities when he or she clearly demonstrates to the District Engineer that the overall mining plan will result in a net increase in aquatic resource functions. The Corps will consider the SMCRA agency's decision regarding the amount of currently undisturbed adjacent lands needed to facilitate the remining and reclamation of the previously mined area. The total area disturbed by new mining must not exceed 40% of the total acreage covered by both the remined area and the additional area necessary to carry out the reclamation of the previously mined area.

Notification: The permittee must submit a PCN and a document describing how the overall mining plan will result in a net increase in aquatic resource functions to the District Engineer and receive written authorization prior to commencing the activity (see General Condition 31 and Rivers and Harbors Act section 10 and CWA section 404).

Nationwide Permit 50. Underground Coal Mining Activities

This Nationwide Permit authorizes discharges of dredged or fill material into non-tidal waters of the United States associated with underground coal mining and reclamation operations provided the activities are authorized, or are currently being processed as part of an integrated permit processing procedure, by the OSMRE, or by States with approved programs under Title V of the Surface Mining Control and Reclamation Act of 1977.

The discharge must not cause the loss of greater than 1⁄2-acre of non-tidal waters of the United States, including the loss of no more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the District Engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in minimal adverse effects. This Nationwide Permit does not authorize discharges into nontidal wetlands adjacent to tidal waters. This Nationwide Permit does not authorize coal preparation and processing activities outside of the mine site.

Notification: The permittee must submit a PCN to the District Engineer and receive written authorization prior to commencing the activity (see General Condition 31). If reclamation is required by other statutes, then a copy of the reclamation plan must be submitted with the PCN (Rivers and Harbors Act section 10 and CWA section 404)

Note: Coal preparation and processing activities outside of the mine site may be authorized by Nationwide Permit 21.

Nationwide Permit 51. Land-Based Renewable Energy Generation Facilities

This Nationwide Permit authorizes discharges of dredged or fill material into non-tidal waters of the United States for the construction, expansion, or modification of land-based renewable energy production facilities, including attendant features. Such facilities include infrastructure to collect solar (concentrating solar power and photovoltaic), wind, biomass or geothermal energy. Attendant features may include, but are not limited to roads, parking lots and stormwater management facilities within the land-based renewable energy generation facility.

The discharge must not cause the loss of greater than1/2-acre of non-tidal waters of the United States, including the loss of no more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the District Engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in minimal adverse effects. This permit does not authorize discharges into non-tidal wetlands adjacent to tidal waters.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31 and Rivers and Harbors Act section 10 and CWA section 404).

Note 1: Utility lines constructed to transfer the energy from the land-based renewable generation facility to a distribution system, regional grid, or other facility are generally considered to be linear projects and each separate and distant crossing of a waterbody is eligible for treatment as a separate single and complete linear project. Those utility lines may be authorized by Nationwide Permit 12 or another Department of the Army authorization. If the only activities associated with the construction, expansion, or modification of a land-based renewable energy generation facility that require Department of the Army authorization are discharges of dredged or fill material into waters of the United States to construct, maintain, repair, and/or remove utility lines, then Nationwide Permit 12 shall be used if those activities meet the terms and conditions of Nationwide Permit 12, including any applicable Regional Conditions and any case-specific conditions imposed by the District Engineer.

Note 2: For any activity that involves the construction of a wind energy generating structure, solar tower, or overhead transmission line, a copy of the PCN and Nationwide Permit verification will be provided to the Department of Defense Siting Clearinghouse, which will evaluate potential effects on military activities.

Nationwide Permit 52. Water-Based Renewable Energy Generation Pilot Projects

This Nationwide Permit authorizes structures and work in navigable waters of the United States and discharges of dredged or fill material into waters of the United States for the construction, expansion, modification or removal of water-based wind or hydrokinetic renewable energy generation pilot projects and their attendant features. Attendant features may include, but are not limited to, land-based collection and distribution facilities, control facilities, roads, parking lots and stormwater management facilities.

For the purposes of this Nationwide Permit, the term “pilot project” means an experimental project where the renewable energy generation units will be monitored to collect information on their performance and environmental effects at the project site.

The discharge must not cause the loss of greater than 1/2-acre of waters of the United States, including the loss of no more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the District Engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in minimal adverse effects. The placement of a transmission line on the bed of a navigable water of the United States from the renewable energy generation unit(s) to a land-based collection and distribution facility is considered a structure under section 10 of the Rivers and Harbors Act of 1899 (see 33 CFR 322.2(b)), and the placement of the transmission line on the bed of a navigable water of the United States is not a loss of waters of the United States for the purposes of applying the 1/2-acre or 300 linear foot limits.

For each single and complete project, no more than 10 generation units (e.g., wind turbines or hydrokinetic devices) are authorized.

This Nationwide Permit does not authorize activities in coral reefs. Structures in an anchorage area established by the U.S. Coast Guard must comply with the requirements in 33 CFR part 322.5(l)(2). Structures may not be placed in established danger zones or restricted areas as designated in 33 CFR part 334, Federal navigation channels, shipping safety fairways or traffic separation schemes established by the U.S. Coast Guard (see 33 CFR part 322.5(l)(1)), or EPA or Corps designated open water dredged material disposal areas.

Upon completion of the pilot project, the generation units, transmission lines, and other structures or fills associated with the pilot project must be removed to the maximum extent practicable unless they are authorized by a separate Department of the Army authorization, such as another Nationwide Permit, an individual permit or a regional general permit. Completion of the pilot project will be identified as the date of expiration of FERC license, or the expiration date of the Nationwide Permit authorization if no FERC license is issued.

Notification: The permittee must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 31 and Rivers and Harbors Act section 10 and CWA section 404).

Note 1: Utility lines constructed to transfer the energy from the land-based collection facility to a distribution system, regional grid, or other facility are generally considered to be linear projects and each separate and distant crossing of a waterbody is eligible for treatment as a separate single and complete linear project. Those utility lines may be authorized by Nationwide Permit 12 or another Department of the Army authorization.

Note 2: An activity that is located on an existing locally or Federally maintained Corps project requires separate approval from the Chief of Engineers under 33 U.S.C. 408.

Note 3: If the pilot project, including any transmission lines, is placed in navigable waters of the United States (i.e., Rivers and Harbors Act section 10 waters) within the coastal United States, the Great Lakes, and United States territories, copies of the PCN and Nationwide Permit verification will be sent by the Corps to the National Ocean Service, for charting the generation units and associated transmission line(s) to protect navigation.

Note 4: For any activity that involves the construction of a wind energy generating structure, solar tower, or overhead transmission line, a copy of the PCN and Nationwide Permit verification will be provided to the Department of Defense Siting Clearinghouse, which will evaluate potential effects on military activities.

1.2 General Conditions of the Nationwide Permits

Division and District[5] engineers may modify the Nationwide Permits to help ensure that Nationwide Permits authorize only those activities that result in minimal individual and cumulative adverse effects on the aquatic environment and other public interest factors. Division Engineers may add Regional Conditions[6] to Nationwide Permits in cases where it is necessary to restrict or prohibit the use of a Nationwide Permit in a specific geographic area or class of waters. For example, Regional Conditions may restrict or prohibit the use of Nationwide Permits in areas known to be inhabited by endangered or threatened species. As another example, Regional Conditions may require a prospective permittee to notify the District Engineer before conducting a Nationwide Permit activity, to provide the District Engineer the opportunity to review the activity and determine whether ESA section 7 consultation is required.

District Engineers may add conditions, on a case-by-case basis, to a Nationwide Permit to ensure that a specific activity results in minimal individual and cumulative adverse effects on the environment. These case-specific conditions may include compensatory mitigation requirements, measures to protect endangered or threatened species or critical habitat, or other requirements. To qualify for Nationwide Permit authorization, the prospective permittee must comply with the following General Conditions, as appropriate, in addition to any regional or case-specific conditions imposed by the Division Engineer or District engineer. Prospective permittees should contact the appropriate Corps District office to determine if Regional Conditions have been imposed on a Nationwide Permit. Prospective permittees should also contact the appropriate the Corps District office to determine the status of CWA Section 401 water quality certification and/ or Coastal Zone Management Act consistency for a Nationwide Permit. Every person who may wish to obtain permit authorization under one or more Nationwide Permits, or who is currently relying on an existing or prior permit authorization under one or more Nationwide Permits, has been and is on notice that all of the provisions of 33 CFR 330.1 through 330.6 apply to every Nationwide Permit authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any Nationwide Permit authorization.

Text of the Nationwide Permit General Conditions

1. Navigation.

   No activity may cause more than a minimal adverse effect on navigation.

   a. Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittees' expense on authorized facilities in navigable waters of the United States.

[5] Divisions and District jurisdictions and hierarchy are described here: http://www.usace.army.mil/locations.aspx

[6] Regional Conditions can be found at the relevant Corps District webpage cited above.

b. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements.
No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species.

3. Spawning Areas.
Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas.
Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds.
No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by Nationwide Permits 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by Nationwide Permit 27.

6. Suitable Material.
No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see CWA section 307).

7. Water Supply Intakes.
No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects from Impoundments.
If the activity creates an impoundment of water, adverse effects to the aquatic system due

to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows.
To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows.

    a. The activity may alter the pre-construction course, condition, capacity and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains.
The activity must comply with applicable FEMA [Federal Emergency Management Agency]-approved State or local floodplain management requirements.

11. Equipment.
Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls.
Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

13. Removal of Temporary Fills.
Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance.
Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable Nationwide Permit General Conditions, as well as any activity-specific conditions added by the District Engineer to an Nationwide Permit authorization.

15. Single and Complete Project.
The activity must be a single and complete project. The same Nationwide Permit cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers.
No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the

system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

17. Tribal Rights.

No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. Endangered Species.

a. No activity is authorized under any Nationwide Permit which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any Nationwide Permit which "may affect" a listed species or critical habitat, unless section 7 consultation addressing the effects of the proposed activity has been completed.

b. Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the District Engineer with the appropriate documentation to demonstrate compliance with those requirements. The District Engineer will review the documentation and determine whether it is sufficient to address ESA compliance for the Nationwide Permit activity, or whether additional ESA consultation is necessary.

c. Non-Federal permittees must submit a pre-construction notification to the District Engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the District Engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed work or that utilize the designated critical habitat that might be affected by the proposed work. The District Engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

d. As a result of formal or informal consultation with the U.S. Fish and Wildlife Service or NMFS the District Engineer may add species-specific regional endangered species conditions to the Nationwide Permits.

e. Authorization of an activity by a Nationwide Permit does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (*e.g.,* an ESA section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. Fish and Wildlife Service or the NMFS, The Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act that actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

f. Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. Fish and Wildlife Service and NMFS or their world wide Web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http:// www.fisheries.noaa.gov/ respectively.

19. Migratory Birds and Bald and Golden Eagles.
The permittee is responsible for obtaining any "take" permits required under the U.S. Fish and Wildlife Service's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The permittee should contact the appropriate local office of the U.S. Fish and Wildlife Service to determine if such "take" permits are required for a particular activity.

20. Historic Properties.

a. In cases where the District Engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

b. Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act. Federal permittees must provide the District Engineer with the appropriate documentation to demonstrate compliance with those requirements. The District Engineer will review the documentation and determine whether it is sufficient to address NHPA section

404 compliance for the Nationwide Permit activity, or whether additional NHPA section 404 consultation is necessary.

c. Non-Federal permittees must submit a pre-construction notification to the District Engineer if the authorized activity may have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, District Engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The District Engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the District Engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties on which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the District Engineer either that the activity has no potential to cause effects or that consultation under section 106 of the NHPA has been completed.

d. The District Engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the District Engineer will notify the non-Federal applicant that he or she cannot begin work until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

e. Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h–2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on

Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO [State or Tribal Historic Preservation Officers], appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts.
If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the District Engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The District Engineer will initiate the Federal, Tribal and State coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters.
Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, National Estuarine Research Reserves, and State designated outstanding national resource waters. The District Engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a State as having particular environmental or ecological significance, such as State natural heritage sites. The District Engineer may also designate additional critical resource waters after notice and opportunity for public comment.

a. Discharges of dredged or fill material into waters of the United States are not authorized by Nationwide Permits 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

b. For Nationwide Permits 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with General Condition 31, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The District Engineer may authorize activities under these Nationwide Permits only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation.
The District Engineer will consider the following factors when determining appropriate

and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

a. The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

b. Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

c. Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the District Engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal, and provides a project-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the District Engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

    i. The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in minimal adverse effects on the aquatic environment.

    ii. Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

    iii. If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the District Engineer to make the decision on the Nationwide Permit verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) – (14) must be approved by the District Engineer before the permittee begins work in waters of the United States, unless the District Engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

    iv. If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

v. Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the Nationwide Permit authorization, instead of components of a compensatory mitigation plan.

d. For losses of streams or other open waters that require pre-construction notification, the District Engineer may require compensatory mitigation, such as stream restoration, to ensure that the activity results in minimal adverse effects on the aquatic environment.

e. Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the Nationwide Permits. For example, if a Nationwide Permit has an acreage limit of 0.5-acre, it cannot be used to authorize any project resulting in the loss of greater than 0.5-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the Nationwide Permits.

f. Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the restoration or establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. [Restored] Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the District Engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to establish a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or establishing a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the District Engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the District Engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

g. Permittees may propose the use of mitigation banks, in-lieu fee programs or separate permittee-responsible mitigation. For activities resulting in the loss of marine or estuarine resources, permittee-responsible compensatory mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the Nationwide Permit verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

h. Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

24. Safety of Impoundment Structures.
To ensure that all impoundment structures are safely designed, the District Engineer may require non-Federal applicants to demonstrate that the structures comply with established State dam safety criteria or have been designed by qualified persons. The District Engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality.
Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of a Nationwide Permit with CWA [Clean Water Act] section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The District Engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management.
In coastal States where a Nationwide Permit has not previously received a State coastal zone management consistency concurrence, an individual State coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The District Engineer or a State may require additional measures to ensure that the authorized activity is consistent with State coastal zone management requirements.

27. Regional and Case-By-Case Conditions.
The activity must comply with any Regional Conditions that may have been added by the Division Engineer (*see* 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the State, Indian Tribe, or EPA in its section 401 Water Quality Certification, or by the State in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits.
The use of more than one Nationwide Permit for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the Nationwide Permits does not exceed the acreage limit of the Nationwide Permit with the

highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under Nationwide Permit 14, with associated bank stabilization authorized by Nationwide Permit 13, the maximum acreage loss of waters of the United States for the total project cannot exceed1/3-acre.

29. Transfer of Nationwide Permit Verifications.

If the permittee sells the property associated with a Nationwide Permit verification, the permittee may transfer the Nationwide Permit verification to the new owner by submitting a letter to the appropriate Corps District office to validate the transfer. A copy of the Nationwide Permit verification must be attached to the letter, and the letter must contain the following statement and signature:

a. "When the structures or work authorized by this Nationwide Permit are still in existence at the time the property is transferred, the terms and conditions of this Nationwide Permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this Nationwide Permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

____

(Transferee)

____

(Date)

30. Compliance Certification.

Each permittee who receives a Nationwide Permit verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the District Engineer. The Corps will provide the permittee the certification document with the Nationwide Permit verification letter. The certification document will include:

a. A statement that the authorized work was done in accordance with the Nationwide Permit authorization, including any general, regional, or activity-specific conditions;

b. A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

c. The signature of the permittee certifying the completion of the work and mitigation.

31. Pre-Construction Notification (PCN).

a. Timing.

Where required by the terms of the Nationwide Permit, the prospective permittee must notify the District Engineer by submitting a PCN as early as possible. The District Engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, District Engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the District Engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the District Engineer. The prospective permittee shall not begin the activity until either:

i. He or she is notified in writing by the District Engineer that the activity may proceed under the Nationwide Permit with any special conditions imposed by the District or Division Engineer; or

ii. 45 calendar days have passed from the District Engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the District or Division Engineer. However, if the permittee was required to notify the Corps pursuant to General Condition 18 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to General Condition 20 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under Nationwide Permits 21, 49 or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of a Nationwide Permit, the permittee may not begin the activity until the District Engineer issues the waiver. If the District or Division Engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the

Nationwide Permit may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

b. Contents of Pre-Construction Notification.
The PCN must be in writing and include the following information:

i. Name, address, and telephone number of the prospective permittee;

ii. Location of the proposed project;

iii. A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the Nationwide Permit activity, in acres, linear feet, or other appropriate unit of measure; any other Nationwide Permit(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the District Engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the Nationwide Permit. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

iv. The PCN must include a delineation of wetlands, other special aquatic sites and other waters, such as lakes and ponds, and perennial, intermittent and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

v. If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

vi. If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

vii. For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act.

c. Form of a Pre-Construction Notification.
The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this General Condition. A letter containing the required information may also be used.

d. Agency Coordination.

i. The District Engineer will consider any comments from Federal and State agencies concerning the proposed activity's compliance with the terms and conditions of the Nationwide Permits and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

ii. For all Nationwide Permit activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States, for Nationwide Permit 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of stream bed, and for all Nationwide Permit 48 activities that require pre-construction notification, the District Engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or State offices (U.S. Fish and Wildlife Service, State natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of Nationwide Permit 37, these agencies will have 10 calendar days from the date the material is transmitted to telephone or fax the District Engineer notice that they intend to provide substantive, site-specific comments.

The comments must explain why the agency believes the adverse effects will be more than minimal. If so contacted by an agency, the District Engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The District Engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the Nationwide Permits, including the need for mitigation to ensure the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The District Engineer will provide no response to the resource agency, except as provided below. The District Engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For Nationwide Permit 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The District Engineer will consider any comments received to decide whether the Nationwide Permit 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

iii. In cases of where the prospective permittee is not a Federal agency, the District Engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

iv. Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

1.3 District Engineer's Decision-Making Process

In reviewing the PCN for the proposed activity, the District Engineer will determine whether the activity authorized by the Nationwide Permit will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. For a linear project (e.g., roads, highways, railways, trails, airport runways, and taxiways), this determination will include an evaluation of the individual crossings to determine whether they individually satisfy the terms and conditions of the Nationwide Permit(s), as well as the cumulative effects caused by all of the crossings authorized by the Nationwide Permit. If an applicant requests a waiver of the 300 linear foot limit on impacts to intermittent or ephemeral streams or of an otherwise applicable limit, as provided for in Nationwide Permits 13, 21, 29, 36, 39, 40, 42, 43, 44, 50, 51 or 52, the District Engineer will only grant the waiver upon a written determination that the Nationwide Permit activity will result in minimal adverse effects. When making minimal effects determinations the District Engineer will consider the direct and indirect effects caused by the Nationwide Permit activity. The District Engineer will also consider site specific factors, such as the environmental setting in the vicinity of the Nationwide Permit activity, the type of resource that will be affected by the Nationwide Permit activity, the functions provided by the aquatic resources that will be affected by the Nationwide Permit activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the Nationwide Permit activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the District Engineer. If an appropriate functional assessment method is available and practicable to use, that assessment method may be used by the District Engineer to assist in the minimal adverse effects determination. The District Engineer may add case-specific special conditions to the Nationwide Permit authorization to address site-specific environmental concerns.

If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for projects with smaller impacts. The District Engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the District Engineer determines that the activity complies with the terms and conditions of the Nationwide Permit and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the District Engineer will notify the permittee and include any activity-specific conditions in the Nationwide Permit verification the District Engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The District Engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the District Engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the District Engineer will expeditiously review the proposed compensatory mitigation plan. The District Engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the District Engineer to be minimal, the District Engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the Nationwide Permit, including any activity-specific conditions added to the Nationwide Permit authorization by the District Engineer.

If the District Engineer determines that the adverse effects of the proposed work are more than minimal, then the District Engineer will notify the applicant either: (a) that the project does not qualify for authorization under the Nationwide Permit and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the project is authorized under the Nationwide Permit subject to the applicant's submission of a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level; or (c) that the project is authorized under the Nationwide Permit with specific modifications or conditions. Where the District Engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period, with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation or a requirement that the applicant submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the District Engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

1.4 Activities not Included in the Proposed Action

The proposed action does not include activities authorized by other types of Department of the Army permits, including standard individual permits, letters of permission, regional general permits or programmatic general permits[7]. In addition, the proposed action does not include unauthorized activities, including activities that fall within any of the categories of activities authorized by the Nationwide Permits, but are not authorized by any of those Nationwide Permits because the project proponent did not comply with Nationwide Permit General Condition 18, endangered species, or any other applicable Nationwide Permit General Condition, Regional Condition, or case-specific condition. The Corps takes separate actions to resolve unauthorized activities. For actions that do not fall under the Nationwide Permits, the Corps will undergo separate ESA section 7 consultation with the appropriate NMFS Regional Office.

1.5 Data Collection and Management in the Corps Regulatory Program

Since 1977, the Corps has made several efforts to collect data on the activities authorized by Nationwide Permits and has continuously improved the information systems it uses to collect those data. However, despite the fact that the Corps has estimated the number of activities that Nationwide Permits have authorized each year since 1988, the estimates for the first decade of the program are only available for 1982. The data available for the years 1999, 2007 and 2010 were the most detailed[8].

During the 1980s, 1990s and early 2000s, each District maintained its own automated information system to collect Regulatory Program data. Those legacy systems were the Regulatory Administrative Management System (RAMS), RAMS II or a local District database (e.g., Norfolk District's "Tracker", Alaska District's "Permits"). The database structure of RAMS and RAMS II was modified by each District to address its local data collection needs.

Since 1988, the Corps collected standardized basic regulatory permit data from each of the 38 Districts. From 1988 to 2003, Districts reported, via the Quarterly Permit Data System (QPDS), their total permits and other regulatory actions. From 1993 to 2003, the QPDS data has included wetland impacts and wetland mitigation, in acres by Corps District. Impact and mitigation data were not collected for some jurisdictional waters, such as streams and other open waters.

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[7] Although not part of the proposed action, the Corps will report these activities to NMFS on a semi-annual basis. See section 1.5.4 *Impact, Mitigation, and Compliance Data Gathering and Reporting* in this Biological Opinion.

[8] We provide the previous history of the Corps' data collection and management efforts to provide the context for, and a better understanding of, the Corps' current systems reflected in the proposed action.

Wetland impact and mitigation data were reported by permit type and general wetland type (e.g., tidal wetlands, non-tidal wetlands). The data uploaded to Corps Headquarters via QPDS was provided from District legacy systems (described above). For those Districts that used RAMS or RAMS II, District data managers had the ability to alter the database structure to collect data elements that were of local importance to the Districts. These impact data did not distinguish between impact durations (permanent and temporary) and included all impact activity types. The Corps then summarized these data on an annual basis. However, these data cannot be analyzed via their integral components (e.g., specific District, Nationwide Permit number, location, etc.).

In May 1997, the Corps developed additional requirements for collecting data for the Nationwide Permit Program. The Corps required information to be collected such as the nationwide number, Nationwide Permit decision (e.g., verified, withdrawn), status of impact area with respect to critical habitat, results of any ESA determinations, location in the watershed, acres requested and verified (or linear feet requested and verified for certain Nationwide Permits), mitigation acreage, and mitigation source (i.e., permittee mitigation, mitigation bank, other mitigation). The Nationwide Permit data collection requirements were modified in September 2002 to reflect changes to the Nationwide Permits made since 1997.

Around 2001, the Corps began development of a single national level permit reporting tool to replace the RAMS database. That effort resulted in the Operations and Maintenance Business Information Link (OMBIL) Regulatory Module (ORM1) that was developed and deployed in a few Districts in 2004. Over the next couple of years, Districts converted their existing data from all legacy systems into ORM1. There was great variation in the success of this conversion process.

Most Districts had completed this migration and began to use ORM1 by 2006-2007. After the initial launch of ORM1, the system was found to be too cumbersome and a streamlined database design was proposed. This system, ORM2, was implemented in June 2007. ORM1 also had limited reporting capabilities, which made national level data collection and analysis difficult.

Between 2007 and 2010 the Corps made improvements such as adding additional fields for jurisdictional determinations, making a Nationwide Permit number a mandatory field and not allowing permit stacking[9] (having more than one Nationwide Permit number per action), adding details on impact characteristics (permanent and temporary impacts, impact types and impact activity types), making additional data elements mandatory, adding a permanent loss field, and implementing rules to enforce more complete data entry. The Corps notes that continual refinements are to be made.

During consultation with NMFS, the Corps requested that the Districts of concern review 515

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[9] The Corps regulations allowed permittees to use combinations of General Permits and Nationwide Permits to authorize "single and complete" projects (defined as a project proposed or accomplished by one owner or developer) that do not exceed total impact limits (76 Federal Register 9203). This process is known as "stacking of permits." This process allows projects that do not fit within one permit type to be permitted without going through the process associated with Standard Permits. The Corps regulations also allow Nationwide Permits to be combined with Standard Permits if those portions of a project that qualify for a Nationwide Permit have "independent utility"; that is, they would satisfy their intended purpose regardless of their relationship to other parts of the proposal.

data entries, which had unusually large impact values. The Corps found that common data entry errors were responsible for those results. The most common types of errors included entering an entire project area rather than the area of actual impact, lumping impacts of separate and distant activities into a single impact, simple human data entry errors (e.g., entering 10 rather than 0.1), and reporting impact areas in units of square feet rather than acreage.

The discovery of these common errors and the diverse interpretations of how ORM2 is to be populated prompted the Corps to make the following changes to its data collection and entry procedures:

- District Project Managers will use a general permit decision checklist to review each application ensure that it is complete and all requirements have been met.
- More specific data entry guidance will be developed for ORM2 users.
- The ORM2 data entry interface will be revised to include reminders and warnings..
- Regulatory Project Managers will be provided additional training and to ensure accurate data entry.
- Quality assurance/quality control efforts will be increased for the ORM2 data to ensure its accuracy.

1.6 Additional Protective Measures Incorporated into the Proposed Action

The Corps has agreed to incorporate the following additional protective measures into their proposed action in order to minimize adverse effects to ESA listed and proposed species and designated critical habitat under NMFS' jurisdiction:

- The Corps will develop information packages for prospective users of the Nationwide Permits to facilitate compliance with Nationwide Permit General Condition 18; Endangered Species (see section 1.6.1 below).
- The Corps will require that a list of information on the location of the activity (including the particular watershed), area affected and a narrative explanation of how the applicant satisfied requirements or conditions of the Nationwide Permit be provided in PCNs (see section 1.6.2 below).
- The Corps will conduct consultation with NMFS Regional Offices to identify new or modified regional conditions for Nationwide Permits in a particular region (see section 1.6.3 below).
- The Corps will provide NMFS with semi-annual reports on Corps Regulatory Program permitting activities, which will include locations of authorized activities as well as proposed and authorized impacts, required compensatory mitigation, and compliance activities (see section 1.6.4 below). This will include activity-specific information on acres of permanent impacts, in addition to other authorized impacts such as acres of temporary impacts and linear foot impacts, authorized by all types of Corps permits, including the Nationwide Permits. More specifically, the Corps will provide the following information in its semi-annual reports:

- Data from its existing ORM2 automated information system informing NMFS of activities authorized by all forms of Corps permits.
- Data on permanent fill authorized under the Nationwide Permit Program will be separately identified for each Nationwide Permit.
- For other Corps permit authorized fills, data on the authorized permanent fill for each activity and the total amount of permanent fill authorized in the applicable watershed.
- Data informing NMFS of the total amount of permanent fill authorized by all types of Corps permits for each 10-digit Hydrologic Unit Code (HUC) watershed inhabited by listed species and designated critical habitat under NMFS' jurisdiction.

- The Corps will utilize the discretion provided by Nationwide Permit General Condition 23, Mitigation, to require compensatory mitigation for wetland losses of less than 1/10-acre, if the reasonable and prudent measures or Reasonable and Prudent Alternatives (RPAs) in Biological Opinions for activity specific or regional programmatic ESA section 7 consultations for Nationwide Permit activities require wetland compensatory mitigation for losses of less than 1/10-acre (see section 1.6.5 below).
- The Corps will issue guidance to its districts and divisions on conducting cumulative effects analyses for the purposes of the National Environmental Policy Act, CWA Section 404(b)(1) Guidelines, and the ESA (see section 1.6.6 below).
- The Corps will issue guidance to its districts to include a Special Condition to Nationwide Permit verification letters, to require permittees to report incidents where any individuals of fish, marine mammals, abalone, coral or marine plant species listed under the ESA appear to be injured or killed as a result of discharges of dredged or fill material into waters of the United States or structures or work in navigable waters of the United States authorized by a Nationwide Permit (see section 1.6.7 below).
- The Corps will apply the following additional protective measures. The first two measures apply generally to the Nationwide Permit Program, and the remaining measures apply only to eight Nationwide Permits, more precisely Nationwide Permit 12, 13, 14, 29, 31, 33, 36 and 39. These measures are:
  - Within 30 days after a semi-annual report is provided to the NMFS Regional Office, there will be a mandatory meeting between Corps district staff and NMFS Regional staff to discuss the data in the semi-annual report and to determine whether additional permit conditions, consultations, or other protective measures are necessary to address specific types of activities or stressors that affect listed species or designated critical habitat in the watersheds within the Corps district and NMFS Region.
  - The Corps will provide its Regulatory Project Managers with additional training and guidance to ensure accurate data entry into

the Regulatory Program's automated information system, ORM2, which is used to produce the semi-annual reports discussed above. The Corps will also increase its quality assurance/quality control efforts for the ORM2 data to improve its accuracy.

- The Corps will conduct rulemaking to modify Nationwide Permits 12, 13, 14, and 36 to require PCN for proposed activities in waters of the United States in watersheds inhabited by listed species and designated critical habitat under NMFS' jurisdiction if those proposed activities are constructed with impervious materials and would thus add to impervious surface cover in a watershed. The Corps already requires PCNs for all activities under Nationwide Permits 29, 31, 33 and 39.

- The Corps will provide NMFS with the baseline impervious surface cover as of 2006 (or using the most current data[10]) for each 10-digit HUC watershed inhabited by listed species and designated critical habitat under NMFS' jurisdiction.

- The Corps will include in its semi-annual report: the amount of actual impervious surface cover that will result from the activities authorized by the eight Nationwide Permit as well as other Corps permits for each 10-digit HUC watershed inhabited by listed species and designated critical habitat under NMFS' jurisdiction, the ratio of that additional impervious surface cover to the baseline impervious surface cover for the referenced watersheds, and a notation of those watersheds where the ratio is 1% or greater. If the total amount of actual impervious surface cover authorized by Nationwide Permits and other Corps permit activities is greater than 1% of the baseline impervious surface cover in a particular watershed, the Corps will consider that information (as well as other pertinent information) when making its ESA section 7 effect determinations for Nationwide Permit pre-construction notifications associated with these eight Nationwide Permits. If section 7 consultation is initiated, the Corps will also consider this information and include it in preparing a biological assessment.

    - While the scope of the proposed action subject to this consultation is limited to the Nationwide Permit Program, the Corps will, when processing other Corps permits in a watershed where the 1% threshold has been reached (as discussed above), consider this information when making its ESA section 7 effect determinations. If section 7 consultation is initiated, the Corps will also consider this information and include it in preparing a biological assessment.

[10] For example, in 2013 the Multi-Resolution Land Characteristics (MRLC) consortium released an updated National Land Cover Database using data from 2011. http://www.mrlc.gov/nlcd2011.php

1.6.1 Information Packages for Prospective Users

The Corps agreed to establish, in consultation with NMFS, guidelines for developing information packages to post on the Corps District web sites to assist prospective users of the Nationwide Permits to comply with General Condition 18. These information packages will be designed to effectively support a project proponent's assessment of whether any listed species or designated critical habitat might be affected or is in the vicinity of the Nationwide Permit activity, or if the Nationwide Permit activity is located in designated critical habitat, and thereby trigger the requirement to submit a PCN to the Corps in accordance with General Condition 18. The development of these information packages will occur through coordination between Corps Districts and NMFS Regional Offices.

Corps headquarters will develop a template for use by the Corps Districts. Corps headquarters will coordinate that template with NMFS headquarters before distributing it to Corps Districts for implementation. The guidance will be provided as a document posted on a District's web site or other means of making the information readily available to the regulated user community. The document will include an introductory section that explains the requirements of Nationwide Permit General Condition 18, and includes definitions from the Services' ESA section 7 regulations to provide some general guidance for prospective users of the Nationwide Permits to determine whether their proposed activity might affect listed species or critical habitat, or be in the vicinity of listed species or critical habitat, or is in critical habitat, and thus trigger the requirement for submission of a PCN if the Nationwide Permit or its Regional Conditions do not already require a PCN. The Corps District Project Manager (PM) will then evaluate the PCN and make an effect determination, and consult with NMFS if a "may affect" determination is made. Corps Districts and NMFS Regional Offices will work together to ensure that the document contains the most up-to-date information, as well as other additional information the Districts and Regional Offices believe would assist in compliance with General Condition 18, such as local guidance documents.

The information document will include the following information:

1. An introductory section that explains the requirements of General Conditions 18 for non-Federal applicants.
2. Applicable definitions from the Services' ESA section 7 regulations that might be of use to potential users of the Nationwide Permits, such as:
    a. Action
    b. Action area
    c. Destruction or adverse modification
    d. Effects of the action
3. General guidance on what constitutes an "effect that would trigger the requirement to submit a PCN in accordance with General Condition 18." The Corps' guidance will emphasize that an applicant must submit a PCN if there is the slightest potential for an effect to occur, and then the Corps will make the effect determination to decide whether section 7 consultation is necessary, and whether that consultation can be formal or

informal.

4. A list of listed species whose range includes the geographic area of responsibility of the Corps District

5. For each species, provide:

    a. A description of the species (from the NMFS website), including: species description, habitat, distribution, population trends and threats

    b. Map showing the species' range (from the NMFS website)

    c. If applicable, map(s) showing critical habitat (as published in the Federal Register for the final rule designating that critical habitat), including a link to the Electronic Code of Federal Regulations (e-CFR) section describing that critical habitat

    d. Other information deemed by NMFS and the Corps to be appropriate.

6. Additional instructions for submitting PCNs to the Corps (if applicable).

To prevent future negative impacts to species and critical habitat under NMFS' jurisdiction that may result from issuance of Nationwide Permits, the Corps will issue guidance asking Districts to include the following language as a condition of Nationwide Permit verification, and proposes to provide this language to Applicants:

> "Incidents where any individuals of fish, whale, abalone, coral or marine plant species listed under the Endangered Species Act appear to be injured or killed as a result of discharges of dredged or fill material into waters of the United States or structures or work in navigable waters of the United States authorized by this Nationwide Permit in the range of endangered or threatened species under the jurisdiction of the National Marine Fisheries Service shall be reported to the National Marine Fisheries Service, Office of Protected Resources at (301) 713-1401 or Regulatory Division/Branch of the District of the U.S. Army Corps of Engineers [insert phone number]. The finder should leave the plant or animal alone, make note of any circumstances likely causing the death or injury, note the location and number of individuals involved and, if possible, take photographs. Adult animals should not be disturbed unless circumstances arise where it is obviously injured or killed by discharge exposure, or some unnatural cause. The finder may be asked to carry out instructions provided by National Marine Fisheries Service, Office of Protected Resources to collect specimens or take other measures to ensure that evidence intrinsic to the specimen is preserved."

1.6.2 Information Submitted in Pre-Construction Notifications

The Corps will require prospective permittees to provide the following information when they submit PCNs:

1. Applicant Information

2. Location of the activity (including the particular watershed)

3. Area affected (estimated area/linear distance)

4. Narrative explanation of how the applicant satisfied requirements/conditions

   a. Applicants will use either the Corps permit application form (ENG-4345) or a letter or other comparative document that contains the information specified by paragraph (b) of Nationwide Permit General Condition 31. This information will include the following:

      i. A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the Nationwide Permit activity, in acres, linear feet, or other appropriate unit of measure; any other Nationwide Permit(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description [of the proposed action] will be sufficiently detailed to allow the District Engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches will be provided when necessary to show that the activity complies with the terms of the Nationwide Permit. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches will contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

      ii. If the proposed activity will result in the loss of greater than 1⁄10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

      iii. If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the ESA; See General Condition 18.

The District Project Manager will review every application and all the above information to determine whether it is complete. The District Project Manager will use a general permit decision checklist to ensure that all requirements have been met. Once all requirements/condition have been met, the District Project Manager will verify the permit. If the proposed activity does not satisfy all terms and conditions of the Nationwide Permit, the District Project Manager will notify the applicant that an individual permit is required.

1.6.3 Consultation with NMFS Regional Offices and Adoption of Regional Conditions

The Corps has agreed that their Districts will work with their NMFS' Regional counterparts to refine these Regional Conditions and/or to develop and to adopt new Regional Conditions to reduce potential adverse effects to ESA listed and proposed species and designated critical habitat under NMFS' jurisdiction. Regional conditions may only further restrict the use of Nationwide Permits. They would not increase any limits of the Nationwide Permits nor would they increase PCN thresholds. Regional conditions would also not replace or remove any of the national Nationwide Permit General Conditions. These include Regional Conditions that apply to all Nationwide Permits in a particular Region, conditions that apply only to certain Districts and/or conditions that apply to specific Nationwide Permits in a particular Region.

If Regional Conditions are not available for an activity, Region or District, and if the activity may affect ESA listed resources, the Corps is required to request consultation from the appropriate NMFS Regional Office. Some Regional Programmatic Consultation on the Nationwide Permit Program may also occur to cover categories of activities and streamline ESA section 7 compliance at the Regional level. The Corps will also consult with the appropriate NMFS Region on any individual activity or suite of activities that do not fall under one of the Nationwide Permits identified in this proposed action or do not comply with the general or Regional Conditions as agreed to by the Corps and NMFS.

1.6.4 Impact, Mitigation, and Compliance Data Gathering and Reporting

The Corps agrees to issue semi-annual reports on Corps Regulatory Program permitting activities that would be shared with NMFS to provide information on the contribution of activities authorized by Corps permits. Some of these reporting requirements are reflected in section 1.6 above. These semi-annual reports to NMFS will include a data summary and line-by-line raw data (i.e., verified impact and required compensatory mitigation for each activity) for all permitted (verified) activities. Summaries and data reports will be grouped by Region and will be sent to the relevant NMFS Regional Offices and to NMFS Headquarters. The summaries and data reports will include the following information (as well as any requirements reflected in section 1.6):

1. Number of activities
2. Area affected, including:
    a. The proposed area/linear distance submitted in PCNs and reported on Corps' 10.2 ORM2 Database
    b. The verified impact indicated in the verification letter issued by the Corps and recorded in the Corps' 10.2 ORM2 Database. The database will also include the impact activity type, authorized impact area, location and required compensatory mitigation
    c. The actual impact collected during compliance inspections (a minimum of 5% of general permit verifications issued in a particular year). To calculate actual area affected, the Corps will look at compliance rates from 5% of the authorized activities (or whatever percentage the District inspected) and extrapolate. They would include projects that were not performed as well as those that affected less area than proposed

and more area than proposed. They will use these data to determine how much actual area was affected. Inspections must also include checks on impact activity type, area, location, fulfillment of compensatory mitigation requirements (i.e., must show functional replacement has been achieved).

3. Locations (i.e., affected HUC 10 watersheds) as reported in the Corps' 10.2 ORM2 Database

4. Acreage or linear distance of established, restored or enhanced wetlands specifically required as well as what actually occurred. This information will include:

   a. Acreage (or linear distance) of permittee responsible mitigation from Corps' 10.2 ORM2 Database

   b. Mitigation bank credits including those required for specific impacts as tracked in Corps' 10.2 ORM2 database as well as credits available from established mitigation banks as tracked by the Corps' Regulatory in Lieu fee[11] and Bank Information Tracking System (RIBITS) database. Conversion of credits to impact acres would occur wherever possible. The Corps Districts control the mitigation credit release, after consulting with the Interagency Review Team. The credit release is based on attainment of the applicable performance standards specified in the credit release schedule. Mitigation banks are subject to ESA section 7 consultation when the activities involved in the establishment or operation of the mitigation bank (e.g., earthwork to conduct the wetland or stream restoration activity that will generate mitigation bank credits) may affect listed species or critical habitat. Either formal or informal consultation would be conducted, with the Corps as the action agency unless the bank sponsor is a Federal agency. U.S. Fish and Wildlife Service [FWS] and NMFS staff participate on the Interagency Review Team and would advise whether ESA section 7 consultation is needed for a particular mitigation bank proposal. The credit classification system is determined during the review of each mitigation bank or in-lieu fee program proposal but must be tied back in RIBITS to the Cowardin classification system at the system level (i.e., riverine, palustrine, estuarine, marine, lacustrine). Districts have the option of further classifying the credits to the Cowardin subsystem or class level. [See Section 4.1 in the *Environmental Baseline* of this Biological Opinion for a discussion of the Cowardin System]

   c. In Lieu fee program details. An in-lieu fee program must be constructed within three growing seasons of the date the first debit occurs (i.e., when the first credit is secured by a permittee from the in-lieu fee program sponsor) (see 33 CFR 332.8(n)(4)). The in-lieu fee project must be based on a mitigation plan approved by the Corps (after consulting with the Interagency Review Team), with ecological performance standards and a credit release schedule based on attainment of those ecological performance standards. The Corps has no national standard for classifying mitigation

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[11] Note: NMFS is not requesting information from the Corps regarding the costs associated with the program.

bank credits and in-lieu fee program credits. The credit classification system is determined during the review of each mitigation bank or in-lieu fee program proposal but must be tied back in RIBITS to the Cowardin classification system at the system level (i.e., riverine, palustrine, estuarine, marine, lacustrine). Districts have the option of further classifying the credits to the Cowardin subsystem or class level.

5. The kind and functional equivalent of established, restored, or enhanced wetlands, specifically authorized including:

   a. Whether compensatory mitigation was required as tracked by Corps' 10.2 ORM2 database

   b. Type of mitigation: permittee responsible (on site/offsite), mitigation bank credits, in-lieu fee program credits as tracked by Corps' 10.2 ORM2 database as well the Corps' RIBITS database

6. Compliance with pertinent Nationwide Permit conditions (including mitigation) including:

   d. Number of inspections

      i. A minimum of 5% of all Nationwide Permit verifications issued within the most recent fiscal year.

      ii. A minimum of 5% of active permittee-responsible mitigations sites each fiscal year

      iii. A minimum of 20% of active mitigation banks and in-lieu fee programs each fiscal year.

   e. Percentage of compliance

      i. The Corps will reach resolution on non-compliance with permit conditions and/or mitigation requirements on at least 20% of activities determined to be non-compliant at the end of the previous fiscal year and determined to be non-compliant during the current fiscal year. The Corps shall reach resolution on at least 20% of all pending enforcement actions (i.e., unauthorized activities) that are unresolved.

   f. Factors used to prioritize compliance:

      i. Information provided on compliance certification forms submitted as required by General Condition 30, where the authorized activity and (if required) compensatory mitigation has been completed. This involves focusing compliance efforts in cases where the Corps knows the Nationwide Permit activity has been completed instead of traveling to sites where the work may not have done yet.

      ii. Monitoring reports for compensatory mitigation projects, to verify whether the monitoring report is accurate and whether the compensatory mitigation project is achieving its objectives and performance standards. Site visits are normally required to close-out compensatory mitigation projects.

iii. Compliance with the Nationwide Permit General Conditions (including General Condition 18), as well as applicable Regional Conditions. If the Corps District added activity-specific conditions to the Nationwide Permit authorization to minimize adverse environmental effects, efforts to ensure compliance would involve prioritizing compliance inspections for those Nationwide Permit verifications with activity-specific conditions added by District Engineers.

iv. Corps project managers will target compliance inspections in areas where they are conducting other field work or meetings, or along travel routes to that other field work or meetings, to make more efficient use of agency funds and other resources.

v. The performance measures may also be used to prioritize compliance inspections during each quarter of the fiscal year, to ensure that the performance measures are met or exceeded.

vi. From the Corps' 2009 Regulatory Standard Operating Procedure (SOP) (pg. 42): "Districts will prioritize compliance inspections and actions to resolve non-compliance based on compensatory mitigation requirements, regional areas of concern, threatened and endangered species, historic properties, navigation concerns, or other controversial issues that the District considers important."

7. Assessment of aggregate impact, including evidence of aggregate impacts (see next section)

a. The Corps will submit semi-annual reports to NMFS Regions. The summary will contain analysis of impacts by watershed (HUC 10) that will inform assessment of aggregate impacts. This will facilitate time of year restrictions by Region or additional measures (e.g., the revocation, suspension or modification of Nationwide Permits in specific waters or geographic areas, additional regional or activity-specific conditions, etc.) The summary will also include type of authorized impacts (e.g., total area), number of permits, compensatory mitigation required, etc. The raw data (by verified Nationwide Permit activity) will be provided in addition to the summary.

b. If the total amount of actual impervious surface cover authorized by Nationwide Permits and other Corps permit activities is greater than 1% of the baseline impervious surface cover in a particular watershed, the Corps will consider that information (as well as other pertinent information) when making its ESA section 7 effect determinations for Nationwide Permit pre-construction notifications associated with these eight Nationwide Permits (i.e. Nationwide Permit 12, 13, 14, 29, 31, 33, 36 and 39). If section 7 consultation is initiated, the Corps will also consider this information and include it in preparing a biological assessment. The Corps will provide this information in its next semi-annual report.

c. In its first semiannual report, the Corps will provide NMFS with the baseline impervious surface cover as of 2006 [or using the most current data] for each 10-digit

HUC watershed inhabited by listed species and designated critical habitat under NMFS' jurisdiction. The summary will also include type of authorized impacts (e.g., total area), number of permits, compensatory mitigation required, etc**.** The raw data (by verified Nationwide Permit activity) will be provided in addition to the summary.

Within 30 days after each semi-annual report or data submission is provided to the NMFS Regional Office, there will be a mandatory meeting between Corps District staff and NMFS Regional staff to discuss the data and determine whether additional permit conditions, consultations, or other protective measures are necessary to address specific types of activities or stressors that affect listed species or designated critical habitat in the watersheds within the Corps District and NMFS Region.

The Corps has committed to modify, suspend or revoke Nationwide Permits to address any such concerns, which could include, among other things, adding new or modified Regional Conditions to restrict or prohibit the use of one or more Nationwide Permits if new information (e.g., data that suggest inadequate protection for species or low levels of compliance) becomes available. Modifications may include additional actions or requirements, reopening of the permits, and reinitiation of section 7 consultation.

1.6.5 No-Net Loss of Wetland Function Goal

General Condition 23 requires compensatory mitigation for wetland losses greater than 1/10 acre, although the Corps District has the discretion require wetland compensatory mitigation if the Nationwide Permit activity is determined to result in minimal individual and cumulative adverse environmental effects. For any compensatory mitigation required, assessment methods would be used to determine the amount of compensatory mitigation required, where such methods are available and appropriate; in cases where assessment methods are not available or appropriate for use for a Nationwide Permit activity, acreage or linear foot surrogates would be used to quantify the amount of compensatory mitigation required. This approach is consistent with the Corps regulations at 33 CFR 332.3(f)(1).

Also, the discretion provided by paragraph (c) of General Condition 23, to require compensatory mitigation for wetland losses of less than 1/10-acre can be exercised as a result of an activity-specific ESA section 7 consultation for a Nationwide Permit activity, or a regional programmatic ESA section 7 consultation, if the reasonable and prudent measures or RPAs in the Biological Opinions for those consultations require wetland compensatory mitigation for losses of less than 1/10-acre. Division Engineers can also impose Regional Conditions to lower the threshold for requiring wetland compensatory mitigation for Nationwide Permit activities.

1.6.6 Corps Addressing of Aggregate Impacts

The concept of aggregate or cumulative impacts is reflected in a number of statutory, regulatory and scientific contexts. Various terms are used to describe these sorts of impacts, although the precise definition or usage varies with the statutory scheme or other context in which the terms are used. The regulatory scheme of the ESA reflects the concept of aggregate impacts 50 CFR 402.02 (see next paragraph defining "aggregate impacts"). The concept of cumulative impacts is reflected in CWA, including section 404(e) which authorizes the Corps to issue general permits, provided among other things, the permit "will have only minimal cumulative adverse effect on the environment." Under the CWA (40 CFR 230.11(g)) cumulative impacts are "the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems."

Under NEPA, the assessment of "cumulative impacts" is required by Council on Environmental Quality regulations (see 40 CFR 1508.7). Each of the statutory schemes addresses related but different variations of the concept. Similarly, scientific literature, including literature referenced in this opinion, refers to the concept of aggregate or cumulative impacts. The specific usage of the term in the literature must be discerned from the context and intention of the literature itself.

The overall purpose of this Biological Opinion is to determine under the ESA whether the proposed action is likely to jeopardize listed species or result in the destruction or adverse modification of their designated critical habitat (50 CFR 402.14(h)(3)). As mentioned above, a relevant concept for this purpose is "aggregate impacts." For purposes of this consultation under the ESA, we define "aggregate impacts" as the incremental impacts of the action (effects of the action) when added to: (1) the environmental baseline (which includes effects of other past and present impacts, actions as well as the anticipated impacts of all proposed future federal actions that have undergone section 7 consultation, and the impact of non-federal actions which are contemporaneous with the consultation), and (2) cumulative effects (effects of future non-federal actions that are reasonably certain to occur). See 50 CFR 402.02 and the Services' ESA Section 7 Handbook at 4-33 (1998). Nevertheless, throughout the various sections of this Biological Opinion, other concepts of aggregate or cumulative impacts will also be referenced and discussed as reflected in the original regulatory or scientific context in which such terms were used in the source material. Where appropriate or discernable, we will note the type of aggregate or cumulative impacts referenced to avoid confusion.

Aggregate Impacts and the Corps' Action

Corps Headquarters will issue guidance to its districts and divisions on conducting cumulative effects analyses for the purposes of the National Environmental Policy Act, CWA Section 404(b)(1) Guidelines, and the ESA. This guidance will include methods to assess collective impacts per 404(b)(1) by watershed/ecoregion, and ORM2 database reporting for permitted impacts including the number of all activities (fill, Rivers and Harbors Act section 10 structure, ecological restoration, etc.), area, type of impact, etc. within a HUC-10 watershed. This information will be used to identify the contribution of Corps-permitted activities to the aggregate impacts to ESA listed species and designated critical habitat under NMFS' jurisdiction.

This guidance would explain how Corps Districts are to assess collective impacts for various stages of implementing the Nationwide Permit Program, including: (1) the preparation of biological evaluations to support activity-specific ESA section 7 consultations (under Nationwide Permit General Condition 18) or regional programmatic ESA section 7 consultations; (2) the preparation of supplemental decision documents when Corps Division

Engineers approve Regional Conditions for the Nationwide Permits, or suspend or revoke Nationwide Permits in a particular watershed or other geographic area; and (3) District Engineers making minimal effects determinations for case-specific Nationwide Permit PCNs or voluntary requests for Nationwide Permit verifications.

The information from semi-annual reports, the case-specific or regional programmatic ESA section 7 consultations for Nationwide Permit activities in that watershed, and other relevant local information (e.g., watershed studies, State natural resource data, etc.), would be used by Corps Districts and NMFS Regional Offices to identify watersheds in which the aggregate impacts of one or more Nationwide Permits on jurisdictional waters and wetlands or listed species are approaching a level of concern. The Corps Division and District would take action to modify, suspend, or revoke Nationwide Permits to address those concerns, which could include adding new or modified Regional Conditions to restrict or prohibit the use of one or more Nationwide Permits. Corps Districts and NMFS Regional Offices would work together to identify the appropriate means (e.g., what to measure or evaluate) of assessing aggregate impacts for the particular watershed or species of concern.

As described above, to address NMFS' concerns about the addition of impervious surface[12] cover in watersheds containing waters inhabited by listed species, as well as designated critical habitat, under NMFS' jurisdiction, the Corps will conduct rulemaking to modify Nationwide Permits 12, 13, 14, and 36 to require pre-construction notification for proposed activities in waters of the United States in watersheds inhabited by listed species and designated critical habitat under NMFS' jurisdiction if those proposed activities are constructed with impervious materials and would thus add to impervious surface cover in a watershed. These additional PCN requirements will provide assurance that each proposed Nationwide Permit activity constructed with impervious materials is evaluated by the Corps to determine if the proposed Nationwide Permit activity may affect listed species and designated critical habitat. It is not necessary to modify the pre-construction notification requirements for Nationwide Permits 29, 31, 33 and 39 because those Nationwide Permits currently require pre-construction notification for all activities.

If the total amount of actual impervious surface cover authorized by Nationwide Permits and other Corps permit activities is greater than 1% of the baseline impervious surface cover in a particular watershed, the Corps will consider that information (as well as other pertinent information) when making its ESA section 7 effect determinations for Nationwide Permit PCNs associated with these eight Nationwide Permits. If section 7 consultation is initiated, the Corps will also consider this information and include it in preparing a biological assessment. The Corps will provide this information in its next semi-annual report.

The Corps will also submit semi-annual reports to NMFS Regions. The summary will contain analysis of the impact by watershed (HUC 10) that will inform assessment of aggregate impacts.

[12] NMFS uses the term "impervious surface cover" as the National Research Council (2009) defines "impervious surface" in its report on Urban Stormwater in the United States as: "a hard surface area which either prevents or retards the entry of water into the soil. Common impervious surfaces include roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled surfaces."

In its first semiannual report, the Corps will provide NMFS with the baseline impervious surface cover as of 2006 [or using the most current data] for each 10-digit HUC watershed inhabited by listed species and designated critical habitat under NMFS' jurisdiction. The summary will also include type of authorized impacts (e.g., total area), number of permits, compensatory mitigation required, etc**.** The raw data (by verified Nationwide Permit activity) will be provided in addition to the summary.

Within 30 days after each semi-annual report or data submission is provided to the NMFS Regional Office, there will be a mandatory meeting between Corps District staff and NMFS Regional staff to discuss the data and determine whether additional permit conditions, consultations, or other protective measures are necessary to address specific types of activities or stressors that affect listed species or designated critical habitat in the watersheds within the Corps District and NMFS Region.

1.7 Background on the Corps Regulatory Program and the Nationwide Permit Program

The Corps Regulatory Program administers three laws: CWA section 404, section 9 and 10 of the Rivers and Harbors Act of 1899, and section 103 of the Marine Protection, Research and Sanctuaries Act of 1972, as amended. Under CWA section 404, a permit is required to discharge dredged or fill material into waters of the United States. Under section 9 of the Rivers and Harbors Act of 1899, a permit is required to construct dams or dikes across navigable waters of the United States. The obstruction or alteration of a navigable water of the United States requires a permit under section 10 of the Rivers and Harbors Act of 1899. Under section 103 of the Marine Protection, Research and Sanctuaries Act of 1972, as amended, a permit is required to transport dredged material for disposal into ocean waters.

There are three categories of permits that the Corps may issue under its authorities:

- Standard individual permits
- Letters of permission
- General permits, including Nationwide Permits and regional general permits (which may also include programmatic general permits)

Standard individual permits are Department of the Army permits that have been processed through the public interest review procedures, including public notice and receipt of comments, and a 404(b)(1) Guidelines analysis if the proposed activity involves discharges of dredged or fill material into waters of the United States. Letters of permission are also individual permits issued after an abbreviated public interest review procedure, and usually involve coordination with Federal and State agencies prior to making a decision on the permit application. Nationwide Permits are type of general permit issued by the Chief of Engineers to authorize categories of activities across the country that have minimal individual and cumulative environmental effects. Corps Division Engineers can modify, suspend or revoke Nationwide Permits in a particular region, or for a specific category of activities or waters (see 33 CFR 330.5(c)). Corps District Engineers can modify, suspend or revoke activity-specific Nationwide Permit authorizations (see 33 CFR 330.5(d)). Regional general permits are a category of general permit issued by Corps

Division or District Engineers to authorize categories of activities on a regional basis, and programmatic general permits are a specific type of regional general permit intended to reduce duplication with a similar Federal, state, or local agency program.

The Corps first issued Nationwide Permits in 1977 (42 FR 37122) to authorize categories of activities that have minimal adverse effects on the aquatic environment, and streamline the authorization process for those minor activities. Shortly after the Corps issued the 1977 Nationwide Permits, the Federal Water Pollution Control Act 1972 was amended as the Clean Water Act. The 1977 CWA included section 404(e), which authorized the Secretary of the Army to issue:

> …general permits on a State, regional, or nationwide basis for any category of activities involving discharges of dredged or fill material if the Secretary determines that the activities in such category are similar in nature, will cause only minimal adverse environmental effects when performed separately, and will have only minimal cumulative adverse effect on the environment. [33 U.S.C. 1344(e)]

In accordance with CWA section 404(e), general permits can be issued for a period of no more than five years. Since CWA section 404(e) states that Nationwide Permits cannot be issued for a period of time greater than five years, the Corps has issued or reissued Nationwide Permits in 1982 (47 FR 31794), 1984 (49 FR 39478), 1986 (51 FR 41206), 1991 (56 FR 59110), 1995 (60 FR 38650), 1996 (61 FR 65874), 2000 (65 FR 12818), 2002 (67 FR 2020), 2007 (72 FR 11092), and 2012 (77 FR 10184).

The convenience and time savings associated with the Nationwide Permits encourages users of the Nationwide Permits to minimize their proposed impacts to waters of the United States and design their projects within the scope of the Nationwide Permits rather than apply for individual permits for activities which could result in greater adverse impacts to the aquatic environment. The minimization encouraged by the issuance of a Nationwide Permit, as well as compensatory mitigation that may be required for specific activities authorized by a Nationwide Permit, helps reduce adverse environmental effects to jurisdictional waters and wetlands, as well as listed species and critical habitat under NMFS' jurisdiction.

The authority to issue Nationwide Permits was delegated to the Chief of Engineers by the Assistant Secretary of the Army (Civil Works). The current regulations for implementing the Nationwide Permit Program were issued on November 22, 1991 (56 FR 59110). Those regulations also contain procedures where Corps Divisions and District Engineers can modify, suspend or revoke Nationwide Permits. Section 330.4(f) of that regulation addresses compliance of the Nationwide Permit Program with the ESA:

> *Endangered species*. No activity is authorized by any Nationwide Permit if that activity is likely to jeopardize the continued existence of a threatened or endangered species as listed or proposed for listing under the ESA, or to destroy or adversely modify the critical habitat of such species.

1. Federal agencies should follow their own procedures for complying with the requirements of the ESA.

2. Non-Federal permittees shall notify the District Engineer if any Federally listed (or proposed for listing) endangered or threatened species or critical habitat might be affected or is in the vicinity of the project. In such cases, the prospective permittee will not begin work under authority of the Nationwide Permit until notified by the District Engineer that the requirements of the ESA have been satisfied and that the activity is authorized. If the District Engineer determines that the activity may affect any Federally listed species or critical habitat, the District Engineer must initiate section 7 consultation in accordance with the ESA. In such cases, the District Engineer may:

    a. Initiate section 7 consultation and then, upon completion, authorize the activity under the Nationwide Permit by adding, if appropriate, activity-specific conditions; or

    b. Prior to or concurrent with section 7 consultation, assert discretionary authority (see 33 CFR 330.4(e)) and require an individual permit (see 33 CFR 330.5(d)).

3. Prospective permittees are encouraged to obtain information on the location of threatened or endangered species and their critical habitats from the U.S. Fish and Wildlife Service, Endangered Species Office and NMFS.

Nationwide Permits may be issued under the Corps Regulatory Program's two primary statutory authorities: CWA section 404 (33 U.S.C. 1344) and/or section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403), which are discussed in more detail below.

1.7.1 Clean Water Act section 404

Under CWA section 404, the Corps may issue permits for the "discharge of dredged or fill material into the navigable waters at specified disposal sites." [33 U.S.C. 1344(a)]. The Corps authorizes these discharges through individual and general permits. All individual permits require a case-by-case review, including site-specific documentation, a public notice and comment process, a public interest review, a 404(b)(1) Guidelines analysis, and a formal determination on the permit. Compliance with NEPA is achieved through either the preparation of an environmental impact statement or environmental assessment, or the use of a categorical exclusion. The issuance of a CWA section 404 general permit requires a public notice and comment process, a public interest review, a 404(b)(1) Guidelines analysis, and a formal determination on the general permit. For the issuance of a CWA section 404 general permit, compliance with NEPA is usually achieved through the preparation of an environmental assessment. Once a CWA section 404 general permit is issued, activities that comply with the terms and conditions of that general permit are authorized, unless the Corps takes action to modify, suspend, or revoke that general permit authorization.

Waters and Wetlands Regulated Under the CWA

For the purposes of the CWA, "navigable waters" are defined as "waters of the United States." The Corps current regulations defining waters of the United States are found at 33 CFR 328.3(a):

(a) The term waters of the United States means:

> (1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide;
>
> (2) All interstate waters including interstate wetlands;
>
> (3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
>
>> (i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
>>
>> (ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
>>
>> (iii) Which are used or could be used for industrial purpose by industries in interstate commerce.
>
> (4) All impoundments of waters otherwise defined as waters of the United States under the definition;
>
> (5) Tributaries of waters identified in paragraphs (a) (1) through (4) of this section;
>
> (6) The territorial seas;
>
> (7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) (1) through (6) of this section.
>
> (8) Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other Federal agency, for the purposes of the CWA, the final authority regarding Clean Water Act jurisdiction remains with EPA.
>
> Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States.

Wetlands are defined in the Corps regulations at 33 CFR 328.3(b) as:

> …those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

The Corps' definition of the term wetland differs from the Cowardin *et al.* (1979) definition used by the U.S. Fish and Wildlife Service in that it requires all three factors (i.e., wetland hydrology, hydric soils, hydrophytic plant community) to be present for an area to be considered a wetland for the purposes of CWA section 404. The Cowardin *et al.* (1979) definition only requires that one factor be present for an area to be considered a wetland. [See Section 4.1 in the *Environmental Baseline* of this Biological Opinion for a discussion of the Cowardin System]

Not all of the Nation's aquatic resources are subject to regulatory jurisdiction under CWA section 404. Waters of the United States subject to CWA section 404 are defined at 33 CFR Part 328. Some wetlands are not subject to CWA jurisdiction because they do not meet the criteria at Part 328. In its 2001 decision in *Solid Waste County of Northern Cook County v. U.S. Army Corps of Engineers*, the U.S. Supreme Court ruled that CWA jurisdiction does not apply to isolated, intrastate, non-navigable waters whose jurisdictional status was based solely on their use as habitat for migratory birds. Tiner (2003) estimated that in some areas of the country, the proportion of wetlands that are geographically isolated, and may not be subject to CWA jurisdiction is approximately 20 to 50% of the wetland area, and there are other areas where more than 50% of the wetlands are geographically isolated. Geographically isolated wetlands comprise a substantial proportion of the wetlands found in regions with arid, semi-arid and semi-humid climates, as well as areas with karst topography (Tiner 2003). However, it is difficult to determine from maps or aerial photographs whether wetlands are hydrologically isolated from other waters, because there may be small surface hydrologic connections that are not included on those maps or detected by those photographs (Tiner 2003).

In *Rapanos et ux., et al. v. United States*, 547 U.S. 715 (2006), the plurality opinion of the Supreme Court concluded that "waters of the United States" includes only relatively permanent, standing or flowing bodies of water, such as streams, rivers, oceans, lakes, and wetlands that have a continuous surface connection to such waters. In a concurring opinion, Justice Kennedy concluded that a water or wetland is a water of the United States if it has a significant nexus to traditional navigable water. There have been no formal studies to estimate the proportion of wetlands, streams and other aquatic resources that may have been affected by that decision.

The regulations for implementing CWA section 404 require avoidance and minimization of impacts to waters of the United States. The section 404(b)(1) Guidelines (40 CFR part 230) are the substantive environmental criteria for evaluating applications for section 404 permits as well as the issuance of Nationwide Permits and other general permits to authorize categories of activities resulting in discharges of dredged or fill material into waters of the United States. The 404(b)(1) Guidelines require the consideration of alternatives to avoid discharging dredged or fill material into waters of the United States, and therefore encourages the relocation of proposed activities into uplands, if it is practicable to do so (Yocum *et al.* 1989). If discharges into waters of the United States cannot be avoided, CWA section 404(b)(1) Guidelines require minimization of those discharges and their impacts on the aquatic environment to the maximum extent practicable. The costs associated with obtaining and complying with CWA section 404 permits encourages avoidance of impacts to waters of the United States (Yocum *et al.* 1989).

Activities Regulated under CWA Section 404

The terms "discharge of dredged material" and "discharge of fill material" have specific definitions in the Corps regulations. Those definitions explain which activities require CWA section 404 permits, unless they are eligible for an exemption under CWA section 404(f), as described in more detail in the Corps' biological evaluation. The Nationwide Permits authorize certain categories of activities that involve discharges of dredged or fill material into waters of the United States.

Discharges of Dredged Material into Waters of the United States

The Corps regulations define "dredged material" as "material that is excavated or dredged from waters of the United States." [33 CFR 323.2(c)]

The Corps regulations define "discharge of dredged material" as:

> …any addition of dredged material into, including redeposit of dredged material other than incidental fallback within, the waters of the United States. [33 CFR 323.3(d)]

The term "discharge of dredged material" includes, but is not limited to, the following:

- The addition of dredged material to a specified discharge site located in waters of the United States
- The runoff or overflow from a contained land or water disposal area; and
- Any addition, including redeposit other than incidental fallback, of dredged material, including excavated material, into waters of the United States which is incidental to any activity, including mechanized land clearing, ditching, channelization, or other excavation

The Corps regulations consider the use of mechanized earth-moving equipment to conduct land clearing, ditching, channelization, in-stream mining or other earth-moving activities in waters of the United States to result in a discharge of dredged material unless project-specific evidence shows that the activity results in only incidental fallback.

The Corps regulations define "incidental fallback" as:

> …the redeposit of small volumes of dredged material that is incidental to excavation activity in waters of the United States when such material falls back to substantially the same place as the initial removal. Examples of incidental fallback include soil that is disturbed when dirt is shoveled and the back-spill that comes off a bucket when such small volume of soil or dirt falls into substantially the same place from which it was initially removed. [33 CFR 323.2(d)(2)(ii)]

The Corps regulations exclude the following discharges or activities from the definition of "discharge of dredged material":

- Discharges of pollutants into waters of the United States resulting from the onshore subsequent processing of dredged material that is extracted for any commercial use (other than fill). These discharges are subject to section 402 of the CWA even though the extraction and deposit of such material may require a permit from the Corps or applicable State section 404 program. [33 CFR 323.2(d)(3)(i)]
- Activities that involve only the cutting or removing of vegetation above the ground (e.g., mowing, rotary cutting, and chainsawing) where the activity neither substantially disturbs the root system nor involves mechanized pushing, dragging,

or other similar activities that redeposit excavated soil material [33 CFR 323.2(d)(3)(ii)]

- Incidental fallback [33 CFR 323.2(d)(3)(iii)]

The Corps regulations state that an activity associated with a discharge of dredged material destroys an area of waters of the United States if it alters the area in such a way that it would no longer be a water of the United States. Those regulations also state that "[u]nauthorized discharges into waters of the United States do not eliminate CWA jurisdiction, even where such unauthorized discharges have the effect of destroying waters of the United States." [33 CFR 323.2(d)(5)]

An activity associated with a discharge of dredged material is considered to degrade a water of the United States if it "…has more than a *de minimis* (i.e. inconsequential) effect on the area by causing an identifiable individual or cumulative adverse effect on any aquatic function." [33 CFR 323.2(d)(6)]

In addition, CWA section 404 permits are not required for the following activities:

- Any incidental addition, including redeposit, of dredged material associated with any activity that does not have or would not have the effect of destroying or degrading an area of waters of the United States as defined in 33 CFR 323.2(d)(5) and (d)(6). This exception does not apply to any person preparing to undertake mechanized land clearing, ditching, channelization and other excavation activity in a water of the United States, which would result in a redeposit of dredged material, unless the person demonstrates to the satisfaction of the Corps…prior to commencing the activity involving the discharge, that the activity would not have the effect of destroying or degrading any area of waters of the United States. [33 CFR 323.2(d)(4)(i)]
- Incidental movement of dredged material occurring during normal dredging operations, defined as dredging for navigation in navigable waters of the United States, with proper authorization from the Congress and/or a Corps permit issued under section 10 of the Rivers and Harbors Act of 1899. This exception is not applicable to dredging activities in wetlands. [33 CFR 323.2(d)(4)(ii)]
- Certain discharges, such as those associated with normal farming, silviculture, and ranching activities, are not prohibited by or otherwise subject to regulation under CWA section 404. [33 CFR 323.2(d)(4)(iii)]

Discharges of Fill Material into Waters of the United States

The Corps regulations define "fill material" at 33 CFR 323.2(e)(1) as material placed in waters of the United States where the material has the effect of:

- Replacing any portion of a water of the United States with dry land; or
- Changing the bottom elevation of any portion of a water of the United States.

Examples of such fill materials include, but are not limited to: rock, sand, soil, clay, plastics, construction debris, wood chips, overburden from mining or other excavation activities, and materials used to create any structure or infrastructure in the waters of the

United States. [33 CFR 323.2(e)(2)]

The term "fill material" does not include trash or garbage. [33 CFR 323.2(e)(3)]

The term "discharge of fill material" is defined as:

> …the addition of fill material into waters of the United States. The term generally includes, without limitation, the following activities: Placement of fill that is necessary for the construction of any structure or infrastructure in a water of the United States; the building of any structure, infrastructure, or impoundment requiring rock, sand, dirt, or other material for its construction; site-development fills for recreational, industrial, commercial, residential, or other uses; causeways or road fills; dams and dikes; artificial islands; property protection and/or reclamation devices such as riprap, groins, seawalls, breakwaters, and revetments; beach nourishment; levees; fill for structures such as sewage treatment facilities, intake and outfall pipes associated with power plants and subaqueous utility lines; placement of fill material for construction or maintenance of any liner, berm, or other infrastructure associated with solid waste landfills; placement of overburden, slurry, or tailings or similar mining-related materials; and artificial reefs. The term does not include plowing, cultivating, seeding and harvesting for the production of food, fiber and forest products. [33 CFR 323.2(f)]

The placement of pilings in waters of the United States may, in some circumstances, be regulated under CWA section 404 as a discharge of fill material and therefore require a permit from the Corps:

> Placement of pilings in waters of the United States constitutes a discharge of fill material when such placement has or would have the effect of a discharge of fill material. Examples of such activities that would have the effect of a discharge of fill material include: projects where the pilings are so closely spaced that sedimentation rates would be increased; projects in which the pilings themselves effectively would replace the bottom of a waterbody; projects involving the placement of pilings that would reduce the reach or impair the flow or circulation of waters of the United States; and projects involving the placement of pilings which would result in the adverse alteration or elimination of aquatic functions. [33 CFR 323.3(c)(1)]

In general, the placement of pilings for linear projects, such as bridges, elevated walkways and power line structures, generally does not have the effect of a discharge of fill material. In addition, the placement of pilings in waters of the United States for piers, wharves and an individual house on stilts generally does not have the effect of a discharge of fill material. Such pilings would require a permit under section 10 of the Rivers and Harbors Act of 1899 if placed in navigable waters of the United States. [See 33 CFR 323.3(c)(2)]

The removal of vegetation from riparian areas is not regulated under CWA section 404 if it does not involve discharges of dredged or fill material into waters of the United States. Cutting and removing trees from riparian areas while leaving the roots and soil intact is not regulated under CWA section 404.

Activities Exempt under CWA Section 404

Certain activities are exempt from the permit requirements of CWA section 404, as listed in section 404(f):

- Normal farming, silviculture, and ranching activities such as plowing, seeding, cultivating, minor drainage, harvesting for the production of food, fiber, and forest products, or upland soil and water conservation practices;
- Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, and bridge abutments or approaches, and transportation structures;
- The purpose construction or maintenance of farm or stock ponds or irrigation ditches, or the maintenance of drainage ditches;
- The construction of temporary sedimentation basins on a construction site which does not include placement of fill material into the navigable waters;
- The construction or maintenance of farm roads or forest roads, or temporary roads for moving mining equipment, where such roads are constructed and maintained, in accordance with best management practices, to assure that flow and circulation patterns and chemical and biological characteristics of the navigable waters are not impaired, that the reach of the navigable waters is not reduced, and that any adverse effect on the aquatic environment will be otherwise minimized; and
- A discharge resulting from any activity with respect to which a State has an approved program under section 208(b)(4) which meets the requirements of subparagraphs (B) and (C) of such section, is not prohibited by or otherwise subject to regulation under this section or section 301(a) or 402 of this Act (except for effluent standards or prohibitions under section 307).

A discharge of dredged or fill material into waters of the United States is not eligible for a CWA section 404(f) exemption and requires a CWA section 404 permit if it is part of an activity whose purpose is to convert an area of the waters of the United States into a use to which it was not previously subject, where the flow or circulation of waters of the United States may be impaired or the reach of such waters reduced. [See 33 CFR 323.4(c)] If any of those conditions are met, a CWA section 404 permit is required.

1.7.2 Section 10 of the Rivers and Harbors Act of 1899

Under section 10 of the Rivers and Harbors Act of 1899, a Department of the Army permit is required for the obstruction or alteration of any navigable water of the United States. Such activities include the construction of any structure in or over any navigable water of the United States, the excavating from or depositing of material in those navigable waters, or the accomplishment of any other work affecting the course, location, condition or capacity of navigable waters. [33 U.S.C. 403]

The Corps Rivers and Harbors Act section 10 authority extends to artificial islands, installations, and other devices located on the seabed, to the seaward limit of the outer continental shelf (see section 4(f) of the Outer Continental Shelf Lands Act of 1953 as amended (43 U.S.C. 1333(e)).

Waters Regulated Under Section 10 of the Rivers and Harbors Act of 1899

Navigable waters of the United States are generally defined as:

> …those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the waterbody, and is not extinguished by later actions or events which impede or destroy navigable capacity. [33 CFR 329.4]

The general criteria used to identify navigable waters of the United States are listed in 33 CFR 329.5:

- Past, present, or potential presence of interstate or foreign commerce;
- Physical capabilities for use by interstate or foreign commerce; and
- Defined geographic limits of the waterbody.

Activities Regulated under Section 10 of the Rivers and Harbors Act of 1899

Department of the Army permits are required under Rivers and Harbors Act section 10 for structures and/or work in or affecting navigable waters of the United States, except for activities listed in 33 CFR 322.4 (see section 1.5.3 of this biological evaluation).

- The term “structure” is defined as “any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other obstacle or obstruction.” [33 CFR 322.2(b)]
- The term “work” is defined as “any dredging or disposal of dredged material, excavation, filling or other modification of a navigable water of the United States.” [33 CFR 322.2(c)]

Activities Exempt under Section 10 of the Rivers and Harbors Act of 1899

- Activities that were commenced or completed shoreward of established Federal harbor lines before May 27, 1970, do not require Rivers and Harbors Act section 10 permits.
- Under section 154 of the Water Resource Development Act of 1976 (Pub. L. 94–587), Department of the Army permits are not required under Rivers and Harbors Act section 10 to construct wharves and piers in any waterbody, located entirely within one state, that is a navigable water of the United States solely on the basis of its historical use to transport interstate commerce [33 CFR 322.4].

Certain fishing and harvesting activities are regulated under Rivers and Harbors Act section 10 if they meet the definition of “structure” at 33 CFR 322.2(b) or “work” at 33 CFR 322.2(c). The placement of lobster traps, crab pots, eel pots and pound nets are structures that act as obstructions in navigable waters require Rivers and Harbors Act section 10 authorization. Other fishing activities, such as trawling, do not require Rivers and Harbors Act section 10 authorization because they are not structures or work that modifies the course, location, condition, or capacity of navigable waters.

2.0 Approach to the Assessment

2.1 Overview of NMFS' Assessment Framework

Section 7(a)(2) of the ESA requires Federal agencies, in consultation with and with the assistance of the Services, to insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of endangered species, threatened species, or result in destruction or adverse modification of critical habitat that has been designated for these species (16 U.S.C. 1536). During consultations on specific actions, NMFS fulfills its obligations using an assessment framework that begins by identifying the physical, chemical, or biotic components of proposed actions that are likely to have individual, interactive, or collective direct and indirect effects on the environment (we use the term "potential stressors" for these components of an action); we then determine whether listed species or designated critical habitat are likely to be exposed to those potential stressors; we estimate how listed species or designated critical habitat are likely to respond to any exposure; then we conclude by estimating the risks those responses pose to the individuals, populations, and species or designated critical habitat that are likely to be exposed.

Federal agency programs apply to activities over large geographic areas over long periods of time, with substantial uncertainty about the number, location, timing, frequency and intensity of specific activities those programs would authorize, fund or carry out. Our traditional approaches to section 7 consultations, which focus on the specific effects of a specific proposal, are not designed to deal with the spatial and temporal scales and level of uncertainty that is typical of consultations on agency programs.

Rather than trying to adapt traditional consultation approaches to programmatic consultations, we have developed an assessment framework that specifically allows us to help Federal agencies insure that their programs comply with the requirements of section 7(a)(2) of the ESA as described in the Interagency Endangered Species Consultation Handbook (U.S. Fish and Wildlife Service and NMFS 1998; Chapter 5). Specifically, our programmatic consultations examine the decision-making processes that are integrated into Federal agency programs to determine whether those decision-making processes are likely to comply with the requirements of ESA section 7(a)(2) to insure that the activities that Federal agencies authorize, fund or carry out are not likely to jeopardize the continued existence of endangered species or threatened species under the jurisdiction of NMFS or result in the destruction or adverse modification of critical habitat that has been designated for those species. That is, during programmatic consultations we ask whether or to what degree the Federal action agency (in this case, the Corps) has structured its proposed program so that the agency:

1. Collects the information necessary to allow it to know or reliably estimate the probable individual and cumulative consequences of its program on the environment, generally,

and listed resources specifically;

2. Evaluates the information it collects to assess how its actions have affected the environment, generally, and endangered species, threatened species, and designated critical habitat specifically; and

3. When this information suggests that the activities authorized, funded, or carried out by its program no longer comply with the mandate and purposes of its program or of section 7(a)(2) of the ESA, does the action agency use its authorities to bring those activities into compliance with program mandates and the requirements of section 7(a)(2) of the ESA.

Here, "program structure" refers to the decision-making processes, applications of standards and criteria (including standards of information and treatment of uncertainty), feedback loops and internal audits, and controls (including permit conditions) that agencies employ to ensure that agency decisions to authorize fund, or carry out specific actions or a class of actions are likely to fulfill the mandates of the program before the agency authorizes, funds, or carries out those actions. Our approach allows us to determine if the proposed action is not likely to jeopardize the continued existence of any endangered and threatened species under the jurisdiction of NMFS and result in the destruction or adverse modification of critical habitat that has been designated for these species.

These process triggers are typically subjected to two screening processes:

1. An initial screening process that are designed to insure that proposals minimally comply with statutory, regulatory, or policy requirements that are applicable to requests for permits, licenses, or funding; and

2. A secondary screening processes that are designed to insure that an agency satisfies the statutory, regulatory, or policy requirements or criteria that must be met before an agency can issue a permit, license, or funding.

For example, the screening process the Corps applies to Standard Permits includes reviews for completeness; analyses for compliance with the CWA section 404(b)(1) guidelines (which includes an evaluation of the availability of upland alternatives); compliance with State water quality standards; compliance with toxic effluent standards; compliance with the requirements of section 7(a)(2) of the ESA; public interest review; and mitigation sequencing.

Agency screening processes typically produce recommendations to agency decision-makers, who have the authority to make final decisions on agency actions. Following those decisions, the action agency, permittee, licensee or funding recipient undertakes the action; including any terms or conditions the action agency has attached. The action produces a set of direct, indirect and collective effects on the environment and any living organisms that occur in or rely on the environment that is affected by the action and the condition of the environment changes in response to those effects. The significance of any changes in the condition of the environment should be determined by comparing the state of the environment with the action in place to some reference criterion, which is typically the desired condition of the environment (often established in statute).

A program may also contain an audit function represented by a monitoring component, a feedback component, and an information gathering and evaluation component that informs a screening process. The monitoring component would collect empirical information on individual actions or a sample of individual actions to:

1. Identify what action actually occurred for comparison with the action that had been proposed and approved (implementation monitoring);
2. Identify which terms and conditions, if any, were satisfied, including any mitigation measures that were required (implementation monitoring);
3. Gather empirical information on the action's direct and indirect effects on the environment, including the effectiveness of any mitigation measures that had been required (validation and compliance monitoring);
4. Gather the empirical evidence to determine whether or to what degree the environment changed in response to those effects; and
5. Gather the empirical evidence sufficient to determine whether a proposal contributed to environmental conditions that fail to meet program purposes and standards.

The feedback component evaluates empirical data collected by monitoring and incorporates those data into agency decisions about prior or subsequent.

Regardless of whether an agency's decision-making processes corresponds to this model, five components of an agency's decision-making process are critical to our assessment of whether or to what degree individual actions authorized, funded, or carried out by the program are not likely to jeopardize the continued existence of endangered species or threatened species under the jurisdiction of NMFS or result in the destruction or adverse modification of critical habitat that has been designated for those species, as required by ESA section 7(a)(2). The first critical component is the screening process an agency applies to specific actions authorized, funded or carried out by a program. When we examine this component of an agency's decision-making process, questions we ask include: What standards apply to the screening process? How rigorous are those standards? How rigorously does the action agency apply those standards? Are proposals assumed to comply with an agency's statute barring evidence of non-compliance or vice versa? Which party (prospective permittees or the action agency) bears the responsibility for presenting the evidence that supports their position? Does an agency's record of performance allow us to conclude that the screening process works as designed by filtering out proposals that do not satisfy applicable environmental mandates, standards, criteria and program purposes?

The second critical component is the information that forms the foundation for the agency's screening process. When we examine this component of an agency's decision-making process, questions we ask include: Does the agency assess the individual and aggregate impacts of specific proposals? Does the agency's methodology consider all of the variables that would have to be considered to determine whether a specific proposal is likely to have adverse consequence for endangered or threatened species and designated critical habitat? Do assessments employ data acquisition procedures that are likely to identify, gather and analyze all of the information that would be relevant to identify the presence or absence of consequence for endangered or threatened species and designated critical habitat? Does the assessment process incorporate quality assurance and quality control procedures? Are those procedures designed to prevent

Type I decision error (falsely concluding that a proposal had an adverse impact), Type II decision error (falsely concluding that a proposal had no adverse impact) or both?

The third critical component is an action agency's decision-making process, which includes the information and variables that inform the agency's decision on whether or not to authorize, fund, or implement an action, the decisions the agency makes, and any conditions or terms the agency attaches to its decision. When we examine this component of an agency's decision-making process, we examine patterns in prior decisions the agency has made to determine whether or to what degree those decisions have insured that the subsequent action complies with the requirements of section7 (a)(2) of the ESA.

The fourth critical component is an audit function. Does the action agency regularly or continuously audit the results of its actions? Are the monitoring and feedback loops designed to allow the agency to:

1. Collect empirical information that allows them to insure that specific actions they authorize, fund, or carry out are undertaken as designed (including any terms, conditions, or mitigation measures associated with the proposal);
2. Assess the actual effects of those actions; and
3. Determine whether the program is fulfilling its mandate, purposes, and goals.

Finally, we examine an agency's record of performance over time to determine whether or to what degree its actual decisions show evidence of incorporating new information to improve subsequent decisions.

The final critical component is the agency's authority to modify its prior and subsequent decisions — and its willingness to use that authority — when new information (particularly information provided by the audit function) reveals that particular authorizations have not satisfied applicable environmental mandates, standards, criteria, and program purposes (the applicable environmental mandates includes compliance with section 7(a)(2) of the ESA).

We organize our programmatic consultations using a sequence of questions that focus on the agency's decision-making process, in general, and the five critical components we just described. Those questions focus on whether and to what degree an agency has structured a program so that the agency is in a position to know or reliably estimate whether endangered or threatened species or designated critical habitat are likely to be:

1. Exposed to stressors associated with specific actions a program would authorize, fund, or carry out;
2. Respond to that exposure; and
3. Experience individual-level, population-level, or species-level risks as a result of those responses.

Further, we ask whether or to what degree an agency actively gathers that information, whether or to what degree an agency incorporates that information into its decision-making processes about specific actions and whether or to what degree an agency changes the decisions it makes about specific actions based on that information.

It might be possible for NMFS to conclude that a Federal action agency had failed to meet the requirements of section 7(a)(2) of the ESA, without endangered or threatened species or designated critical habitat being adversely affected by that failure. To address this possibility, we preface our assessments of an agency's decision-making process with an assessment of the probable consequences of exposing endangered and threatened species and designated critical habitat to the physical, chemical, and biotic stressors that are known to be associated with actions the program would authorize, fund, or carry out. This component of our analyses establishes the risks program pose to endangered and threatened species and designated critical habitat. Any risks we identify in this component of our analyses provide the context for our assessment of whether or to what degree an agency's program is likely to eliminate or avoid the risks the program poses.

2.1.1 Risk Analyses for Endangered and Threatened Species and Designated Critical Habitat

NMFS helps Action Agencies determine whether or to what degree they have complied with the requirements of section 7(a)(2) of the ESA by assessing whether and to what degree an agency has structured a program so that the agency is in a position to know or reliably estimate: (a) whether endangered or threatened species are likely to be placed at increased risk of extinction; or (b) if those species avoid extinction, whether they are likely to experience increased risk of failing to recover from having been endangered or threatened because of the actions the program authorizes, funds, or carries out.

However, as we described in the preceding subsection of this Chapter, we preface our assessments of an agency's decision-making process with an assessment of the probable consequences of exposing endangered and threatened species and designated critical habitat to the physical, chemical, and biotic stressors that are known to be associated with actions the program would authorize, fund, or carry out.

Our consideration of how well an agency's program manages risks to endangered and threatened species reflects ecological relationships between listed species, the populations that comprise them, and the individuals that comprise those populations: the continued existence of species is determined by the fate of the populations that comprise them and the continued existence of a population is determined by the fate of the individuals that comprise them. Populations grow or decline as the individuals that comprise the population live, die, grow, mature, migrate, and reproduce, or fail to do so. When we assess whether or to what degree an agency's program is likely to eliminate or avoid risks to endangered or threatened species, we are mindful of the distinction between species, the populations that comprise the species and the individuals that comprise those populations.

When we assess whether or to what degree an agency's program is likely to eliminate or avoid risks to individual members of endangered or threatened species, we think in terms of the individuals' fitness — its current or expected future reproductive success — which integrates an individuals' longevity with its current and future reproductive success. In particular, we examine the scientific and commercial data available to determine if an individual's probable response to stressors produced by an Action would reasonably be expected to reduce the individual's current or expected future reproductive success by increasing an individual's likelihood of dying prematurely, increasing the age at which it becomes reproductively mature, reducing the age at which it stops reproducing, reducing the number of live births it produces during any reproductive bout, reducing the number of reproductive bouts it engages in over its reproductive lifespan (in animals that reproduce multiple times), or causing the individual's progeny to experience any of these phenomena (Brommer 2000, Brommer *et al.* 1998, 2002; Clutton-Brock 1998, Coulson *et al.* 2006, Kotiaho *et al.* 2005, McGraw and Caswell 1996, Newton and Rothery 1997, Oli and Dobson 2003, Roff 2002, Stearns 1992, Turchin 2003).

When individual members of an endangered or threatened species can be expected to experience reductions in their current or expected future reproductive success or experience reductions in the rates at which they grow, mature, or become reproductively active, we would expect those reductions to also reduce the abundance, reproduction rates, and growth rates (or increase variance in one or more of these rates) of the populations those individuals represent (see Stearns 1992). Actions that are likely to reduce one or more of these variables (or one of the variables we derive from them) have fulfilled a *necessary* condition for reductions in viability of the population(s) those individuals represent, which would also satisfy a *necessary* condition for reductions in the viability of the species those populations comprise. Our programmatic assessments focus on whether or to what degree an agency's program is likely to insure that the direct or indirect effects of actions the program would authorize are not likely to reduce the fitness of listed individuals or are not likely to reduce that fitness to a degree that would be sufficient to reduce the viability of the population(s) those individuals represent.

Our consideration of how well an agency's program manages risks to designated critical habitat focuses on the value of the physical, chemical or biotic phenomena of the critical habitat for the conservation of the endangered and threatened species for which the critical habitat was designated. In this step of our assessment, we consider information about the contribution of constituent elements of critical habitat (or of the physical, chemical, or biotic phenomena that give the designated area value for the conservation of listed species, particularly for older critical habitat designations that have no constituent elements) to the conservation value of those areas of critical habitat that occur in the action area. Then we consider the contribution of the conservation value of those areas to the conservation value of the entire critical habitat designation. Our programmatic assessments focus on whether or to what degree an agency's program is likely to insure that the direct or indirect effects of actions the program would authorize are not likely to reduce the conservation value of critical habitat that has been designated for endangered or threatened species or are not likely to reduce that conservation value to a degree that would be sufficient to reduce the species' likelihood of recovering from having been endangered or threatened.

2.2 Application of this Approach in this Consultation

We treat the suite of Nationwide Permits the Corps proposes to issue as a "program" that would authorize a wide array of discharges of dredged or fill material over the permit term. As we described in section 2.1, during programmatic consultations we ask whether or to what degree the Corps has structured this program so that the Corps: (1) collects the information necessary to allow it to know how the actions it permits affect the environment, generally, and listed resources specifically; (2) evaluates that information to assess how its actions have affected the environment, generally, and endangered species, threatened species, and designated critical habitat[13] specifically; and (3) when this information suggests that actions authorized by one or more of the Nationwide Permits affecting the environment, generally, and endangered species, threatened species, and designated critical habitat specifically, does the Corps use its authorities to modify or prohibit those actions. Specific additional questions we ask about the Nationwide Permit Program are:

1. Is the Nationwide Permit Program structured so that the Corps is positioned to know or reliably estimate the general and particular effects of the discharges of dredged or fill material that would be authorized by the Nationwide Permits into waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur, on the quality of the waters that would receive those discharges? That is, at the level of Corps' Districts and hydrologic regions, sub-regions, basins, and sub-basins of the United States, its territories and possessions:

    1.1 Is the Nationwide Permit Program structured so that the Corps is positioned to know or reliably estimate the total number of discharges of dredged or fill material resulting from the Nationwide Permits into waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur, individually and collectively, over the duration of the proposed permits?

    1.2 Is the Nationwide Permit Program structured so that the Corps is positioned to know or reliably estimate the total volume of dredged or fill material that would be authorized by the Nationwide Permits into waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur, individually and collectively, over the duration of the proposed permits?

    1.3 Is the Nationwide Permit Program structured so that the Corps is positioned to know or reliably estimate the rate at which dredged or fill material that would be authorized by the Nationwide Permits into waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur, individually and collectively, over the duration of the proposed permits?

    1.4 Is the Nationwide Permit Program structured so that the Corps is positioned to know or reliably estimate the timing of discharges of dredged or fill material that would be authorized by the Nationwide Permits into waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or

[13] For this Conference Biological Opinion, when we refer to threatened or endangered species under NMFS' jurisdiction and any critical habitat that has been designated for those species, we mean all species and designated critical habitat that have been listed, and all species and designated critical habitat that have been proposed to be listed under the ESA.

the critical habitat that has been designated for those species occur, individually and collectively, over the duration of the proposed permits?

1.5 Is the Nationwide Permit Program structured so that the Corps is positioned to know or reliably estimate the location of discharges of dredged or fill material that would be authorized by the Nationwide Permits into waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur, individually and collectively, over the duration of the proposed permits?

1.6 Is the Nationwide Permit Program structured so that the Corps is positioned to know or reliably estimate the baseline quality of the waters in the hydrologic basins that would receive dredged or fill material resulting from the Nationwide Permits, where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur, individually and collectively, over the duration of the proposed permits?

2. Is the Nationwide Permit Program structured so that the Corps is positioned to know or reliably estimate patterns of applicant compliance with the requirements of each of the Nationwide Permits?

2.1 Is the Nationwide Permit Program structured so that the Corps is positioned to know or reliably estimate geographic and temporal patterns of applicant compliance with the requirements of each of the Nationwide Permits?

2.2 In those instances in which applicants do not comply with the requirements of the Nationwide Permits, it the Nationwide Permit Program structured so that the Corps is positioned to know or reliably estimate the magnitude of non-compliance with those requirements?

3. Is the Nationwide Permit Program structured so that the Corps is positioned to know or reliably estimate when specific waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, and the critical habitats designated for those species occur, have been or are being degraded as a result of the individual or aggregate impacts of discharges resulting from each of the Nationwide Permits or the suite of permits?

Aggregate impacts under the ESA include:

3.1 Time-crowded perturbations or perturbations that are so close in time that the effects of one perturbation do not dissipate before a subsequent perturbation occurs.

3.2 Space-crowded perturbations or perturbations that are so close in space that their effects overlap.

3.3 Interactions or perturbations that have qualitatively and quantitatively different consequences for the ecosystems, ecological communities, populations, or individuals exposed to them because of synergism (when stressors produce fundamentally different effects in combination than they do individually), additivity, magnification (when a combination of stressors have effects that are more than additive), or antagonism (when two or more stressors have less effect in combination than they do individually).

3.4 The gradual disturbance and loss of land and habitat, or incremental and decremental effects are often, but not always, involved in each of the preceding three categories. The Corps has designed the Nationwide Permits so that they only authorize actions that have small or limited consequences when the actions are considered in isolation. However, that program limitation makes it more important to understand whether or to what degree the Corps has insured that the small effects of those individual actions do not accumulate to have ecological consequences that are substantially greater than any individual action.

4. Is the Nationwide Permit Program structured so that the Corps is positioned to take the actions that are sufficient to prevent waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur, from being further degraded by the individual or collective effects of the discharges of dredged or fill materials or other activities that would be authorized by the Nationwide Permits on the quality of the waters that would receive those discharges? If the Nationwide Permit Program positions the Corps to take these actions, is the Corps likely to take these actions given its pattern of practice over time or any new commitments included in the Nationwide Permits?

5. Has the Corps structured its Nationwide Permit Program so that the Corps is positioned to insure that endangered or threatened species are not likely to be exposed to: (a) the dredged or fill material that would be discharged into waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur, each year of the duration of the proposed permits; or (b) reductions in water quality that are caused by or are associated with such discharges?

5.1 If the Corps cannot insure that endangered or threatened species are not likely to be exposed to dredged or fill material that would be discharged into waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur, each year of the duration of the proposed permits, has the Corps structured its Nationwide Permit Program so that the Corps can insure that endangered or threatened species are not likely to be exposed to discharges that are likely to elicit responses that are potentially adverse for the listed individuals that are likely to be exposed to those discharges?

5.2 If the Corps cannot insure that endangered or threatened species are not likely to be exposed to reductions in water quality resulting from discharges of dredged or fill material into waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur, each year of the duration of the proposed permits, has the Corps structured its Nationwide Permit Program so that the Corps can insure that endangered or threatened species are not likely to be exposed to reductions in water quality that are likely to elicit responses that are potentially adverse for the listed individuals that are likely to be exposed to those reductions?

5.2.1 Has the Corps structured the Nationwide Permit Program so the Corps will know or be able to reliably estimate the physical, chemical, or biotic stressors that are likely to be produced as a direct or indirect result of the discharges of dredged or fill materials that would be authorized by the Nationwide Permit Program (that is, the stressors produced by the actual discharges of dredged or fill materials on, over, or near waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur)?

Alternatively, has the Corps structured the Nationwide Permit Program so the Corps will know or be able to reliably determine whether or to what degree physical, chemical, or biotic stressors that are not authorized by the Nationwide Permit Program have been produced as a direct or indirect result of the discharges of dredged or fill materials that would be authorized by the proposed permits? Or, has the Corps structured the Nationwide Permit Program so the Corps will know or be able to reliably estimate that discharges of dredged or fill materials that would be authorized by the proposed permits have not occurred in concentrations, frequencies, or for durations that exceed the authorization of the proposed permit?

5.2.2 Has the Corps structured the Nationwide Permit Program so the Corps will know or be able to reliably determine whether or to what degree applicants have complied with the conditions, restrictions, or mitigation measures the proposed permits require when they discharge dredged or fill material into waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur?

5.2.3 Has the Corps structured the Nationwide Permit Program so the Corps will know or be able to reliably estimate whether or what degree specific endangered or threatened species are likely to be exposed to: (a) potentially harmful concentrations of dredged or fill materials the proposed permits would authorize to be discharged into waters of the United States where ESA listed endangered or threatened, or the critical habitat that has been designated for those species occur, or (b) the ecological consequences of discharging dredged or fill materials into waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur?

5.2.4 Has the Corps structured the Nationwide Permit Program so the Corps will continuously identify, collect, and analyze information that suggests that the discharges of dredged or fill materials into waters of the United States may expose endangered or threatened species or designated critical habitat under NMFS' jurisdiction to dredged or fill material at concentrations, intensities, durations, or frequencies that are known or suspected to produce physical, physiological, behavioral, or ecological responses that have potential individual or collective adverse consequences for individuals organisms or constituent elements of critical habitat?

5.2.5 Has the Corps structured the Nationwide Permit Program so the Corps will employ an analytical methodology that considers: (a) the status and trends of endangered or threatened species or designated critical habitat; (b) the demographic and ecological status of populations and individuals of those species given their exposure to pre-existing stressors in different drainages and watersheds; (c) the direct and indirect pathways by which endangered or threatened species or designated critical habitat might be exposed to discharges of dredged or fill materials into waters of the United States; and (d) the physical, physiological, behavior, sociobiological, and ecological consequences of exposing endangered or threatened species or designated critical habitat to dredged or fill materials at concentrations, intensities, durations, or frequencies that are known or suspected to produce physical, physiological, behavioral, or ecological responses, given their pre-existing demographic and ecological condition?

5.3 Has the Corps structured the Nationwide Permit Program so the Corps will be able to prevent endangered or threatened species from being exposed to discharges of dredged or fill materials: (a) at concentrations, rates, or frequencies that are potentially harmful to individual organisms, populations, or these species; or (b) to ecological consequences that are potentially harmful to individual organisms, populations, or the species? How quickly would the Corps be able to implement preventive measures?

Our assessment focused on whether and to what degree the Corps structured the Nationwide Permit Program in ways that would prevent endangered or threatened species or critical habitat that has been designated for those species from being exposed to discharges of dredged or fill materials into waters of the United States and other activities because such exposures commonly trigger a cascade of events who ultimate consequence is difficult to prevent. For example, once individual plants and animals are exposed to a discharges or dredged or fill materials, their responses to the exposure is controlled by the concentration, duration, and frequency associated with the exposure, their sensitivity to the discharged materials, other physical, chemical, or biotic stressors that are exposed to in the same time interval, their pre-existing physiological state, and their constitutional endowment. Because it is so difficult to prevent free-ranging organisms from responding to anthropogenic stressors once they have been exposed, the most effective management measures are designed to influence the exposure itself. Because of this, our assessment focuses on whether and to what degree the Nationwide Permit Program prevents endangered and threatened species and designated critical habitat from being exposed to discharges and other activities that would be authorized by the Nationwide Permit Program.

As we also discussed in the introduction to this chapter, it might be possible for NMFS to conclude that a Federal agency had failed to insure that their actions comply with the requirements of section 7(a)(2) of the ESA without endangered or threatened species or designated critical habitat being adversely affected by that failure. To address this possibility, we preface our assessment of the Corps' decision-making process with an assessment of the probable consequences of exposing endangered and threatened species and designated critical habitat to the discharges and other activities the Corps proposes to authorize. Specifically, we:

1. Examine the activities that would be authorized by the Nationwide Permit Program.

   This step of our analyses identifies spatial and temporal patterns associated with each category of activity; specifically: (a) the geographic distribution of the different activities; (b) the number or discharges; (c) the amounts of dredged or fill materials that are likely to be discharged; and (d) the rate of discharges.

2. We determine the degree of geographic and temporal overlap between the activities that would be authorized by the Nationwide Permits and endangered and threatened species and designated critical habitat under NMFS' jurisdiction.

   These analyses describe the spatial overlap and any specific evidence (reports or studies) that particular endangered or threatened species or designated critical habitat have been or are likely to be exposed to those use patterns. However, our exposure analyses are not conducted on a fine spatial scale because we they are only designed to establish whether or to what degree endangered or threatened species or designated critical habitat overlap, in space and time (some discharges of dredged or fill material may be occur when migratory species are not in an area, for example). Given spatial and temporal overlap, we then have reason to ask whether or to what degree the Corps' Nationwide Permit Program can insure that these species or critical habitat are not likely to be exposed.

3. We conduct a detailed review of the literature available on the physical, physiological, behavioral, social, and ecological responses of endangered or threatened species or constituent elements of critical habitat given exposure to discharged of dredged or fill materials into waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur, or to the effects of those discharges and the activities associated with those activities on the ecology of the watersheds in which they occur (that is, effects resulting from changes in populations of prey, predators, competitors, symbionts, etc.). Rather than discuss the literature for each species, we organize the data using species groups (e.g., Pacific Salmon; Sturgeon; Sea Turtles; etc.). We base these groups on their similar biology and ecological needs which result in similar stress pathways and responses to stressors of the action.

4. We summarize the probable consequences of the responses identified in the preceding section for populations of endangered and threatened species and designated critical habitat.

In this consultation, we present the results of these analyses before we present the results of our review and evaluate the Corps' Nationwide Permit Program using the sequence of questions we identified previously. We use the results of these combined analyses to determine whether and to what degree the Corps structured the Nationwide Permit Program in ways that comply with the requirements of section 7(a)(2) of the ESA to insure that the activities the Corps authorizes, funds or carries out are not likely to jeopardize the continued existence of endangered species or threatened species under the jurisdiction of NMFS or result in the destruction or adverse modification of critical habitat that has been designated for those species.

2.3 Evidence Available for the Consultation

The evidence available for this consultation includes data the Corps has collected on Nationwide Permits the Corps has issued since 1977, when it created its first set of Nationwide Permits and stated its intention to "remain aware of potential aggregate impacts that may occur on a regional basis as a result of these Nationwide Permits. If adverse aggregate impacts are anticipated from any of the discharges [of dredged or fill material into waters of the United States] subject to these Nationwide Permits, we intend to take appropriate administrative action, including the exercise of authority express in 232.4-4 to require individual or general permits for these activities." These data include the actual or estimated number of activities that were authorized using the different Nationwide Permits, the actual or estimated acreage impacted by those permits and the actual or estimated acreage created or restored to mitigate the acreage impacted by activities authorized by the Nationwide Permits.

In addition to the data available from the Corps, the organizations *Environmental Working Group* and *Public Employees for Environmental Responsibility* (PEER) distributed data they received from the Corps in response to Freedom of Information Act (FOIA) requests they submitted in the 1990s. As a result of one FOIA request the Environmental Working Group submitted in 1994 and two FOIA requests the Environmental Working Group submitted in 1995, the group received and published data on the total number of activities authorized in 27 of the Corps Districts by 18 of the Nationwide Permits that had been issued at the time. They also published data on the total number of activities authorized by Nationwide Permits and estimates of the acreage impacted by those between 1988 and 1996 with additional acreage estimates for 1997-2001. In 1999, PEER published data on the number of standard permits, letters of permission, Nationwide Permits and Regional General Permits the Corps issued for the years 1982, 1987, 1992-1996, and 1998.

Data on the status and trends of wetlands and deepwater habitats have developed by the FWS's National Wetlands Inventory for decades and cover the United States, generally (Dahl 1990, 2000, 2006, 2011, 2013; Dahl and Johnson 1991). The U.S. Geological Survey also published a national summary of wetland resources in 1996 (Fretwell *et al.* 1996) and Abernethy and Turner (1987) published national estimates of changes in the acreage of forested wetlands. In addition, the U.S. Fish and Wildlife Service's National Wetlands Inventory and others have developed data on the status and trends of wetlands and deepwater habitats in the following states, regions, or localities: Alaska (Hall *et al.* 1994), Boston Islands Harbor Recreation Area (Tiner *et al.* 2003), Casco Bay Estuary in the Gulf of Maine (Foulis and Tiner 1994), Central Valley (California; Frayer *et al.* 1989), Chesapeake Bay (Tiner *et al.* 1994), coastal Louisiana (Barras *et al.* 2004), coastal watersheds of the eastern United States (Stedman and Dahl 2008), Edisto River basin (South Carolina; Marshall *et al.* 1993), Florida (Frayer and Hefner 1991, Dahl 2005), the greater Buffalo area (New York; Tiner *et al.* 2008), Hackensack meadowlands (New Jersey; Tiner *et al.* 2002a), Hackensack River watershed (New Jersey; Tiner and Berquist 2007), Maine (Tiner 2007), Maryland (Tiner and Burke 1995), Narragansett Bay estuary (Massachusetts and Rhode Island; Tiner *et al.* 2004), New Hampshire (Tiner 2007), New Jersey (Tiner 1985), northeastern States (Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Virginia; Tiner 2010), Parker River watershed (Massachusetts; Tiner *et al.* 2002b), Peconic River estuary (New York; Tiner *et al.* 2003), Rhode Island (Tiner 1989), Rhode Island Department of Environmental Management (1999, 2004, 2007; Murphy and Ely 2002), salt marshes in estuaries of southwestern Connecticut (Tiner *et al.* 2006), South Carolina (Dahl 1999), southeastern Virginia (Tiner *et al.* 2005), coastal Texas (Moulton *et al.* 1997), and Willamette River Valley (Oregon; Morlan *et al.* 2010). These data provide critical context for considering the potential consequences of impacts associated with activities permitted by the Corps on the ecological health of wetlands and other aquatic ecosystems in the United States, its territories and possessions.

In addition, over the past decade the Environmental Law Institute published several reports on off-site wetland mitigation banks (ELI 2002, 2009a), compensatory mitigation (ELI 2004a, 2004b, 2006), and wetland avoidance and minimization (ELI 2008, 2009b); these reports contain data on mitigation banks in the United States and their performance, the effectiveness of compensatory mitigation, and avoidance and minimization policies within the Corps Districts. Similarly, the City of Tacoma (Washington) distributed a report that reviews in-lieu fee mitigation program for shoreline habitat within the city boundaries (City of Tacoma 2010).

We supplemented this information by conducting electronic searches of literature published in English or with English abstracts using multiple library and electronic database services. These searches included literature in the biological, ecological and agricultural sciences, master's theses and doctoral dissertations.

We supplemented our electronic searches by searching the literature cited sections of journal articles and other documents we acquired electronically. Because the geographic scope of the Nationwide Permit Program is limited to the United States, its territories and possessions, we limited the scope of our searches to that geographic area as well.

We analyzed and compared the different papers based on the quality of their study design, sample sizes, level of scrutiny prior to and during publication, and study results. We considered carefully-designed field experiments (for example, experiments that control potentially confounding variables) of a higher quality than field experiments that were not designed to control those variables. Carefully-designed field experiments were generally considered to be of a higher quality than computer simulations or theoretical papers. Studies that relied on large sample sizes with small variances were generally considered to be of higher quality than studies that relied on small sample sizes or large variances.

2.4 Treatment of "Aggregate Impacts"

To address the question of whether the activities that would be authorized by the Nationwide Permits have direct and indirect effects on the environment that are small both individually and collectively, we explicitly consider those impacts of the proposed permits in an *Aggregate Impacts* section of the *Effects of the Action* chapter of this Biological Opinion. Here, we mean "aggregate impacts" as defined above for ESA purposes, *i.e.*, the incremental impacts of the action (effects of the action) when added to: (1) the environmental baseline (which includes effects of other past and present impacts, actions as well as the anticipated impacts of all proposed future federal actions that have undergone section 7 consultation, and the impact of non-federal actions which are contemporaneous with the consultation), and (2) cumulative effects (effects of future non-federal actions that are reasonably certain to occur).

Aggregate impacts include:

1. time-crowded perturbations or perturbations (i.e., repeated occurrence of one type of impact in the same area) that are so close in time that the effects of one perturbation do not dissipate before a subsequent perturbation occurs;
2. space-crowded perturbations (i.e., a concentration of a number of different impacts in the same area) or perturbations that are so close in space that their effects overlap;
3. interactions or perturbations that have qualitatively and quantitatively different consequences for the ecosystems, ecological communities, populations, or individuals exposed to them because of synergism (when stressors produce fundamentally different effects in combination than they do individually), additivity, magnification (when a combination of stressors have effects that are more than additive), or antagonism (i.e., when two or more stressors have less effect in combination than they do individually); and
4. gradual disturbance and loss of land and habitat, or incremental and decremental effects are often, but not always, involved in each of the preceding three categories (known as "nibbling") (NRC 1986).

2.5 Action Area

The Action Area means 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 consists of waters of the United States[14], its territories (which includes American Samoa, Baker Island, Guam, Howland Island, Jarvis Island, Johnston Atoll, Midway Islands, Navassa Island, the Commonwealth of the Northern Mariana Islands, Palmyra Atoll, Puerto Rico, the U.S. Virgin Islands, and Wake Island), and its possessions, into which the Corps will authorize the discharge

[14] Here we use the term as defined in 33 CFR part 328, which defines "waters of the United States" for the purposes of the Clean Water Act, and 33 CFR part 329, which defines "navigable waters of the United States" for the purposes of Section 10 of the Rivers and Harbors Act of 1899.

of dredged and fill material. For purposes of this Opinion, we consider the action area to be the area directly or indirectly affected by the activities that the Corps authorizes under the Nationwide Permit Program; we also describe direct and indirect effects as those resulting from those discharges, or other adverse effects caused by the environmental changes those discharges cause.

The Action Area for this consultation consists of all waters of the U.S. in the United States, its territories, and its possessions (which includes American Samoa, Baker Island, Guam, Howland Island, Jarvis Island, Johnston Atoll, Midway Atoll, Navassa Island, the Commonwealth of the Northern Mariana Islands, Palmyra Atoll, Puerto Rico, the U.S. Virgin Islands, and Wake Island) where the Corps authorizes discharges of dredged and fill material or other structures or work. Waters of the U.S. extend to the outer reach of the three mile territorial sea, defined in section 502(8) of the CWA as the belt of the seas measured from the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters, and extending seaward a distance of three miles.

Although the Nationwide Permits have no specific geographic limitations within this Action Area, the New England District suspends Nationwide Permits within the District and replaces them with General Permits that are specific to the States of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont. The General Permit for activities in the State of Connecticut was finalized in July 2011 and expires in July 2016; the permit for the State of Maine expires in October 2015; the permit for the State of Massachusetts expires on January 2015 (the New England District proposed a modification to this permit in August 2011, but that modification would not change the expiration date); the permit for the State of New Hampshire expires in August 2017; the permit for the State of Rhode Island expires in February 2017; and the Permit for the State of Vermont expires in December 2017. Because of these State-specific general permits, the lands and territorial waters of the six New England States are not included in the action area for this consultation.

Because NMFS only has jurisdiction over marine, coastal, estuarine, or anadromous endangered species, threatened species and critical habitat that has been designated for those species in those ecosystems, this consultation addresses the potential effects of the Nationwide Permits in a portion of this Action Area. Specifically, we focus on the effects of the Nationwide Permits resulting from activities authorized, funded or carried out by the following 19 Corps of Engineer's Districts (moving from north to south along the Atlantic coast, east to west along the Gulf of Mexico, then south to north along the Pacific coast and excluding the New England District): New York, Philadelphia, Baltimore, Norfolk, Wilmington, Charleston, Savannah, Jacksonville, Mobile, New Orleans, Galveston, Los Angeles, Sacramento, San Francisco, Walla Walla, Portland, Seattle, Alaska, and Hawaii (see Figure 2). These 19 Districts encompass the geographic area in which endangered species, threatened species and designated critical habitat under NMFS' jurisdiction occur.

3.0 Status of Listed Resources

Table 3.1 identifies the species[15] and critical habitat designations that may be affected by the Nationwide Permits:

Table 3.1 Species and critical habitat designations considered in this consultation.
* Critical habitat that may occur in the action area is denoted by asterisk
** Proposed critical habitat denoted by double asterisk.

Common name (Distinct population segment, evolutionarily significant unit, or subspecies)	*Scientific name*	**Status**
Cetaceans		
Whale, blue	*Balaenoptera musculus*	Endangered
Whale, bowhead	*Balaena mysticetus*	Endangered
Whale, fin	*Balaenoptera physalus*	Endangered
Whale, humpback	*Megaptera novaeangliae*	Endangered
Whale, right (North Atlantic)	*Eubalaena glacialis*	Endangered
Whale, right (North Pacific)	*Eubalaena japonicus*	Endangered
Whale, sei	*Balaenoptera borealis*	Endangered
Whale, sperm	*Physeter macrocephalus*	Endangered

[15] In this section of the Biological Opinion, we use the word "species" as it has been defined in section 3 of the Endangered Species Act of 1973, which include "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature" (16 U.S.C. 1532). Pacific salmon that have been listed as endangered or threatened were listed as "evolutionarily significant units" which NMFS uses to identify distinct population segments of Pacific salmon. Nevertheless, any taxa that have been listed as an ESU or DPS qualify as a "species" for the purposes of the ESA.

Killer whale (Southern Resident*)	*Orcinus orca*	Endangered
Beluga whale (Cook Inlet*)	*Delphinapterus leucas*	Endangered
False killer whale (Hawaiian insular)	*Pseudorca crassidens*	Endangered
Pinnipeds		
Guadalupe fur seal	*Arctocephalus townsendi*	Threatened
Hawaiian monk seal*,**	*Monachus schauinslandi*	Endangered
Steller sea lion (Western*)	*Eumetopias jubatus*	Endangered
Bearded seal (Beringia) [16]	*Erignathus barbatus nauticus*	Threatened
Ringed seal (Arctic)	*Phoca hispida hispida*	Threatened
Sea turtles		
Green sea turtle (Florida & Mexico's Pacific coast colonies)	*Chelonia mydas*	Endangered
Green sea turtle (all other areas*)		Threatened
Hawksbill sea turtle*	*Eretmochelys imbricate*	Endangered
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered
Leatherback sea turtle*	*Dermochelys coriacea*	Endangered
Loggerhead sea turtle (North Pacific Ocean)	*Caretta caretta*	Endangered
Loggerhead sea turtle (Northwest Atlantic Ocean*)		Threatened

[16] On July 25, 2014, the U.S. District Court for the District of Alaska issued a memorandum decision in a lawsuit challenging the listing of bearded seals under the ESA (Alaska Oil and Gas Association v. Pritzker, Case No. 4:13-cv-00018-RPB). The decision vacated NMFS's listing of the Beringia DPS of bearded seals as a threatened species. NMFS has appealed that decision to the U.S. Court of Appeals for the Ninth Circuit. In the interim, this Biological Opinions continues to address effects to bearded seals so that the Corps has the benefit of NMFS's analysis of the consequences of proposed actions on this DPS, even though the listing of the species is not in effect.

Olive ridley sea turtle (Mexico's Pacific coast breeding colonies)	*Lepidochelys olivacea*	Endangered
Olive ridley sea turtle (all other areas)		Threatened
Sturgeons		
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered
Green sturgeon (southern*)	*Acipenser medirostris*	Threatened
Gulf sturgeon*	*Acipenser oxyrhinchus desotoi*	Threatened
Atlantic sturgeon (Gulf of Maine DPS[17])	*Acipenser oxyrinchus*	Threatened
Atlantic sturgeon (New York Bight)		Endangered
Atlantic sturgeon (Chesapeake Bay)		Endangered
Atlantic sturgeon (Carolina)		Endangered
Atlantic sturgeon (South Atlantic)		Endangered
Salmonids		
Chinook salmon (CA Coastal*)	*Oncorhynchus tshawytscha*	Threatened
Chinook salmon (Central Valley Spring-run*)		Threatened
Chinook salmon (Lower Columbia River*)		Threatened
Chinook salmon (Upper Columbia River Spring-run*)		Endangered
Chinook salmon (Puget Sound*)		Threatened

[17] Distinct Population Segment: A DPS, or a distinct population segment, is a vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species. The ESA provides for listing species, subspecies or distinct population segments of vertebrate species.

Chinook salmon (Sacramento River Winter-run*)		Endangered
Chinook salmon (Snake River Fall-run*)		Threatened
Chinook salmon (Snake River Spring/Summer-run*)		Threatened
Chinook salmon (Upper Willamette River*)		Threatened
Chum salmon (Columbia River*)	*Oncorhynchus keta*	Threatened
Chum salmon (Hood Canal Summer-run*)		Threatened
Coho salmon (Central CA Coast*)	*Oncorhynchus kisutsch*	Endangered
Coho salmon (Lower Columbia River**)		Threatened
Coho salmon (Southern Oregon & Northern California Coast*)		Threatened
Coho salmon (Oregon Coast*)		Threatened
Sockeye salmon (Ozette Lake*)	*Oncorhynchus nerka*	Threatened
Sockeye salmon (Snake River*)		Endangered
Steelhead (Central California Coast*)	*Oncorhynchus mykiss*	Threatened
Steelhead (California Central Valley*)		Threatened
Steelhead (Lower Columbia River*)		Threatened
Steelhead (Middle Columbia River*)		Threatened
Steelhead (Northern California*)		Threatened
Steelhead (Puget Sound)		Threatened
Steelhead (Snake River*)		Threatened

Steelhead (South-Central California Coast*)		Threatened
Steelhead (Southern California*)		Threatened
Steelhead (Upper Columbia River*)		Threatened
Steelhead (Upper Willamette River*)		Threatened
Other fishes		
Bocaccio (Georgia Basin*)	*Sebastes paucispinus*	Endangered
Canary rockfish (Georgia Basin*)	*Sebastes ruberrimus*	Threatened
Nassau grouper	*Epinephelus striatus*	Proposed Threatened
Pacific eulachon (Southern DPS*)	*Thaleichthys pacificus*	Threatened
Scalloped hammerhead shark (Central & Southwest Atlantic)	*Sphyrna lewini*	Threatened
Scalloped hammerhead shark (Eastern Pacific)		Endangered
Scalloped hammerhead shark (Indo-West Pacific)		Threatened
Smalltooth sawfish*	*Pristis pectinata*	Endangered
Yelloweye rockfish (Georgia Basin*)	*Sebastes pinniger*	Threatened
Marine invertebrates		
N/A	*Acropora globiceps*	Threatened
N/A	*Acropora jacquelineae*	Threatened
N/A	*Acropora retusa*	Threatened
N/A	*Acropora rudis*	Threatened
N/A	*Acropora speciosa*	Threatened
N/A	*Euphyllia paradivisa*	Threatened
N/A	*Isopora crateriformis*	Threatened
N/A	*Pavona diffluens*	Threatened

N/A	*Seriatopora aculeate*	Threatened
Boulder star coral	*Orbicella franksi*	Threatened
Elkhorn coral*	*Acropora palmata*	Threatened
Lobed star coral	*Orbicella annularis*	Threatened
Mountainous star coral	*Orbicella faveolata*	Threatened
Pillar coral	*Dendrogyra cylindrus*	Threatened
Rough cactus coral	*Mycetophyllia ferox*	Threatened
Staghorn coral*	*Acropora cervicornis*	Threatened
White abalone	*Haliotis sorenseni*	Endangered
Black abalone*	*Haliotis cracherodii*	Endangered
Marine plant		
Johnson's seagrass*	*Halophila johnsonii*	Threatened

3.1 Species and Designated Critical Habitat Not Considered in this Biological Opinion

As described in the *Approach to the Assessment*, NMFS uses two criteria to identify those endangered or threatened species or critical habitat that are not likely to be adversely affected by the various activities that would be authorized by the current Nationwide Permits. The first criterion was *exposure* or some reasonable expectation of a co-occurrence between one or more potential stressor associated with the activities that would be authorized by the proposed permits and a particular listed species or designated critical habitat. The second criterion is the probability of a *response* given exposure, which considers *susceptibility*: species that may be exposed to sound transmissions from active sonar, for example, but are likely to be unaffected by the sonar (at sound pressure levels they are likely to be exposed to) are also not likely to be adversely affected by the sonar.

More particularly, we apply the following standards to determine if the proposed action is not likely to adversely affect listed species or designated critical habitat: all of the effects of the action are expected to be discountable, insignificant or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. We applied these criteria to the species listed at the beginning of this section; this subsection summarizes the results of those evaluations.

3.1.1 Atlantic Salmon (Gulf of Maine DPS) and Critical Habitat

Atlantic salmon are an anadromous species: spawning and juvenile rearing occur in freshwater rivers followed by migration to the marine environment. This listing includes wild Atlantic salmon found in rivers and streams from the lower Kennebec River north to the border between the U.S. and Canada, including the Dennys, East Machias, Machias, Pleasant, Narraguagus, Ducktrap, and Sheepscot Rivers and Cove Brook. While at sea, Atlantic salmon undertake extensive migrations to waters off Canada and Greenland. Data from past commercial harvest indicate that post-smolts overwinter in the southern Labrador Sea and in the Bay of Fundy. Juvenile salmon in New England rivers typically migrate to sea in May after a two to three year period of development in freshwater streams, and remain at sea for two winters before returning to their U.S. natal rivers to spawn from mid-October through early November.

The abundance of wild, Gulf of Maine Atlantic salmon is perilously small: the total run size of spawning adults in this species numbered approximately 150 animals in 1999 (NRC 2004). Since 1992, no wild Atlantic salmon have been caught in commercial fisheries or by research or survey vessels within the distribution of this species. Because of their current distribution, these Atlantic salmon might only co-occur with activities that would be authorized by the Corps' New England District. As we discussed in the preceding section (Action Area), the New England District suspends Nationwide Permits within the District and replaces them with General Permits that are specific to the States of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont. Atlantic salmon would be exposed to activities authorized by these General Permits (particularly activities authorized by the General Permit for the State of Maine) rather than the activities authorized by the Nationwide Permits, and a separate section 7 consultation on any such General Permit would be conducted. As a result, we do not consider this species further in this consultation.

Critical habitat was designated for Atlantic salmon (Gulf of Maine DPS) in 2009 (74 FR 29300) to include all perennial rivers, streams, and estuaries and lakes connected to the marine environment within the range of the DPS, except for those particular areas within the range that are specifically excluded. The primary constituent elements (PCEs) include sites for spawning and incubation, sites for juvenile rearing, and sites for migration. The essential physical and biological features of habitat are those features that allow Atlantic salmon to successfully use sites for spawning and rearing and sites for migration. These features include substrate of suitable size and quality; rivers and streams of adequate flow, depth, water temperature and water quality; rivers, streams, lakes and ponds with sufficient space and diverse, abundant food resources to support growth and survival; waterways that allow for free migration of both adult and juvenile Atlantic salmon; and diverse habitat and native fish communities in which salmon interact with while feeding, migrating, spawning, and resting. The entire occupied range of the DPS in which critical habitat is designated is within the State of Maine. As discussed above, the New England District suspends Nationwide Permits within the District and replaces them with General Permits (including those specific to the State of Maine). Atlantic salmon (Gulf of Maine DPS) critical habitat would be exposed to activities authorized by these General Permits rather than the activities authorized by the Nationwide Permits, and again, would be subject to separate section 7 consultations. As a result, we do not consider this critical habitat further in this consultation.

3.1.2 Largetooth Sawfish

Largetooth sawfish is an elasmobranch species often found in brackish water near river mouths and large bays, preferring partially enclosed waters, lying in deeper holes and on bottoms of mud or muddy sand (Bigelow and Schroeder 1953). The species was listed as endangered under the ESA on July 12, 2011 (76 FR 40822) largely due to habitat alteration, bycatch, trade and the inadequacy of existing regulatory mechanisms to address and reduce habitat alterations, bycatch and trade. Historically, largetooth sawfish are thought to inhabit warm temperate to tropical marine waters in the eastern and western Atlantic and Caribbean. In the western Atlantic, this species occurred from the Caribbean and Gulf of Mexico south through Brazil (Burgess and Curtis 2003; Burgess *et al.* 2009). This species, like the smalltooth sawfish, is highly mangrove-associated (Burgess *et al.* 2009). Though their habitats once overlapped in the northern Gulf of Mexico, the largetooth sawfish historically had a more southerly range than the smalltooth sawfish and appears to have a more narrow seasonal migration pattern.

Currently, largetooth sawfish are thought to primarily occur in freshwater habitats in Central (includes Mexico) and South America and West Africa. Though reported in the United States, it appears that largetooth sawfish was never as abundant as smalltooth sawfish, with approximately 39 confirmed records (33 in Texas) from 1910 through 1961, with no confirmed sightings in U.S. waters in the years since (Burgess *et al.* 2009). We believe it is extremely unlikely that these species will be exposed to effects from the Nationwide Permits given its current range and the fact that not a single individual has been identified in U.S. waters since 1961. Therefore, the proposed action is not likely to adversely affect largetooth sawfish and this species will not be considered further in this Biological Opinion.

3.2 Introduction to the Status Assessment

The rest of this section of our Biological Opinion consists of narratives for each of the threatened and endangered species and designated critical habitat that are likely to occur in the action area and that may be adversely affected by activities that would be authorized by the Nationwide Permits. Each narrative contains a summary of the global status of the species and any critical habitat that has been designated for those species.

The summary of the global status of the species contains information on the distribution, population structure and threat regime to support our assessment of the species' global status. This information also allows us to determine where the distribution of these species overlaps with the distribution of the activities that would be authorized by the Nationwide Permits and to identify where appropriate specific populations that might be exposed to those activities. More complete reviews of the literature on the different species and critical habitat designations are available in five-year status reviews, listing documents, and recovery plans for the species we discuss or in the public literature.

3.2.1 Whale, Blue

Blue whales were listed as endangered under the ESA in 1973 (35 FR 18319). We used information available in the stock assessment and status review reports and other information to summarize the status of the species, as follows.[18]

Distribution

In the western North Atlantic Ocean, blue whales are found from the Arctic to at least the mid-latitude waters of the North Atlantic (CeTAP 1982, Wenzel *et al.* 1988, Yochem and Leatherwood 1985, Gagnon and Clark 1993). Blue whales have been observed frequently off eastern Canada, particularly in waters off Newfoundland, during the winter. In the summer month, they have been observed in Davis Strait (Mansfield 1985), the Gulf of St. Lawrence (from the north shore of the St. Lawrence River estuary to the Strait of Belle Isle), and off eastern Nova Scotia (Sears *et al.* 1987). In the eastern North Atlantic Ocean, blue whales have been observed off the Azores Islands, although Reiner *et al.* (1993) do not consider them common in that area.

At least three subspecies of blue whales have been identified based on body size and geographic distribution (*B. musculus intermedia*, which occurs in the higher latitudes of the Southern Oceans, *B. m. musculus*, which occurs in the Northern Hemisphere, and *B. m. brevicauda* which occurs in the mid-latitude waters of the southern Indian Ocean and north of the Antarctic convergence), but this consultation will treat them as a single entity. Readers who are interested in these subspecies will find more information in Gilpatrick *et al.* (1997), Kato *et al*. (1995), Omura *et al*. (1970) and Ichihara (1966).

In addition to these subspecies, the International Whaling Commission's (IWC) Scientific Committee has formally recognized one blue whale population in the North Pacific (Donovan 1991), although there is increasing evidence that more than there may be more than one blue whale population in the Pacific Ocean (Gilpatrick *et al.* 1997, Barlow *et al.* 1995, Mizroch *et al.* 1984a, Ohsumi and Wada 1974). For example, studies of the blue whales that winter off Baja California and in the Gulf of California suggest that these whales are morphologically distinct from blue whales of the western and central North Pacific (Gilpatrick *et al.* 1997), although these differences might result from differences in the productivity of their foraging areas more than genetic differences (the southern whales forage off California; Sears *et al.* 1987; Barlow *et al.* 1997; Calambokidis *et al.* 1990).

A population or "stock" of endangered blue whales occurs in waters surrounding the Hawaiian archipelago (from the main Hawaiian Islands west to at least Midway Island), although blue whales are rarely reported from Hawaiian waters. The only reliable report of this species in the central North Pacific was a sighting made from a scientific research vessel about 400 km northeast of Hawaii in January 1964 (NMFS 1998). However, acoustic monitoring has recorded blue whales off Oahu and the Midway Islands much more recently (Barlow *et al.* 1994, McDonald and Fox 1999, Northrop *et al.* 1971; Thompson and Friedl 1982).

The recordings made off Oahu showed bimodal peaks throughout the year, suggesting that the animals were migrating into the area during summer and winter (Thompson and Friedl 1982;

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[18] See http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/bluewhale.htm for more information.

McDonald and Fox 1999). Twelve aerial surveys were flown within 25 nm^2 of the main Hawaiian Islands from 1993-1998 and no blue whales were sighted. Nevertheless, blue whale vocalizations that have been recorded in these waters suggest that the occurrence of blue whales in these waters may be higher than blue whale sightings. There are no reports of blue whales strandings in Hawaiian waters.

The IWC also groups all of the blue whales in the North Atlantic Ocean into one "stock" and groups blue whales in the Southern Hemisphere into six "stocks" (Donovan 1991), which are presumed to follow the feeding distribution of the whales.

Status

Blue whales were listed as endangered under the ESA in 1973. Blue whales are listed as endangered on the IUCN Red List of Threatened Animals (Baillie and Groombridge 1996). They are also protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Marine Mammal Protected Act (MMPA). Critical habitat has not been designated for blue whales.

It is difficult to assess the status of blue whales because (1) there is no general agreement on the size of the blue whale population prior to whaling and (2) estimates of the current size of the different blue whale populations vary widely. We may never know the size of the blue whale population prior to whaling, although some authors have concluded that their population consisted of about 200,000 animals before whaling. Similarly, estimates of the global abundance of blue whales are uncertain. Since the cessation of whaling, the global population of blue whales has been estimated to range from 11,200 to 13,000 animals (Maser *et al.* 1981; U. S. Department of Commerce 1983). These estimates, however, are more than 20 years old.

A lot of uncertainty surrounds estimates of blue whale abundance in the North Pacific Ocean. Barlow (1994) estimated the North Pacific population of blue whales at between 1,400 and 1,900. Barlow and Calambokidis (1995) estimated the abundance of blue whales off California at 2,200 individuals. Wade and Gerrodette (1993) and Barlow *et al.* (1997) estimated there were a minimum of 3,300 blue whales in the North Pacific Ocean in the 1990s. Most recently, Calambokidis *et al.* (2010) estimated that the eastern North Pacific stock size is increasing at approximately 3% per year and the most recent population estimate is 2,497 (Waring 2011).

The size of the blue whale population in the north Atlantic is also uncertain. The population has been estimated to number from a few hundred individuals (Allen 1970; Mitchell 1974) to 1,000 to 2,000 individuals (Sigurjónsson 1995). Gambell (1976) estimated there were between 1,100 and 1,500 blue whales in the North Atlantic before whaling began and Braham (1991) estimated there were between 100 and 555 blue whales in the North Atlantic during the late 1980s and early 1990s. Sears *et al.* (1987) identified over 300 individual blue whales in the Gulf of St. Lawrence, which provides a minimum estimate for their population in the North Atlantic. Sigurjónsson and Gunnlaugson (1990) concluded that the blue whale population had been increasing since the late 1950s and argued that the blue whale population had increased at an annual rate of about 5 percent between 1979 and 1988, although the level of confidence we can place in these estimates is low.

Estimates of the number of blue whales in the Southern Hemisphere range from 5,000 to 6,000 (review by Yochem and Leatherwood 1985) with an average rate of increase that has been estimated at between 4 and 5 percent per year. Butterworth *et al.* (1993), however, estimated the Antarctic population at 710 individuals. More recently, Stern (2001) estimated the blue whale population in the Southern Ocean at between 400 and 1,400 animals (c.v. 0.4). The pygmy blue whale population has been estimated at 6,000 individuals (Yochem and Leatherwood 1985)

The information available on the status and trend of blue whales do not allow us to reach any conclusions about the extinction risks facing blue whales as a species, or particular populations of blue whales. With the limited data available on blue whales, we do not know whether these whales exist at population sizes large enough to avoid demographic phenomena that are known to increase the extinction probability of species that exist as "small" populations (that is, "small" populations experience phenomena such as demographic stochasticity, inbreeding depression, Allee effects, among others, that cause their population size to become a threat in and of itself) or if blue whales are threatened more by exogenous threats such as anthropogenic activities (primarily whaling, entanglement, and ship strikes) or natural phenomena (such as disease, predation, or changes in the distribution and abundance of their prey in response to changing climate).

3.2.2 Whale, Bowhead

Bowhead whales were listed as endangered species on June 2, 1970 (35 FR 8495). Bowhead whales received further protection under CITES. Critical habitat has not been designated for bowhead whales. We used information available in the stock assessment and status review reports and other information to summarize the status of the species, as follows[19].

Distribution

Bowhead whales were historically found in all arctic waters of the northern hemisphere. The Bering Sea population, which is also known as the western Arctic or Bering-Chukchi-Beaufort population, has been studied more than any other bowhead whale population. This population winters in the central and western Bering Sea (November to April) and migrates north and east through the eastern Chukchi Sea to the Beaufort Sea along the coast of Alaska and northwestern Canada (Brueggeman 1982, Braham *et al.* 1984). From June through September, these bowhead whales remain on foraging grounds in the eastern Beaufort Sea before migrating back to their wintering grounds in the Bering Sea (Hazard and Cubbage 1982; Richardson *et al.* 1987).

Bowhead whales in the western North Atlantic are currently segregated into two populations: the Davis Strait population occupies the Davis Strait, Baffin Bay and the Canadian Arctic Archipelago while the Hudson Bay population occupies Hudson Strait, Hudson Bay and Foxe Basin (Moore and Reeves 1993).

The Spitsbergen bowhead whale population, which is also known as the Greenland whale, bowhead whales in the eastern North Atlantic have been observed in the waters north of Iceland and as far east as the Laptev Sea. Shelden and Rugh (1995) reported sightings along the

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[19] See http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/bowheadwhale.htm for more information.

coastline of Greenland, in the waters near Spitsbergen Island, off North Cape in northern Norway, in the waters of Zemlya Frantsa-losifa (Franz Josef Land), near Novaya Zemlya, and near Severnaya Zemlya.

Bowhead whales are known to exist as five separate populations: (1) Sea of Okhotsk, which occurs in the north Pacific Ocean off the western coast of Siberia near the Kamchatka Peninsula; (2) Bering Sea; (3) Hudson Bay; (4) Davis Strait, which is found in Davis Strait, Baffin Bay, and along the Canadian Arctic Archipelago; and (5) Spitsbergen, which is found in the North Atlantic Ocean east of Greenland in the Greenland, Kara, and Barents Seas (IWC 1992). A separate Bering Sea population may have become extinct because of whaling activities, except for the component that migrated to the Beaufort Sea.

Status

Before exploitation, the Sea of Okhotsk population may have numbered between 3,000 and 6,500 animals (Shelden and Rugh 1995); it is now estimated to number between 300 and 400 animals (although these population estimates are not reliable). Individuals from this population may have mixed with individuals from the Bering Sea population, although the available evidence indicates the two stocks are essentially separate (Moore and Reeves 1993).

The Bering Sea population of bowhead whales declined from an estimated population of 10,400 to 23,000 animals (Woodby and Botkin 1993); by 1910, this population had been reduced to a few thousand individuals. From 1978 to 1983, this population was estimated to have numbered between 3,500 to 5,300 animals based on shore-based visual surveys (Zeh *et al.* 1993). The IWC Scientific Committee now recognizes the current population estimate to be 16,892 whales (95% C.I.: 15,704-18,928) (IWC 2014).

The Spitsbergen population was reduced from 24,000 to a few "tens" of whales and has not recovered in the past 80 years. The Davis Strait and Hudson Bay populations declined from about 12,300 whales to less than 450, although significant whaling has not occurred in 80 years. There are no reliable estimates of the size of the Hudson Bay population of bowhead whales, although Mitchell (1977) conservatively estimates it at 100 or less. More recently, this population has been estimated to number from 256 to 284 whales within Foxe Basin (Cosens *et al.* 1997).

The Davis Strait population is separated from the Bering Sea population by the heavy ice found across the Northwest Passage (Moore and Reeves 1993). The population was estimated to have originally numbered over 11,700 (Woodby and Botkin 1993) but was significantly reduced by commercial whaling between 1719 and 1915. The Davis Strait population is currently estimated to be 350 animals (Zeh *et al.* 1993) and recovery is described as "at best, exceedingly slow" (Davis and Koski 1980). Canadian Inuit have expressed an interest in resuming subsistence hunting of bowhead whales in Davis Strait, although the IWC has not acted on this request.

The Spitsbergen population of bowhead whales was believed to have been the most numerous of the bowhead whale populations: before they were hunted by whalers, they are estimated to have numbered about 24,000 animals (Woodby and Botkin 1993). Between 1940 and September 1990, 37 bowhead whale sightings have been reported from this region (Moore and Reeves 1993). With a population size numbering in the tens of animals, the Spitsbergen population of bowhead whales is now critically endangered (Shelden and Rugh 1995).

3.2.3 Whale, Fin

The fin whale is a large, widely distributed baleen whale, comprised of two (or possibly three) subspecies. Fin whales are found in deep, offshore waters of all major oceans, primarily in temperate to polar latitudes. The species was originally listed as endangered on December 2, 1970 (35 FR 18319). We used information available in the recovery plan (NMFS 2010b), the five-year review (NMFS 2011a) and recent stock assessment reports to summarize the status of the species, as follows.

Distribution

In the North Atlantic Ocean, fin whales occur in summer foraging areas from the coast of North America to the Arctic, around Greenland, Iceland, northern Norway, Jan Meyers, Spitzbergen and the Barents Sea. In the western Atlantic, they winter from the edge of sea ice south to the Gulf of Mexico and the West Indies. In the eastern Atlantic, they winter from southern Norway, the Bay of Biscay and Spain with some whales migrating into the Mediterranean Sea (Gambell 1985).

Fin whales are common off the Atlantic coast of the United States in waters immediately off the coast seaward to the continental shelf (about the 1,000-fathom contour). In this region, they tend to occur north of Cape Hatteras where they accounted for about 46 percent of the large whales observed in surveys conducted between 1978 and 1982. During the summer months, fin whales in this region tend to congregate in feeding areas between 41°20'N and 51°00'N, from shore seaward to the 1,000-fathom contour.

In the Atlantic Ocean, Clark (1995) reported a general southward pattern of fin whale migration in the fall from the Labrador and Newfoundland region, south past Bermuda, and into the West Indies. The overall distribution may be based on prey availability, and fin whales are found throughout the action area for this consultation in most months of the year. This species preys opportunistically on both invertebrates and fish (Watkins *et al.* 1984). They feed by filtering large volumes of water for the associated prey. Fin whales are larger and faster than humpback and right whales and are less concentrated in nearshore environments.

In the North Atlantic Ocean, the IWC recognizes seven management units or “stocks” of fin whales: (1) Nova Scotia, (2) Newfoundland-Labrador, (3) West Greenland, (4) East Greenland-Iceland, (5) North Norway, (6) West Norway-Faroe Islands and (7) British Isles-Spain-Portugal. In addition, the population of fin whales that resides in the Ligurian Sea, in the northwestern Mediterranean Sea is believed to be genetically distinct from other fin whales populations (as used in this Biological Opinion, “populations” are isolated demographically, meaning, they are driven more by internal dynamics — birth and death processes — than by the geographic redistribution of individuals through immigration or emigration. Some usages of the term “stock” are synonymous with this definition of “population” while other usages of “stock” do not).

In the North Pacific Ocean, the IWC recognizes two “stocks”: (1) East China Sea and (2) rest of the North Pacific (Donovan, 1991). However, Mizroch *et al.* (1984) concluded that there were five possible “stocks” of fin whales within the North Pacific based on histological analyses and tagging experiments: (1) East and West Pacific that intermingle around the Aleutian Islands; (2) East China Sea; (3) British Columbia; (4) Southern-Central California to Gulf of Alaska; and (5) Gulf of California. Based on genetic analyses, Berube *et al.* (1998) concluded that fin whales in the Sea of Cortez represent an isolated population that has very little genetic exchange with other populations in the North Pacific Ocean (although the geographic distribution of this population and other populations can overlap seasonally). They also concluded that fin whales in the Gulf of St. Lawrence and Gulf of Maine are distinct from fin whales found off Spain and in the Mediterranean Sea.

Regardless of how different authors structure the fin whale population, mark-recapture studies have demonstrated that individual fin whales migrate between management units (Mitchell 1974; Gunnlaugsson and Sigurjónsson 1989), which suggests that these management units are not geographically isolated populations.

Status

Two subspecies of fin whales are recognized (Northern Hemisphere and Southern Hemisphere), North Atlantic, North Pacific and Southern Hemisphere fin whales appear to be reproductively isolated. Of the 3 – 7 stocks in the North Atlantic (N ~ 50,000), one occurs in U.S. waters, where the best estimate of abundance is 3,985 whales. There are three stocks in U.S. Pacific waters: Alaska (N_{min} =5,700), Hawaii (N_{min} = 101) and California/Oregon/Washington (N_{min} = 3,269). Abundance appears to be increasing in Alaska (4.8 percent annually) and possibly California. Trends are not available for other stocks due to insufficient data. Abundance data for the Southern Hemisphere stock are limited; however, there were an estimated 85,200 whales in 1970.

The fin whale is endangered because of past commercial whaling. In the North Atlantic, at least 55,000 fin whales were killed between 1910 and 1989. In the North Pacific, at least 74,000 whales were killed between 1910 and 1975. Approximately 704,000 whales were killed in the Southern Hemisphere from 1904 to 1975. Fin whales are still killed under the IWC's "aboriginal subsistence whaling" in Greenland, under Japan's scientific whaling program, and via Iceland's formal reservation to the Commission's ban on commercial whaling. Additional threats include: ship strikes, reduced prey availability due to overfishing or climate change, and noise. Though the original cause of endangerment remains, whaling has been significantly reduced. Its large population size may provide some resilience to current threats, but trends are largely unknown.

Fin whales were listed as endangered under the ESA in 1970. In 1976, the IWC protected fin whales from commercial whaling (Allen 1980). Fin whales are listed as endangered on the IUCN Red List of Threatened Animals (Baillie and Groombridge 1996). They are also protected by CITES and the MMPA. Critical habitat has not been designated for fin whales.

It is difficult to assess the status of fin whales because (1) there is no general agreement on the size of the fin whale population prior to whaling and (2) estimates of the current size of the different fin whale populations vary widely. We may never know the size of the fin whale population prior to whaling. Chapman (1976) estimated the "original" population size of fin whales off Nova Scotia as 1,200 and 2,400 off Newfoundland, although he offered no explanation or reasoning to support that estimate. Sergeant (1977) suggested that between 30,000 and 50,000 fin whales once populated the North Atlantic Ocean based on assumptions about catch levels during the whaling period. Sigurjónsson (1995) estimated that between 50,000 and 100,000 fin whales once populated the North Atlantic, although he provided no data or evidence to support that estimate. More recently, Palumbi and Roman (2006) estimated that about 360,000 fin whales (95% confidence interval = 249,000 - 481,000) populated the North Atlantic Ocean before whaling based on mutation rates and estimates of genetic diversity.

Similarly, estimates of the current size of the different fin whale populations and estimates of their global abundance also vary widely. The recovery plan for fin whales (75 FR 47538) accepts a minimum population estimate of 2,362 fin whales for the North Atlantic Ocean; however, the recovery plan also states that this estimate, which is based on shipboard and aerial surveys conducted in the Georges Bank and Gulf of St. Lawrence in 1999 is the "best" estimate of the size of this fin whale population (NMFS 2007). However, based on data produced by surveys conducted between 1978-1982 and other data gathered between 1966 and 1989, Hain *et al.* (1992) estimated that the population of fin whales in the western North Atlantic Ocean (specifically, between Cape Hatteras, North Carolina, and Nova Scotia) numbered about 1,500 whales in the winter and 5,000 whales in the spring and summer. Because authors do not always reconcile "new" estimates with earlier estimates, it is not clear whether the current "best" estimate represents a refinement of the estimate that was based on older data or whether the fin whale population in the North Atlantic has declined by about 50% since the early 1980s.

The East Greenland-Iceland fin whale population was estimated at 10,000 animals (95% confidence interval = 7,600 - 14,200), based on surveys conducted in 1987 and 1989 (Buckland *et al.* 1992). The number of eastern Atlantic fin whales, which includes the British Isles-Spain-Portugal population, has been estimated at 17,000 animals (95% confidence interval = 10,400 - 28,900; Buckland *et al.* 1992). These estimates are both more than 15 years old and the data available do not allow us to determine if they remain valid.

Forcada *et al.* (1996) estimated the fin whale population in the western Mediterranean numbered 3,583 individuals (standard error = 967; 95% confidence interval = 2,130-6,027). This is similar to a more recent estimate published by Notarbartolo-di-Sciara *et al.* (2003). Within the Ligurian Sea, which includes the Pelagos Sanctuary for Marine Mammals and the Gulf of Lions, the fin whale population was estimated to number 901 (standard error = 196.1) whales (Forcada *et al.* 1995).

The best abundance estimate available for the Western North Atlantic stock is 2,269 (CV = 0.37) from August 2006 with a minimum population estimate of 1,678 (Waring *et al.* 2010). However, based on data produced by surveys conducted between 1978-1982 and other data gathered between 1966 and 1989, Hain *et al.* (1992) estimated that the population of fin whales in the western North Atlantic Ocean (specifically, between Cape Hatteras, North Carolina, and Nova Scotia) numbered about 1,500 whales in the winter and 5,000 whales in the spring and summer. Because authors do not always reconcile "new" estimates with earlier estimates, it is not clear whether the current "best" estimate represents a refinement of the estimate that was based on older data or whether the fin whale population in the North Atlantic has declined by about 50% since the early 1980s.

Regardless of which of these estimates, if any, have the closest correspondence to the actual size and trend of the fin whale population, all of these estimates suggest that the global population of fin whales consists of tens of thousands of individuals and that the North Atlantic population consists of at least 2,000 individuals. Based on ecological theory and demographic patterns derived from several hundred imperiled species and populations, fin whales appear to exist at population sizes that are large enough to avoid demographic phenomena that are known to increase the extinction probability of species that exist as "small" populations (that is, "small" populations experience phenomena such as demographic stochasticity, inbreeding depression, Allee effects, among others, that cause their population size to become a threat in and of itself). As a result, we assume that fin whales are likely to be threatened more by exogenous threats such as anthropogenic activities (primarily whaling, entanglement, and ship strikes) or natural phenomena (such as disease, predation, or changes in the distribution and abundance of their prey in response to changing climate) than endogenous threats caused by the small size of their population.

Nevertheless, based on the evidence available, the number of fin whales that are recorded to have been killed or injured in the past 20 years by human activities or natural phenomena, does not appear to be increasing the extinction probability of fin whales, although it may slow the rate at which they recover from population declines that were caused by commercial whaling.

3.2.4 Whale, Humpback

On August 29, 2013, NMFS initiated a status review of the North Pacific population to determine whether to identify the population as a DPS and to delist it. We used information available in the recovery plan (NMFS 1991) and recent stock assessment reports to summarize the status of the species, as follows.

Distribution

Humpback whales are a cosmopolitan species that occur in the Atlantic, Indian, Pacific and Southern Oceans. Humpback whales migrate seasonally between warmer, tropical or sub-tropical waters in winter months (where they reproduce and give birth to calves) and cooler, temperate or sub-Arctic waters in summer months (where they feed). In their summer foraging areas and winter calving areas, humpback whales tend to occupy shallower, coastal waters; during their seasonal migrations, however, humpback whales disperse widely in deep, pelagic waters and tend to avoid shallower coastal waters (Winn and Reichley 1985).

In the North Pacific Ocean, the summer range of humpback whales includes coastal and inland waters from Point Conception, California, north to the Gulf of Alaska and the Bering Sea, and west along the Aleutian Islands to the Kamchatka Peninsula and into the Sea of Okhotsk (Tomlin 1967, Nemoto 1957, Johnson and Wolman 1984 as cited in NMFS 1991b). These whales migrate to Hawaii, southern Japan, the Mariana Islands and Mexico during the winter.

In the Atlantic Ocean, humpback whales range from the mid-Atlantic bight, the Gulf of Maine, across the southern coast of Greenland and Iceland, and along coast of Norway in the Barents Sea. These humpback whales migrate to the western coast of Africa and the Caribbean Sea during the winter.

In the Southern Ocean, humpback whales occur in waters off Antarctica. These whales migrate to the waters off Venezuela, Brazil, southern Africa, western and eastern Australia, New Zealand and islands in the southwest Pacific during the austral winter. A separate population of humpback whales appears to reside in the Arabian Sea in the Indian Ocean off the coasts of Oman, Pakistan and India (Mikhalev 1997).

Descriptions of the population structure of humpback whales differ depending on whether an author focuses on where humpback whales winter or where they feed. During winter months in northern or southern hemispheres, adult humpback whales migrate to specific areas in warmer, tropical waters to reproduce and give birth to calves. During summer months, humpback whales migrate to specific areas in northern temperate or sub-arctic waters to forage. In summer months, humpback whales from different "reproductive areas" will congregate to feed; in the winter months, whales will migrate from different foraging areas to a single wintering area. In either case, humpback whales appear to form "open" populations; that is, populations that are connected through the movement of individual animals.

North Pacific Ocean

NMFS' Stock Assessment Reports recognize four "stocks" of humpback whales in the North Pacific Ocean, based on genetic and photo-identification studies: two Eastern North Pacific stocks, one Central North Pacific stock, and one Western Pacific stock (Hill and DeMaster 1998). The first two of these "stocks" are based on where these humpback whales winter: the central North Pacific "stock" winters in the waters around Hawaii while the eastern North Pacific "stock" (also called the California-Oregon-Washington-Mexico stock) winters along coasts of Central America and Mexico. However, Calambokidis *et al.* (1997) identified humpback whales from Southeast Alaska (central North Pacific), the California-Oregon-Washington (eastern North Pacific), and Ogasawara Islands (Japan, Western Pacific) groups in the Hawaiian Islands during the winter; humpback whales from the Kodiak Island, Southeast Alaska, and British Columbia groups in the Ogasawara Islands; and whales from the British Columbia, Southeast Alaska, Prince William Sound, and Shumagin-Aleutian Islands groups in Mexico.

A "population" of humpback whales winters in an area extending from the South China Sea east through the Philippines, Ryukyu Retto, Ogasawara Gunto, Mariana Islands and Marshall Islands (Rice 1998). Based on whaling records, humpback whales wintering in this area have also occurred in the southern Marianas through the month of May (Eldredge 1991). There are several recent records of humpback whales in the Mariana Islands, at Guam, Rota and Saipan during January through March (Darling and Mori 1993; Eldredge 1991, 2003; Taitano 1991). During the summer, whales from this population migrate to the Kuril Islands, Bering Sea, Aleutian Islands, Kodiak, Southeast Alaska and British Columbia to feed (Angliss and Outlaw 2007, Calambokidis 1997, 2001).

North Atlantic Ocean

In the Atlantic Ocean, humpback whales aggregate in four feeding areas in the summer months: (1) Gulf of Maine, eastern Canada, (2) west Greenland, (3) Iceland and (4) Norway (Katona and Beard 1990, Smith *et al.* 1999). The principal breeding range for these whales lies from the Antilles and northern Venezuela to Cuba (Winn *et al.* 1975, Balcomb and Nichols 1982, Whitehead and Moore 1982). The largest contemporary breeding aggregations occur off the Greater Antilles where humpback whales from all of the North Atlantic feeding areas have been identified from photographs (Katona and Beard 1990, Clapham *et al.* 1993b, Mattila *et al.* 1994, Palsbøll *et al.* 1997, Smith *et al.* 1999, Stevick *et al.* 2003a). Historically, an important breeding aggregation was located in the eastern Caribbean based on the important humpback whale fisheries this region supported (Mitchell and Reeves 1983, Reeves *et al.* 2001, Smith and Reeves 2003). Although sightings persist in those areas, modern humpback whale abundance appears to be low (Winn *et al.* 1975, Levenson and Leapley 1978, Swartz *et al.* 2003). Winter aggregations also occur at the Cape Verde Islands in the Eastern North Atlantic (Reiner *et al.* 1996, Reeves *et al.* 2002, Moore *et al.* 2003). In another example of the "open" structure of humpback whale populations, an individual humpback whale migrated from the Indian Ocean to the South Atlantic Ocean and demonstrated that individual whales may migrate from one ocean basin to another (Pomilla and Rosenbaum 2005).

Status

Humpback whales were listed as endangered under the ESA in 1973. Humpback whales are listed as endangered on the IUCN Red List of Threatened Animals (Baillie and Groombridge 1996). They are also protected by CITES and the MMPA. Critical habitat has not been designated for humpback whales.

It is difficult to assess the current status of humpback whales for the same reasons that it is difficult to assess the status of other whales we have discussed thus far: (1) there is no general agreement on the size of the humpback whale population prior to whaling and (2) estimates of the current size of the different humpback whale populations vary widely and produce estimates that are not always comparable to one another, although robust estimates of humpback whale populations in the western North Atlantic have been published. We may never know the size of the humpback whale population prior to whaling.

Winn and Reichley (1985) argued that the global population of humpback whales consisted of at least 150,000 whales in the early 1900s, with the largest population historically occurring in the Southern Ocean. Based on analyses of mutation rates and estimates of genetic diversity, Palumbi and Roman (2006) concluded that there may have been as many as 240,000 (95% confidence interval = 156,000 – 401,000) humpback whales in the North Atlantic before whaling began. In the western North Atlantic between Davis Strait, Iceland and the West Indies, Mitchell and Reeves (1983) estimated there were at least 4,685 humpback whales in 1865 based on available whaling records (although the authors note that this does not represent a "pre-exploitation estimate" because whalers from Greenland, the Gulf of St. Lawrence, New England and the Caribbean Sea had been hunting humpback whales before 1865).

There are over 60,000 humpback whales worldwide, occurring primarily in the North Atlantic, North Pacific and Southern Hemisphere. Current estimates indicate approximately 20,000 humpback whales in the North Pacific, with an annual growth rate of 4.9 percent (Calambokidis 2010). Estimates of the number of humpback whales occurring in the different populations that inhabit the Northern Pacific population have risen over time. In the 1980s, estimates ranged from 1,407 to 2,100 (Baker 1985; Darling and Morowitz 1986; Baker and Herman 1987), while recent estimates place the population size at about 6,000 whales (standard error = 474) in the North Pacific (Calambokidis *et al.* 1997; Cerchio 1998; Mobley *et al.* 1999). Based on data collected between 1980 and 1983, Baker and Herman (1987) used a capture-recapture methodology to produce a population estimate of 1,407 whales (95% confidence interval = 1,113 - 1,701).

Stevick *et al.* (2003) estimated the size of the North Atlantic humpback whale population between 1979 and 1993 by applying statistical analyses that are commonly used in capture-recapture studies to individual humpback whales that were identified based on natural markings. Between 1979 and 1993, they estimated that the North Atlantic populations (what they call the "West Indies breeding population") consisted of between 5,930 and 12,580 individual whales. The best estimate they produced (11,570; 95% confidence interval = 10,290 -13,390) was based on samples from 1992 and 1993. If we assume that this population has grown according to the instantaneous rate of increase Stevick *et al.* (2003) estimated for this population (r = 0.0311), this would lead us to estimate that this population could be over 20,000 individuals in 2011-2012..

As discussed previously, between 2004 and 2006, an international group of whale researchers coordinated their surveys to conduct a comprehensive assessment of the population structure, levels of abundance, and status of humpback whales in the North Pacific (Calambokidis *et al.* 2008). That effort identified 7,971 unique individuals from photographs taken during close approaches. Of this total, 4,516 individuals were identified at wintering regions in at least one of the three seasons in which the study surveyed wintering area and 4,328 individuals were identified at least once at feeding areas in one of the two years in which the study surveyed feeding areas. Based on the results of that effort, Calambokidis *et al.* (2008) estimated that the current population of humpback whales in the North Pacific Ocean consisted of about 18,300 whales, not counting calves. Almost half of the humpback whales that were estimated to occur in wintering areas, or about 8,000 humpback whales, occupy the Hawaiian Islands during the winter months.

Regardless of which of these estimates, if any, most closely correspond to the actual size and trend of the humpback whale population, all of these estimates suggest that the global population of humpback whales consists of tens of thousands of individuals, that the North Atlantic population consists of at least 2,000 individuals and the North Pacific population consists of about 18,000 individuals. Based on ecological theory and demographic patterns derived from several hundred imperiled species and populations, humpback whales appear to exist at population sizes that are large enough to avoid demographic phenomena that are known to increase the extinction probability of species that exist as "small" populations (that is, "small" populations experience phenomena such as demographic stochasticity, inbreeding depression, Allee effects, among others, that cause their population size to become a threat in and of itself). As a result, we assume that humpback whales will have elevated extinction probabilities because of exogenous threats caused by anthropogenic activities (primarily whaling, entanglement, and ship strikes) and natural phenomena (such as disease, predation, or changes in the distribution and abundance of their prey in response to changing climate) rather than endogenous threats caused by the small size of their population.

3.2.5 Whale, Right (North Atlantic)

The species was originally listed as endangered on December 2, 1970 (35 FR 18319). We used information available in the 5-year review (NMFS 2012b) and recent stock assessment reports to summarize the status of the species, as follows.

Distribution

North Atlantic right whales are distributed seasonally from the Gulf of Mexico north to waters off Newfoundland and Labrador (on the western Atlantic) and from northern Africa and Spain north to waters north of Scotland and Ireland (the Shetland and Orkney Islands; on the eastern Atlantic coast).

In the western Atlantic Ocean, right whales generally occur in northwest Atlantic waters west of the Gulf Stream and are most commonly associated with cooler waters (21°C). North Atlantic right whales are most abundant in Cape Cod Bay between February and April (Hamilton and Mayo 1990 Schevill *et al.* 1986, Watkins and Schevill 1982), in the Great South Channel in May and June (Kenney *et al.* 1986, Payne *et al.* 1990), and off Georgia and Florida from mid-November through March (Slay *et al.* 1996). Right whales also frequent the Bay of Fundy, Browns and Baccaro Banks (in Canadian waters), Stellwagen Bank and Jeffrey's Ledge in the spring and summer months, and use mid-Atlantic waters as a migratory pathway between the winter calving grounds and their spring and summer nursery-feeding areas in the Gulf of Maine. North Atlantic right whales are not found in the Caribbean Sea and have been recorded only rarely in the Gulf of Mexico.

NMFS recognizes two extant groups of right whales in the North Atlantic Ocean (*E. glacialis*): an eastern population and a western population. A third population may have existed in the central Atlantic (migrating from east of Greenland to the Azores or Bermuda), but appears to be extinct, if it existed as a distinct population at all (Perry *et al.* 1999).

The degree to which the two extant populations of North Atlantic right whales are connected through immigration or emigration is unknown, but the two populations have historically been treated as if they are isolated populations. Nevertheless, on 5 January 2009, a North Atlantic right whale that had been observed in the Bay of Fundy on 24 September 2008 was observed in the Azore Islands (38 22.698 N and 28 30.341W) which demonstrates that at least one right whale migrated across the Atlantic (L. Steiner, post on MarMam, 7 January 2009).

Status

Right whales (both *E. glacialis* and *E. australi*s) were listed as endangered under the ESA in 1970. In April 2008, NMFS divided right whales into three separate listings: Northern right whales (*E. glacialis*), North Pacific right whales (*E. japonica*), and Southern right whales (*E. australis*), all of which were listed as endangered. Since 1949, the northern right whale has been protected from commercial whaling by the IWC. They are also protected by CITES and the MMPA. NMFS designated critical habitat for the North Atlantic population of right whales on 3 June 1994 (59 FR 28793).

Current distribution and abundance data suggest significant reductions from historic levels. In the eastern North Atlantic, the right whale population likely numbers in the low tens at best with little known regarding their distribution and migration pattern. This population may be functionally extinct (Best *et al.* 2001). The western North Atlantic population numbered at least 361 individuals in 2005 and at least 396 in 2010 (Waring *et al.* 2012). The legacy effects of whaling appear to have had and continue to have greatest effect on endangered Northern Atlantic right whales by reducing them to a population size that is sufficiently small to experience "small population dynamics" (Caughley 1994, Lande 1993, Lande *et al.* 2003, Melbourne and Hastings 2008). Kraus *et al.* (2005) estimated that about 350 individual right whales, including about 70 mature females, occur in the western North Atlantic.

At these population sizes, we would expect North Atlantic right whales to have higher probabilities of becoming extinct because of demographic stochasticity, demographic heterogeneity (Coulson *et al.* 2006, Fox *et al.* 2006) —including stochastic sex determination (Lande *et al.* 2003) — and the effects of phenomena interacting with environmental variability. Demographic stochasticity refers to the randomness in the birth or death of an individual in a population, which results in random variation on how many young that individuals produce during their lifetime and when they die. Demographic heterogeneity refers to variation in lifetime reproductive success of individuals in a population (generally, the number of reproductive adults an individual produces over their reproductive lifespan), such that the deaths of different individuals have different effects on the growth or decline of a population (Coulson *et al.* 2006). Stochastic sex determination refers to the randomness in the sex of offspring such that sexual ratios in population fluctuate over time (Melbourne and Hastings 2008).

At small population sizes, populations experience higher extinction probabilities because of their population size, because stochastic sexual determination can leave them with all males or all females (which occurred to the heath hen and dusky seaside sparrow just before they became extinct), or because the loss of individuals with high reproductive success has a disproportionate effect on the rate at which the population declines (Coulson *et al.* 2006). In general, an individual's contribution to the growth (or decline) of the population it represents depends, in part, on the number of individuals in the population: the smaller the population, the more the performance of a single individual is likely to affect the population's growth or decline (Coulson *et al.* 2006). Given the small size of the northern right whale population, the performance (= "fitness" measured as the longevity of individuals and their reproductive success over their lifespan) of individual whales would be expected to have appreciable consequences for the growth or decline of the northern right whale population. Evidence of the small population dynamics of North Atlantic right whales appears in demographic models that suggest that the death or survival of one or two individual animals is sufficient to determine whether North Atlantic right whales are likely to accelerate or abate the rate at which their population continues to decline (Fujiwara and Caswell 2001).

These phenomena would increase the extinction probability of northern right whales and amplify the potential consequences of human-related activities on this species. Based on their population size and population ecology (that is, slow-growing mammals that give birth to single calves with several years between births), we assume that right whales would have elevated extinction probabilities because of exogenous threats caused by anthropogenic activities that result in the death or injury of individual whales (for example, ship strikes or entanglement) and natural phenomena (such as disease, predation, or changes in the distribution and abundance of their prey in response to changing climate) *as well as* endogenous threats resulting from the small size of their population. Based on the number of other species in similar circumstances that have become extinct (and the small number of species that have avoided extinction in similar circumstances), the longer North Atlantic right whales remain in these circumstances, the greater their extinction probability becomes.

Critical Habitat

Five areas have been reported to be critical to the survival and recovery of North Atlantic right whales: (1) coastal Florida and Georgia; (2) the Great South Channel, which lies east of Cape Cod; (3) Cape Cod and Massachusetts Bays; (4) the Bay of Fundy; and (5) Browns and Baccaro Banks off southern Nova Scotia. The first three areas occur in U.S. waters and have been designated by NMFS as critical habitat (59 FR 28793). North Atlantic right whales are most abundant in Cape Cod Bay between February and April (Hamilton and Mayo 1990; Schevill *et al.* 1986; Watkins and Schevill 1982), in the Great South Channel in May and June (Kenney *et al.* 1986, Payne *et al.* 1990), and off Georgia/Florida from mid-November through March (Slay *et al.* 1996). Right whales also frequent the Bay of Fundy, Browns and Baccaro Banks (in Canadian waters), Stellwagen Bank and Jeffrey's Ledge in spring and summer months and use mid-Atlantic waters as a migratory pathway between winter calving grounds and their spring and summer nursery/feeding areas in the Gulf of Maine. A recent review and comparison of sighting data suggests that Jeffrey's Ledge may also be regularly used by right whales in late fall (October through December; Weinrich *et al.* 2000).

The availability of dense concentrations of zooplankton blooms in Cape Cod Bay in late winter and the Great South Channel in spring is described as the key factor for right whale utilization of these areas. Kraus and Kenney (1991) provide an overview of data regarding right whale use of these areas. Important habitat components in Cape Cod Bay include seasonal availability of dense zooplankton patches and protection from weather afforded by landmasses surrounding the bay. The spring current regime and bottom topography of the Great South Channel result in nutrient rich upwelling conditions. These conditions support the dense plankton and zooplankton blooms used by right whales. The combination of highly oxygenated water and dense zooplankton concentrations are optimal conditions for the small schooling fishes (sand lance, herring and mackerel) that prey upon some of the same zooplankton as right whales. Therefore, the abundance of these fishes, in turn, may affect and be affected by the distribution of several piscivorous marine mammal species such as humpback, fin, minke, and pilot whales, Atlantic whitesided dolphins, and harbor porpoise (CeTAP 1982).

Overfishing has severely reduced the stocks of several groundfish species such as cod, haddock and yellowtail flounder. Recovery of commercially targeted finfish stocks from their current overfished condition may reduce the biomass of small schooling fish that feed directly on zooplankton resources throughout the region. It is unknown whether zooplankton densities that occur seasonally in Cape Cod Bay or the Great South Channel could be expected to increase significantly. However, increased predation by groundfish on small schooling fish in certain areas and at specific critical periods may allow the necessary high zooplankton densities to be maintained in these areas for longer periods, or accumulate in other areas at levels acceptable to right whales.

Fishing is allowed within the Cape Cod Bay and Great South Channel right whale critical habitat. Lobster trap gear and anchored gillnet gear are believed to pose the most serious risks of entanglement and serious injury to right whales frequenting these waters. As a result, regulations developed under the Atlantic Large Whale Take Reduction Program restrict the use of lobster and anchored gillnet gear in Cape Cod Bay and Great South Channel critical habitat. The most restrictive measures apply during peak right whale abundance: January 1 to May 15 in Cape Cod Bay, and April 1 to June 30 in the Great South Channel critical habitat. Measures include prohibitions on the use of lobster trap gear and anchored gillnet gear in the Great South Channel critical habitat during periods of peak right whale abundance (with the exception of gillnet gear in the Great South Channel Sliver Area), and, for Cape Cod Bay critical habitat, anchored gillnet gear prohibitions and lobster trap restrictions during peak right whale abundance. During non-peak periods of right whale abundance, lobster trap and gillnet fishers must modify their gear by using weak links in net and/or buoy lines, follow gillnet anchoring requirements and meet mandatory breaking strengths for buoy line weak links, amongst others. Additional measures (i.e., gear marking requirements, and prohibitions on the use of floating line and the wet storage of gear) apply within as well as outside of critical habitat. All of these measures are intended to reduce the likelihood of whale entanglements or the severity of an entanglement should an animal encounter anchored gillnet or lobster gear.

The critical habitat identified in the Southeast U.S. is used primarily as a calving and nursery area. The nearshore waters of northeast Florida and southern Georgia were formally designated as critical habitat for right whales on June 3, 1994 (59 FR 28793); ten years after they were first identified as a likely calving and nursery area for right whales. Since that time, 74 percent of all known, mature female North Atlantic right whales have been documented in this area (Kraus *et al.* 1993). While sightings off Georgia and Florida include primarily adult females and calves, juveniles and adult males have also been observed.

Northern critical habitat was designated because of the concentration of right whales that feed in the area, apparently associated with complex oceanographic features that drive prey density and distribution. This area has come under considerable scrutiny within the past few years because of the concern over ship strikes in this area. Boston serves as a major port facility and vessels transiting to and from the port cross critical habitat where North Atlantic right whale mortality occurs. Shipping traffic has generally increased in the recent past and could be considered to degrade the habitat due to the additional mortality and injury risk now present in the area. Although voluntary regulations are in place, these are frequently ignored and mandatory regulations are under consideration. The southern critical habitats are along Georgia and northeastern Florida coasts (waters from the coast out 15 nautical miles between the latitudes of 31°15' N and 30°15' N and from the coast out five nautical miles between 30°15' N and 28°00' N).

Southern critical habitat is designated to protected calving and breeding grounds for North Atlantic right whales, which generally calve and breed in shallow coastal waters. Significant degradation of these areas has not been clearly identified.

3.2.6 Whale, Right (North Pacific)

The species was originally listed with the North Atlantic right whale (i.e., "Northern" right whale) as endangered on December 2, 1970 (35 FR 18319). It was listed separately as endangered on March 6, 2008 (73 FR 12024). We used information available in the 5-year review (NMFS 2012b) and recent stock assessment reports to summarize the status of the species, as follows.

Distribution

Very little is known of the distribution of right whales in the North Pacific because so few of these animals have been seen in the past 20 years. In 1996, a group of 3 to 4 right whales (which may have included a calf) were observed in the middle shelf of the Bering Sea, west of Bristol Bay and east of the Pribilof Islands (Goddard and Rugh 1998). In June 1998, a lone whale was observed on historic whaling grounds near Albatross Bank off Kodiak Island, Alaska (Waite and Hobbs 1999). Surveys conducted in July of 1997 - 2000 in Bristol Bay reported observations of lone animals or small groups of right whales in the same area as the 1996 sighting (Hill and DeMaster 1998, Perryman *et al.* 1999).

Historical whaling records (Maury 1852, Townsend 1935, Scarff 1986) indicate the right whale ranged across the North Pacific above 35°N lat. They summered in the North Pacific Ocean and southern Bering Sea from April or May to September, with a peak in sightings in coastal waters of Alaska in June and July (Maury 1852, Townsend 1935, Omura 1958, Klumov 1962, Omura *et al.* 1969). Their summer range extended north of the Bering Strait (Omura *et al.* 1969). However, they were particularly abundant in the Gulf of Alaska from 145° to 151°W (Berzin and Rovnin 1966), and apparently concentrated in the Gulf of Alaska, especially south of Kodiak Islands and in the Eastern Aleutian Islands and southern Bering Sea shelf waters (Braham and Rice 1984).

The winter distribution patterns of right whales in the Pacific are virtually unknown, although some right whales have been sighted as far south as 27°N in the eastern North Pacific. They have also been sighted in Hawaii (Herman *et al.* 1980), California (Scarff 1986), Washington and British Columbia. Their migration patterns are unknown, but are believed to include north-south movements between summer and winter feeding areas. The scarcity of right whales is the result of an 800-year history of whaling that continued into the 1960s (Klumov 1962).

Status

Since 1949, the northern right whale has been protected from commercial whaling by the IWC. Right whales (both *E. glacialis* and *E. australi*s) are listed as endangered under the ESA. They are also protected by CITES and the MMPA. NMFS designated critical habitat for the North Atlantic population of right whales on June 3, 1994 (59 FR 28793). Critical habitat for right whales in the North Pacific Ocean was designated in 2006 and 2008. NMFS issued a final recovery plan for the North pacific right whale in 2013 (78 FR 34347).

The recovery plan for this species suggests that its population included more than 11,000 individuals before they were hunted, based on a known harvest of over 11,000 right whales by U.S. whalers with additional numbers struck and lost (Brownell *et al.* 1986). Current population estimates range from a low of 100-200 (Braham and Rice 1984) to a high of 220-500 (Berzin and Yablokov 1978 [in Berzin and Vladimirov 1981]), but Hill and DeMaster (1998) argue that it is not possible to reliably estimate the population size or trends of right whales in the North Pacific. As a result, no population projections are available for this species.

Critical Habitat

In 2008, NMFS designated critical habitat for the North Pacific right whale, which includes an area in the Southeast Bering Sea and an area south of Kodiak Island in the Gulf of Alaska (73 FR

19000). These areas are influenced by large eddies, submarine canyons, or frontal zones which enhance nutrient exchange and act to concentrate prey. These areas are adjacent to major ocean currents and are characterized by relatively low circulation and water movement. Both critical habitat areas support feeding by North Pacific right whales because they contain the designated primary constituent elements, which include: nutrients, physical oceanographic processes, certain species of zooplankton and a long photoperiod due to the high latitude (73 FR 19000). Consistent North Pacific right whale sights are a proxy for locating these elements. At present, these primary constituent elements do not appear to have been significantly degraded due to human activity. However, climate change could affect the distribution and abundance of copepod prey.

3.2.7 Whale, Sei

The species was originally listed as endangered on December 2, 1970 (35 FR 18319). We used information available in the recovery plan (NMFS 2011p), the five-year review (NMFS 2012a) and recent stock assessment reports to summarize the status of the species, as follows.

Distribution

Sei whales occur in every ocean except the Arctic Ocean. The migratory pattern of this species is thought to encompass long distances from high-latitude feeding areas in summer to low-latitude breeding areas in winter; however, the location of winter areas remains largely unknown (Perry *et al.* 1999). Sei whales are often associated with deeper waters and areas along the continental shelf edge (Hain *et al.* 1985); however, this general offshore pattern of sei whale distribution is disrupted during occasional incursions into more shallow and inshore waters (Waring *et al.* 2004).

In the western Atlantic Ocean, sei whales occur from Labrador, Nova Scotia, and Labrador in the summer months and migrate south to Florida, the Gulf of Mexico and the northern Caribbean (Gambell 1985, Mead 1977). In the eastern Atlantic Ocean, sei whales occur in the Norwegian Sea (as far north as Finnmark in northeastern Norway), occasionally occurring as far north as Spitsbergen Island, and migrate south to Spain, Portugal and northwest Africa (Jonsgård and Darling 1974, Gambell 1985).

In the North Pacific Ocean, sei whales occur from the Bering Sea south to California (on the east) and the coasts of Japan and Korea (on the west). During the winter, sei whales are found from 20° to 23°N latitude (Masaki 1977; Gambell 1985). Horwood (1987) reported that 75 - 85% of the North Pacific population of sei whales resides east of 180° longitude.

The population structure of sei whales is largely unknown because there are so few data on this species. The IWC's Scientific Committee groups all of the sei whales in the entire North Pacific Ocean into one population (Donovan 1991). However, some mark-recapture, catch distribution, and morphological research suggest more than one "stock" of sei whales may exist in the Pacific: one between 175°W and 155°W longitude, and another east of 155°W longitude (Masaki 1977); however, the amount of movement between these "stocks" suggests that they probably do not represent demographically-isolated populations as we use this concept in this Biological Opinion.

Mitchell and Chapman (1977) divided sei whales in the western North Atlantic in two populations, one that occupies the Nova Scotia Shelf and a second that occupies the Labrador Sea. Sei whales are most common on Georges Bank and into the Gulf of Maine and the Bay of Fundy during spring and summer, primarily in deeper waters. There are occasional influxes of sei whales further into Gulf of Maine waters, presumably in conjunction with years of high copepod abundance inshore. Sei whales are occasionally seen feeding in association with right whales in the southern Gulf of Maine and in the Bay of Fundy.

Status

In the North Pacific, the IWC began management of commercial taking of sei whales in 1970, and sei whales were given full protection in 1976 (Allen 1980). Sei whales are also protected by CITES and the MMPA. They are listed as endangered under the IUCN Red List of Threatened Animals (Baillie and Groombridge 1996). Critical habitat has not been designated for sei whales.

There are ~80,000 sei whales worldwide, in the North Atlantic, North Pacific and Southern Hemisphere. Three stocks occur in U.S. waters: Nova Scotia (N = 357), Hawaii (N_{min} = 37) and Eastern North Pacific (N_{min} = 83). Population trends are not available due to insufficient data. It is unknown whether the population size is stable or fluctuating. Prior to commercial whaling, sei whales in the north Pacific are estimated to have numbered 42,000 individuals (Tillman 1977), although Ohsumi and Fukuda (1975) estimated that sei whales in the North Pacific numbered about 49,000 whales in 1963, had been reduced to 37,000 or 38,000 whales by 1967, and reduced again to 20,600 to 23,700 whales by 1973. Japanese and Soviet catches of sei whales in the North Pacific and Bering Sea increased from 260 whales in 1962 to over 4,500 in 1968 and 1969, after which the sei whale population declined rapidly (Mizroch *et al.* 1984). When commercial whaling for sei whales ended in 1974, the population of sei whales in the North Pacific had been reduced to between 7,260 and 12,620 animals (Tillman 1977). In the same year, the North Atlantic population of sei whales was estimated to number about 2,078 individuals, including 965 whales in the Labrador Sea group and 870 whales in the Nova Scotia group (IWC 1977, Mitchell and Chapman 1977).

Like blue whales, the information available on the status and trend of sei whales do not allow us to reach any conclusions about the extinction risks facing sei whales as a species, or particular populations of sei whales. With the limited data available on sei whales, we do not know whether these whales exist at population sizes large enough to avoid demographic phenomena that are known to increase the extinction probability of species that exist as “small” populations (that is, “small” populations experience phenomena such as demographic stochasticity, inbreeding depression, Allee effects, among others, that cause their population size to become a threat in and of itself) or if sei whales might are threatened more by exogenous threats such as anthropogenic activities (primarily whaling, entanglement, and ship strikes) or natural phenomena (such as disease, predation, or changes in the distribution and abundance of their prey in response to changing climate). However, sei whales have historically exhibited sudden increases in abundance in particular areas followed by sudden decreases in number. Several authors have reported “invasion years” in which large numbers of sei whales appeared off areas like Norway and Scotland followed the next year by sudden decreases in population numbers (Jonsgård and Darling 1974).

With the evidence available, we do not know if this year-to-year variation still occurs in sei whales. However, if sei whales exist as a fraction of their historic population sizes, large amounts of variation in their abundance would increase the extinction probabilities of individual populations (Fagan and Holmes 2006, Fagan *et al.* 1999, 2001).

3.2.8 Whale, Sperm

Sperm whales were listed as endangered under the ESA in 1973. Sperm whales have been protected from commercial harvest by the IWC since 1981, although the Japanese continued to harvest sperm whales in the North Pacific until 1988 (Reeves and Whitehead 1997). They are also protected by CITES and the MMPA. Critical habitat has not been designated for sperm whales. We used information available in the status review, stock assessments and the recovery plan (75 FR 81584) to summarize the status of the species, as follows[20].

Distribution

Sperm whales occur in every ocean except the Arctic Ocean. Sperm whales are found throughout the North Pacific and are distributed broadly from tropical and temperate waters to the Bering Sea as far north as Cape Navarin. Mature, female and immature sperm whales of both sexes are found in more temperate and tropical waters from the equator to around 45˚ N throughout the year. These groups of adult females and immature sperm whales are rarely found at latitudes higher than 50˚ N and 50˚ S (Reeves and Whitehead 1997). Sexually mature males join these groups throughout the winter. During the summer, mature male sperm whales are thought to move north into the Aleutian Islands, Gulf of Alaska and the Bering Sea.

In the western Atlantic Ocean, sperm whales are distributed in a distinct seasonal cycle, concentrated east-northeast of Cape Hatteras in winter and shifting northward in spring when whales are found throughout the Mid-Atlantic Bight. Distribution extends further northward to areas north of Georges Bank and the Northeast Channel region in summer and then south of New England in fall, back to the Mid-Atlantic Bight.

Sperm whales commonly concentrate around oceanic islands in areas of upwelling, and along the outer continental shelf and mid-ocean waters. Because they inhabit deeper pelagic waters, their distribution does not include the broad continental shelf of the Eastern Bering Sea and these whales generally remain offshore in the eastern Aleutian Islands, Gulf of Alaska and the Bering Sea.

Sperm whales have a strong preference for the 3,280 feet (1,000 meters) depth contour and seaward. Berzin (1971) reported that they are restricted to waters deeper than 300 meters (984 feet), while Watkins (1977) and Reeves and Whitehead (1997) reported that they are usually not found in waters less than 1,000 meters (3,281 feet) deep. While deep water is their typical habitat, sperm whales have been observed near Long Island, New York, in water between 41-55 meters (135-180 feet; Scott and Sadove 1997). When they are found relatively close to shore, sperm whales are usually associated with sharp increases in bottom depth where upwelling

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[20] See: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spermwhale.htm for more information.

occurs and biological production is high, implying the presence of a good food supply (Clarke 1956).

The population structure of sperm whales is largely unknown. Lyrholm and Gyllenstein (1998) reported moderate, but statistically significant, differences in sperm whale mitochondrial (mtDNA) between ocean basins, although sperm whales throughout the world appear to be homogenous genetically (Whitehead 2003). Genetic studies also suggest that sperm whales of both genders commonly move across over ocean basins and that males, but not females, often breed in ocean basins that are different from the one in which they were born (Whitehead, 2003). Sperm whales may not form "populations" as that term is normally conceived. Jaquet (1996) outlined a hierarchical social and spatial structure that includes temporary clusters of animals, family units of 10 or 12 females and their young, groups of about 20 animals that remain together for hours or days, "aggregations" and "super-aggregations" of 40 or more whales, and "concentrations" that include 1,000 or more animals (Peterson 1986, Whitehead and Wiegart 1990, Whitehead *et al.* 1991). The "family unit" forms the foundation for sperm whale society and most females probably spend their entire life in the same family unit (Whitehead 2002). The dynamic nature of these relationships and the large spatial areas they are believed to occupy might complicate or preclude attempts to apply traditional population concepts, which tend to rely on group fidelity to geographic distributions that are relatively static over time.

Status

The status and trend of sperm whales at the time of this summary is largely unknown. Allen and Angliss (2012) reported that estimates for population abundance, status and trends for sperm whales off the coast of Alaska were not available when they prepared the Stock Assessment Report for marine mammals off Alaska. Similarly, no information was available to support estimates of sperm whales status and trends in the western North Atlantic Ocean (Waring *et al.* 2007), the Indian Ocean (Perry *et al.* 1999) or the Mediterranean Sea.

Nevertheless, several authors and organizations have published "best estimates" of the global abundance of sperm whales or their abundance in different geographic areas. Based on historic whaling data, 190,000 sperm whales were estimated to have been in the entire North Atlantic, but the IWC considers data that produced this estimate unreliable (Perry *et al.* 1999). Whitehead (2002) estimated that prior to whaling sperm whales numbered around 1,110,000 and that the current global abundance of sperm whales is around 360,000 (coefficient of variation = 0.36) whales. Whitehead's current population estimate (2002) is about 20% of past global abundance estimates, which were based on historic whaling data.

Waring *et al.* (2007) concluded that the best estimate of the number of sperm whales along the Atlantic coast of the U.S. was 4,029 (coefficient of variation = 0.38) in 1998 and 4,804 (coefficient of variation = 0.38) in 2004, with a minimum estimate of 3,539 sperm whales in the western North Atlantic Ocean.

Barlow and Taylor (2005) derived two estimates of sperm whale abundance in a 7.8 million km^2 study area in the northeastern temperate Pacific: when they used acoustic detection methods they produced an estimate of 32,100 sperm whales (coefficient of variation = 0.36); when they used visual surveys, they produced an estimate of 26,300 sperm whales (coefficient of variation = 0.81). Caretta *et al.* (2005) concluded that the most precise estimate of sperm whale abundance off California, Oregon and Washington was 1,233 (coefficient of variation = 0.41; based on ship surveys conducted in the summer and fall of 1996 and 2001). Their best estimate of the abundance of sperm whales in Hawaii was 7,082 sperm whales (coefficient of variation = 0.30) based on ship-board surveys conducted in 2002.

Mark and recapture data from sperm whales led Whitehead and his co-workers to conclude that sperm whale numbers off the Galapagos Islands decreased by about 20% a year between 1985 and 1995 (Whitehead *et al.* 1997). In 1985 Whitehead *et al.* (1997) estimated there were about 4,000 female and immature sperm whales, whereas in 1995 they estimated that there were only a few hundred. They suggested that sperm whales migrated to waters off the Central and South American mainland to feed in productive waters of the Humboldt Current, which had been depopulated of sperm whales because of intensive whaling.

The information available on the status and trend of sperm whales do not allow us to make definitive statement about the extinction risks facing sperm whales as a species or particular populations of sperm whales. However, the evidence available suggests that sperm whale populations probably exhibit the dynamics of small populations, causing their population dynamics to become a threat in and of itself. The number of sperm whales killed by Soviet whaling fleets in the 1960s and 1970s would have substantial and adverse consequence for sperm whale populations and their ability to recover from the effects of whaling on their population. The number of adult female killed by Soviet whaling fleets, including pregnant and lactating females whose death would also have resulted in the death of their calves, would have had a devastating effect on sperm whale populations. In addition to decimating their population size, whaling would have skewed sex ratios in their populations, created gaps in the age structure of their populations, and would have had lasting and adverse effect on the ability of these populations to recover (for example, see Whitehead 2003).

Populations of sperm whales could not have recovered from the overharvests of adult females and immature whales in the 30 to 40 years that have passed since the end of whaling, but the information available does not allow us to determine whether and to what degree those populations might have stabilized or whether they have begun the process of recovering from the effects of whaling. Absent information to the contrary, we assume that sperm whales will have elevated extinction probabilities because of both exogenous threats caused by anthropogenic activities (primarily whaling, entanglement, and ship strikes) and natural phenomena (such as disease, predation, or changes in the distribution and abundance of their prey in response to changing climate) as well as endogenous threats caused by the legacy of overharvests of adult females and immature whales on their populations (that is, a population with a disproportion of adult males and older animals coupled with a small percentage of juvenile whales that recruit into the adult population).

3.2.9 Whale, Beluga (Cook Inlet)

The beluga whale (Delphinapterus leucas) was listed as endangered under the ESA, effective December 22, 2008 (73 FR 62919). We used information available in the final rule, the 2008 Status Reviews (Hobbs and Shelden 2008, Hobbs *et al.* 2008) and recent stock assessment reports (Allen and Angliss 2011) to summarize the status of the DPS, as follows.

Distribution

Cook Inlet beluga are one of five populations (or "stocks") of beluga whales that are currently recognized in Alaska (Angliss and Outlaw, 2007). The range of this species is generally limited to Cook Inlet in southcentral Alaska, although they have been sighted in the Gulf of Alaska outside of Cook Inlet.

Status

Historic numbers of beluga whales in Cook Inlet are unknown. Dedicated surveys began in earnest in the 1990s when NMFS began conducting aerial surveys for beluga whales in Cook Inlet. Prior to then, survey efforts were inconsistent, part of larger sea bird and marine mammal surveys, made by vessel or estimated following interviews with fishermen (Klinkhart 1966). In many cases, the survey methodology or confidence intervals were not described. For instance (Klinkhart 1966) conducted aerial surveys in 1964 and 1965, where he describes having estimated the populations at 300-400 whales, but the methodology was not described nor did he report the variance around these estimates. Other estimates were incomplete due to the small area the survey focused upon (e.g., river mouth estimates; e.g., Hazard 1988). The most comprehensive survey effort prior to the 1990s occurred in 1979 and included transects from Anchorage to Homer, and covered the upper, middle and lower portions of Cook Inlet. From this effort, and using a correction factor of 2.7 to account for submerged whales Calkins (1989) estimated the 1979 abundance at about 1,293 whales.

Between 1979 and 1994, according to above noted population estimates, Cook Inlet beluga whales declined by 50%, with another 50% decline observed between 1994 and 1998. Using a growth fitted model Hobbs *et al.* (2008) observed an average annual rate of decline of -2.91% (SE = 0.010) from 1994 to 2008, and a -15.1% (SE = 0.047) between 1994 and 1998. A comparison with the 1999-2008 data suggests the rate of decline at 1.45% (SE=0.014) per year (Hobbs *et al.* 2008). Given that harvest was curtailed significantly between 1999 and 2008, NMFS had expected the population would begin to recover at a rate of 2-6% per year. However, abundance estimates demonstrate that this is not the case (Hobbs and Shelden 2008).

In conducting its status review, NMFS conducted a suite of population viability analyses (PVA) to estimate the time to extinction for Cook Inlet beluga whales. The models were sensitive to a variety of parameters such as killer whale predation, Allee effects and unusual mortality events. The best approximation of the current population incorporated killer whale predation at only one beluga whale per year and allowed for an unusual mortality event occurring on average every 20 years. Based on this scenario, there is an 80% probability that the Cook Inlet beluga whale is declining, a 26% probability that this species will be extinct in 100 years (by 2108) and a 70% probability that this species will be extinct within 300 years (by 2308).

Critical Habitat

On April 11, 2011, NMFS designated critical habitat for the Cook Inlet beluga whale 76 FR 20180. Two specific areas are designated comprising 7,800 square kilometers of marine habitat. Area one encompasses all marine waters of Cook Inlet north of a line from the mouth of Threemile Creek (61°08.5′ N., 151°04.4′ W.) connecting to Point Possession (61°02.1′ N., 150°24.3′ W.), including waters of the Susitna River south of 61°20.0′ N., the Little Susitna

River south of 61°18.0′ N. and the Chickaloon River north of 60°53.0′ N. (2) Area two encompasses all marine waters of Cook Inlet south of a line from the mouth of Threemile Creek (61°08.5′ N., 151°04.4′ W.) to Point Possession (61°02.1′ N., 150°24.3′ W.) and north of 60°15.0′N., including waters within two nautical miles seaward of the mean high water boundary along the western shoreline of Cook Inlet between 60°15.0′ N. and the mouth of the Douglas River (59°04.0′ N., 153°46.0′ W.); all waters of Kachemak Bay east of 151°40.0′ W.; and waters of the Kenai River below the Warren Ames bridge at Kenai, Alaska.

Area 1 has the highest concentration of beluga whales in the spring through fall as well as the greatest potential for adverse impact from anthropogenic threats. It contains many rivers with large eulachon and salmon runs, including two rivers in Turnagain Arm (Twenty-mile River and Placer River) that are visited by beluga whales in the early spring. Use declines in the summer and increases again in August through the fall, coinciding with Coho salmon returns. Also included in Area 1 are Knik Arm and the Susitna delta. Area 2 is located south of Area 1 and is used by Cook Inlet beluga whales for fall and winter feeding and as transit waters.

The primary constituent elements essential to the conservation of Cook Inlet beluga whales are: (1) intertidal and subtidal waters of Cook Inlet with depths <30 ft. (mean lower low water) and within 5 miles of high and medium flow accumulation anadromous fish streams; (2) primary prey species consisting of four species of Pacific salmon (Chinook, Coho, sockeye and chum salmon), Pacific eulachon, Pacific cod, walleye pollock, saffron cod and yellowfin sole; (3) waters free of toxins or other harmful agents; (4) Unrestricted passage within or between the critical habitat areas, and; (5) an absence of in-water noise levels that result in the abandonment of habitat by Cook Inlet beluga whales.

Intertidal and subtidal waters of Cook Inlet could be modified from a variety of fill placement and channel modifications resulting from coastal development. However, the intertidal, subtidal and areas within 8 km (5 mi) of anadromous fish streams are generally intact and undisturbed.

Pacific salmon (Chinook, sockeye, chum and coho), Pacific eulachon, Pacific cod, walleye pollock, saffron cod and yellowfin sole are impacted by commercial fisheries, and recreational fishing. However, at this time NMFS has no information to suggest prey availability has been a factor in the decline or is impeding the recovery of the Cook Inlet beluga whale.

Upper Cook Inlet is designated as Category 3 on the CWA Section 303(d) list of impaired waterbodies, which means that insufficient information in is available to determine whether the waterbody meets water quality standards. The lower Cook Inlet is not on the listed of impaired water bodies and are relatively unpolluted.

Port facilities are located throughout Cook Inlet and large vessel traffic is common. Anthropogenic noise is also present, especially in upper Cook Inlet near Anchorage. Passage in the critical habitat is generally unrestricted.

3.2.10 Whale, False Killer (Main Hawaiian Islands Insular)

Main Hawaiian Islands Insular false killer whales were listed as endangered under the ESA on November 29, 2012 (77 FR 71260). Critical habitat has not been designated for this species. NMFS currently recognizes three stocks of false killer whale in Hawaiian waters: the Main Hawaiian Islands insular, Hawaii pelagic and the Northwestern Hawaiian Islands (77 FR 70915).

We used information available in the final listing (77 FR 71260) and other data to summarize the status of the DPS, as follows.

Distribution

Main Hawaiian Islands insular false killer whales are one of four stocks of false killer whales currently recognized in the central Pacific (along with the Northwestern Hawaiian Islands stock, the Hawaii pelagic stock, and the Palmyra Atoll stock). While part of the MHI Insular population range overlaps with both the Northwestern Hawaiian Islands and Hawaii pelagic stocks, members of the MHI Insular DPS generally inhabit waters within 140 km from the Main Hawaiian Islands (Carretta *et al.* 2013) and are not expected to venture out into the wider ocean basin with any regularity (Baird *et al.* 2010; Forney *et al.* 2010).

Status

Estimates of the historical population range from 769-2,461 individuals based on assumed biological parameters for the species (Wearmouth and Sims, 2008). Mobley Jr. *et al.* (2000) provided an estimate of 121 individuals from 1993-1998 while Baird *et al.* (2005) estimated a population of 123 individuals (CV=0.72) based on a mark-recapture study of photo-identification data obtained from 2000-2004 around the Main Hawaiian Islands. The most recent status review conducted for the species estimated the population at either 151 (CV=0.20) or 170 (CV=0.21) individuals depending on whether false killer whales photographed near Kauai are included in the estimate (Oleson *et al.* 2010).

A more recent study by Reeves *et al.* (2009) summarized information on false killer whale sightings near Hawaii between 1989 and 2007 and suggested that the insular stock may have declined during the last two decades. Also, Baird (2009) reviewed trends in sighting rates of false killer whales from aerial surveys conducted using consistent methodology around the main Hawaiian Islands between 1994 and 2003 which resulted in a statistically significant decline in the population. These survey findings are supported by genetic analyses, which suggest a recent population decline (Chivers *et al.* 2010). In addition, models used to evaluate extinction risk in the most recent status review indicated current declines at an average rate of 9% since 1989 (Oleson *et al.* 2010). This decline occurred after the closure of the longline fishery close to the islands, suggesting that the population continues to decline despite these protective measures.

The Biological Review Team (BRT) evaluated risk to the population, including identification and ranking of threats to the population, quantitative assessment of extinction probability using a PVA and an assessment of the overall risk of extinction to the population. The PVA analysis indicated the probability of near-extinction (less than 20 animals) within 75 years (three generations) was greater than 20% for all biologically plausible models and given a wide range of input variables. Of the 29 identified threats to the population, the BRT considered the effects of small population size, including inbreeding depression and Allee effects, exposure to environmental contaminants, competition for food with commercial fisheries, hooking, entanglement or intentional harm by fishers to be the most substantial threats to the population (Oleson *et al.* 2010).

3.2.11 Whale, Killer (Southern Resident)

The DPS was listed as endangered under the ESA on November 18, 2005 (70 FR 69903). We used information available in the final rule, the 2011 Status Review (75 FR 17377) and the 2011 Stock Assessment Report (Allen and Angliss 2011) to summarize the status of this species, as follows.

Distribution

Southern Resident killer whales occur in the inland waterways of Puget Sound, Strait of Juan de Fuca, and Southern Georgia Strait during the spring, summer, and fall although they will seasonally migration to coastal waters as far north as Queen Charlotte Islands and Vancouver Island in Canada and south along the coasts of Washington, Oregon, and northern California.

Status

Southern Resident killer whales were listed as endangered on November 18, 2005, because of the demographic consequences of whales that had been captured for aquarium display, killed to reduce their level of predation on fish species and because overfishing has depleted their prey base, the water quality of Puget Sound has been degraded degradation, and individuals are killed in collisions with ships (70 FR 69903). These whales also appear to be threatened by noise from industrial sources and military activities, entanglement in fishing gear, and disturbance associated with whale-watching vessels.

The DPS's resilience to future perturbation is reduced because of its small population size (N = 86); however, it has demonstrated the ability to recover from smaller population sizes in the past and has shown an increasing trend over the last several years.

Critical Habitat

Critical habitat was designated for this species on November 29, 2006 (71 FR 69054) and encompasses three specific areas in Puget Sound: (1) the Summer Core Area in Haro Strait and waters around the San Juan Islands; (2) Puget Sound; and (3) the Strait of Juan de Fuca. The designated area encompasses about 2,560 square miles (6,630 sq. km) of marine habitat.

The critical habitat designation includes all waters relative to a contiguous shoreline delimited by the line at a depth of 20 feet (6.1 m) relative to extreme high water in (see 50 CFR 226.206 for complete latitude and longitude references to all points contained in the following narratives):

1. The summer core areas, which includes all U.S. marine waters in Whatcom and San Juan counties; and all marine waters in Skagit County west and north of the Deception Pass Bridge (Highway 20);

2. Puget Sound, which includes (a) all marine waters in Island County east and south of the Deception Pass Bridge (Highway 20) and east of a line connecting the Point Wilson Lighthouse and a point on Whidbey Island located at 48°12′30″N. latitude and 122° 44′26″W. longitude; (b) all marine waters in Skagit County east of the Deception Pass Bridge (Highway 20); (c) all marine waters of Jefferson County east of a line connecting the Point Wilson Lighthouse and a point on Whidbey Island located at latitude 48° 12′3″N. latitude and 122° 44′26″W. longitude, and north of the Hood Canal Bridge (Highway 104); (d) all marine waters in eastern Kitsap County east of the Hood Canal Bridge (Highway 104); (e) all marine waters (excluding Hood Canal) in Mason County; and (f) all marine waters in King, Pierce, Snohomish, and Thurston counties

3. Strait of Juan de Fuca Area: All U.S. marine waters in Clallam County east of a line connecting Cape Flattery, Washington, Tatoosh Island, Washington, and Bonilla Point, British Columbia; all marine waters in Jefferson and Island counties west of the Deception Pass Bridge (Highway 20), and west of a line connecting the Point Wilson Lighthouse and a point on Whidbey Island located at 48° 12′30″N. latitude and 122° 44′26″W. longitude.

Critical habitat that has been designated for Southern Resident killer whales does not include waters offshore of the Washington coast, Hood Canal or Dabob Bay, the Keyport Range Complex, Sinclair Inlet (near Bremerton), Ostrich Bay and Oyster Bay, portions of Whidbey Island and Navy Operating Area 3 (north and west of Whidbey Island). On April 25, 2014, NMFS made a positive 90-day finding on a petition to revise critical habitat for Southern Resident killer whales that would, among other things, expand critical habitat to include marine waters along the West Coast of the United States(79 FR 22933). As a result, NMFS is conducting a status review of Southern Resident critical habitat.

The primary constituent elements of critical habitat essential to the conservation of Southern Resident killer whales include: 1) water quality to support growth and development; 2) prey species of sufficient quantity, quality, and availability to support individual growth, reproduction; and 3) development, as well as overall population growth; and passage conditions to allow for migration, resting, and foraging.

Water quality in Puget Sound, in general, is degraded and a major concern for water quality is oil spills. However, there has been a declining trend in spill incidents (WDOE 2007). Overfishing, habitat losses and hatchery practices were major causes of decline in salmonid prey base. Populations already weakened by the degradation continue to be stressed by poor water quality. Wild salmon stocks have declined in many areas. However, hatchery production has been high. Total Chinook abundances coast wide increased significantly from the mid-1990s to the early 2000s, but have declined in the last several years (PFMC 2008).

Pollution continues to affect the quality of Southern Resident killer whale prey in Puget Sound. Contamination is a potential threat to Southern Resident killer whale critical habitat. Vessels and sound may also reduce the effective echolocation and reduce availability of fish for the whales in their critical habitat (Holt 2008). Human activities can interfere with movements of the whales and impact their passage in Puget Sound. Vessels may prevent whale passage, and may increase energy expenditure and impact foraging behavior.

3.2.12 Fur Seal, Guadalupe

Guadalupe fur seals were listed as threatened under the Endangered Species Preservation Act of 1966 on March 11, 1967. This listing was extended in 1973 under the ESA of 1973. In the U.S., Guadalupe fur seals *(Arctocephalus townsendii)* were listed as threatened under the ESA in 1985 (50 FR 51252)[21]. We used information available in the final listing (50 FR 51252) and other data to summarize the status of the DPS, as follows.

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[21] See http://www.nmfs.noaa.gov/pr/species/mammals/pinnipeds/guadalupefurseal.htm for more information.

Distribution

Guadalupe fur seals are found on Guadalupe Island (Mexico) in the eastern Pacific Ocean off Mexico; a few individuals have been known to range as far north as Sonoma County, California, south to Los Islotes Islands in Baja California, Mexico. A few Guadalupe fur seals occupy California sea lion rookeries in the Channel Islands of California (Stewart *et al.* 1987 in Reeves *et al.* 1992). Guadalupe fur seals exist as a single population from one breeding colony at Isla Guadalupe, Mexico.

Status

The State of California lists the Guadalupe fur seal as a fully protected mammal in the Fish and Game Code of California (Chapter 8, section 4700, d), and it is also listed as a threatened species in the California Fish and Game Commission Code of Regulations (Title 14, section 670.5, b, 6, H). The Guadalupe fur seal is also protected under CITES and is fully protected under Mexican law. Critical habitat has not been designated for this species. Guadalupe Island was declared a pinniped sanctuary by the Mexican government in 1975.

By 1897, the Guadalupe fur seal was believed to be extinct. None were observed until a fisherman found slightly more than two dozen at Guadalupe Island in 1926. Counts of Guadalupe fur seals have been made sporadically since 1954. A few of these counts were made during the breeding season, but the majority was made at other times of the year. Documented seal counts in the literature generally provide only the total of all Guadalupe fur seals counted (*i.e.*, the counts are not separated by age/sex class). The counts made during the breeding season, when the maximum number of animals occurs on the rookery, were used to examine population growth. The natural logarithm of the counts was regressed against a year to calculate the growth rate of the population. These data indicate that the population of Guadalupe fur seals is increasing exponentially at an average annual growth rate of 13.7 percent. Sub-sampling of the rookery indicates that only 47-55% of the seals present (*i.e.*, hauled out) were counted during the census (Gallo 1994). The minimum size of the population in Mexico can be estimated as the actual count of 3,028 hauled out seals [The actual count data were not reported by Gallo (1994); this number was derived by multiplying the estimated number hauled out by 47 percent, the minimum estimate of the percent counted] (Carretta *et al.* 2006). In the United States, a few Guadalupe fur seals are known to inhabit California sea lion rookeries in the Channel Islands (Stewart *et al.* 1997).

Strandings of Guadalupe fur seals have occurred along the central and northern California coast, suggesting that the seal may be expanding its range (Hanni *et al.* 1997). The severe reduction of the Guadalupe fur seals has evidently had a less substantial effect on its gene pool, when compared to other similarly depleted pinniped species, as relatively high levels of genetic variability have been reported (Bernardi *et al.* 1998).

3.2.13 Monk Seal, Hawaiian

Hawaiian monk seals were listed as endangered under the ESA on November 23, 1976 (41 FR 51611). A five-year status review completed in 2007 recommended retaining monk seals as an endangered species (72 FR 46966, August 22, 2007). Critical habitat was originally designated for Hawaiian monk seals on April 30, 1986 (51 FR 16047) and was extended on May 26, 1988

(53 FR 18988; CFR 226.201). On June 2, 2011 (76 FR 32026), NMFS proposed a second revision to further extend the designation. We used information available in the 2007 5-year review (NMFS 2007a), the 2012 stock assessment report (Carretta *et al.* 2013) and unpublished NMFS data to summarize the status of this species, as follows.

Distribution

The Hawaiian monk seal is found primarily on the Leeward Chain of the Hawaiian Islands, especially Nihoa, Necker, French Frigate Shoals, Pearl and Hermes Reef, Kure Atoll, Laysan, and Lisianski. Sightings on the main Hawaiian Islands have become more common in the past 15 years and a birth was recorded on Kauai and Oahu in 1988 and 1991 respectively (Kenyon 1981, Riedmann 1990). Midway was an important breeding rookery, but is no longer used (Reeves *et al.* 1992). Hawaiian monk seals breed primarily at Laysan Island, Lisianski Island, and Pearl and Hermes Reefs (Tomich 1986). Monk seals are increasingly sighted in the main Hawaiian Islands. Monk seals have been reported on at least three occasions at Johnston Island over the past 30 years (not counting nine adult males that were translocated there from Laysan Island in 1984).

Hawaiian monk seals appear to exist as a single population that occurs in the Northwest Hawaiian Islands and Main Hawaiian Islands. However, groups of individuals that occupy specific islands or atolls in the Hawaiian Archipelago are treated as sub-populations for the purposes of research and management activity.

Pearl and Hermes Reef, the Midway Islands, and Kure Atoll form the three westernmost sub-populations of Hawaiian monk seals. There is a higher degree of migration among these sub-populations than among the sub-populations that occupy Laysan, Lisianski and French Frigate Shoals, which are more isolated. As a result, population growth in the westernmost sub-populations can be influenced more by immigration than by intrinsic growth. Several recent cohorts (groups of individuals born in the same year) at all three sites indicate that survival of juveniles has declined.

Status

Monk seals are considered one of the most endangered groups of pinnipeds on the planet because all of their populations are either extinct (for example, the Caribbean monk seal) or near exist at numbers that are precariously close to extinction (Mediterranean and Hawaiian monk seals).

Two periods of anthropogenic decline have been reported for Hawaiian monk seals. The first decline occurred in the 1800s when sealers, crews of wrecked vessels, and guano and feather hunters nearly hunted the population to extinction (Dill and Bryan 1912, Kenyon and Rice 1959). Following the collapse of this population, expeditions to the Northwest Hawaiian Islands reported increasing numbers of seals (Bailey 1952). A survey in 1958 suggested that the population had partially recovered from its initial collapse. The population of Hawaiian monk seals was believed to number slightly more than 1,000 seals at the end of this period (Rice 1960).

A second decline occurred from the late 1950s to the mid-1970s. Consistent declines in the monk seal population trends have been recorded since surveys commenced in the late 1950s. Counts of Hawaiian monk seals made since the late 1950s and 1980s at the atolls, islands and reefs where they haul out on the northwest Hawaiian Islands showed a 50% population decline

(NMFS 1991). The total population for the five major breeding locations plus Necker Island for 1987 was estimated to be 1,718 seals including 202 pups of the year (Gilmartin 1988). This compares with 1,488 animals estimated for 1983 (Gerrodette 1985). In 1992, the Hawaiian monk seal population was estimated to be 1580 (standard error = 147) (Ragen 1993). The best estimate of total abundance for 1993 was 1,406 (standard error = 131, assuming a constant coefficient of variation). Thus, between 1958 and 1993, mean beach counts declined by 60 percent. For the years, 1985 to 1993 the mean beach counts declined by approximately 5% per year. This downward trend is expected to continue, mainly due to poor pup and juvenile survival in recent years. As of 2012, approximately 1,212 Hawaiian monk seals remained in the wild with 152 seals documented in the Main Hawaiian Islands (Baker *et al.* 2011). Other species in the same genus have gone extinct (i.e., Caribbean monk seal) or have been extirpated from the majority of their previous range (i.e., Mediterranean monk seal). We conclude that the Hawaiian monk seal's resilience to further perturbation is low, and its status is precarious.

Regardless of which of these estimates, if any, most closely correspond to the actual size and trend of Hawaiian monk seals, the evidence available suggest that these monk seals exist as a "small" population (that is, they experience phenomena such as demographic stochasticity, inbreeding depression, Allee effects, among others, that cause their population size to become a threat in and of itself). For example, Hawaiian monk seals have very low survival of juveniles and sub-adults due to starvation (which is believed to be caused by limitations in the food base), low juvenile survival has led to low juvenile recruitment into the adult population, and the adult population increasingly consists of ageing females who reproductive success is expected to decline (if it has not already declined) in the foreseeable future. A positive feedback loop between reduced reproductive success of adult females and reduced recruitment into the adult population (which reduces the number of adult females) is the kind of demographic pattern that is likely to increase the monk seal's decline toward extinction. As a result, we assume that Hawaiian monk seals have elevated extinction probabilities because of exogenous threats caused by anthropogenic activities (primarily whaling, entanglement, and ship strikes), natural phenomena (such as disease, predation, or changes in the distribution and abundance of their prey in response to changing climate), and endogenous threats caused by the small size of their population.

Critical Habitat

Critical habitat for Hawaiian monk seals includes all beach areas, sand spits and islets, including all beach vegetation to its deepest extent inland, and lagoon waters out to a depth of 20 fathoms (120 ft.) for the following areas: Kure Atoll, Midway Islands except Sand Island and its harbor, Pearl and Hermes Reef, Lisianski Island, Laysan Island, Maro Reef, Gardner Pinnacles, French Frigate Shoals, Necker Island, and Nihoa Island.

On June 2, 2011 (76 FR 32026), NMFS proposed to revise critical habitat for Hawaiian monk seals by extending the current designation in the Northwestern Hawaiian Islands out to the 500 meter depth contour, including Sand Island at Midway Islands, and by designating six new areas in the main Hawaiian Islands. Specific areas proposed for the main Hawaiian Islands include terrestrial and marine habitat from five meters inland from the shoreline extending seaward to the 500-meter depth contour around: Kaula Island, Niihau, Kauai, Oahu, Maui Nui (including

Kahoolawe, Lanai, Maui, and Molokai), and Hawaii (except those areas that have been identified as not included in the designation).

Essential features of critical habitat for the conservation of Hawaiian monk seals include the following: Areas with characteristics preferred by monk seals for pupping and nursing; shallow, sheltered aquatic areas adjacent to coastal locations preferred by monk seals for pupping and nursing; marine areas from 0 to 500 m in depth preferred by juvenile and adult monk seals for foraging; areas with low levels of anthropogenic disturbance; marine areas with adequate prey quantity and quality; and significant areas used by monk seals for hauling out, resting or molting.

The marine component of this habitat was designated primarily as feeding areas for Hawaiian monk seals, while terrestrial habitat serves as pupping and nursing habitat for mothers and pups. Both components are currently under significant degradation pressure. Because the marine critical habitat is in the Papahānaumokuākea Marine National Monument, fishing is forbidden in the critical habitat. A result of this is the establishment of large predatory fishes (sharks and jacks) that compete with Hawaiian monk seals for prey resources. This may be a cause of seal malnourishment seen throughout many islands in the region.

3.2.14 Sea Lion, Steller (Western)

Steller sea lions were listed as threatened under the ESA on November 26, 1990 (55 FR 49204). We used information available in the final listing (62 FR 24345) and the 2012 stock assessment report (Allen and Angliss 2012) to summarize the status of the western DPS, as follows.

Distribution

The Steller sea lion ranges from Japan, through the Okhotsk and Bering Seas, to central California. It consists of two morphologically, ecologically, and behaviorally distinct DPSs: the Eastern DPS, which includes sea lions in Southeast Alaska, British Columbia, Washington, Oregon and California; and the Western DPS, which includes sea lions in all other regions of Alaska, as well as Russia and Japan. On May 5, 1997, NMFS issued a final determination to list the western DPS as endangered under the ESA (62 FR 24345).

Steller sea lions are distributed around the rim of the North Pacific Ocean from the Channel Islands off Southern California to northern Hokkaido, Japan. In the Bering Sea, the northernmost major rookery is on Walrus Island in the Pribilof Island group. The northernmost major haulout is on Hall Island off the northwestern tip of St. Matthew Island. Their distribution also extends northward from the western end of the Aleutian chain to sites along the eastern shore of the Kamchatka Peninsula. Their distribution is probably centered in the Gulf of Alaska and the Aleutian Islands (NMFS 1992).

The Western population of Steller sea lions occurs in the central and western Gulf of Alaska, Aleutian Islands as well as those that inhabit the coastal waters and breed in Asia (e.g., Japan and Russia).

Status

The ESA listing followed a decline in the U.S. population of about 64% over the three decades prior to the listing. In 1997, the species was split into two separate populations based on demographic and genetic differences (Bickham *et al.* 1996, Loughlin 1997), the western population was reclassified to endangered, while the eastern population remained threatened (62 FR 30772). Critical habitat for this species was designated on August 27, 1993 (58 FR 45269).

Numbers of Steller sea lions declined dramatically throughout much of the species' range, beginning in the mid- to late 1970s (Braham *et al.* 1980, Merrick *et al.* 1987, NMFS 1992, NMFS 1995). For two decades prior to the decline, the estimated total population was 250,000 to 300,000 animals (Kenyon and Rice 1961, Loughlin *et al.* 1984). The population estimate declined by 50-60% to about 116,000 animals by 1989 (NMFS 1992), and by an additional 15% by 1994.

The decline has generally been restricted to the western population of Steller sea lions that had declined by about 5% per year during the 1990s. Counts for this population have fallen from 109,880 animals in the late 1970s to 22,167 animals in 1996, a decline of 80% (NMFS 1995). Over the same time interval, the eastern population has remained stable or increased by several percent per year, in Southeast Alaska (Sease and Loughlin 1999), in British Columbia, Canada (P. Olesiuk, Department of Fisheries and Oceans, unpublished data), and in Oregon (R. Brown, Oregon Department of Fish and Wildlife, unpublished data). Counts in Russian territories have also declined and are currently estimated to be about one-third of historic levels (NMFS 1992).

Population viability analyses have been conducted by Merrick and York (1994) and York *et al.* (1996). The results of these analyses indicate that the next 20 years may be crucial for the western population of Steller sea lions, if the rates of decline observed in 1985 to 1989 or 1994 continue. Within two decades, it is possible that the number of adult females in the Kenai-to-Kiska region could drop to less than 5,000. Once the western population of Steller sea lions crosses this threshold, the small population size, by itself, could accelerate the population's decline to extinction. Extinction rates for rookeries or clusters of rookeries could increase sharply in 40 to 50 years and Steller sea lions could become extinct throughout the entire Kenai-to-Kiska region in the next 100-120 years.

Holmes and York (2003) extended earlier analyses of central Gulf of Alaska sea lions through the late 1990s. They reported a shift in the demographic causes of this population's decline during the 1990s: adult survivorship had reached its lowest point (20% below 1976 levels) while juvenile survivorship and fecundity remained relatively high. By the mid to late 1990s, adult continued to remain depressed, but was accompanied by reduced fecundity and a slight decline in juvenile survivorship to within 5 to 10% of 1976 levels. This reduced fecundity continues to affect this population and Holmes and York (2003) suggested that even a small reduction in adult and juvenile survivorship might cause the population to decline further.

As of 2011, the best estimate of abundance of the western Steller sea lion DPS in Alaska was 52,209 (Nmin = 45, 916). This represents a large decline since counts in the 1950s (N = 140,000) and 1970s (N = 110,000). The potential biological removal is estimated at 275 animals.

Critical Habitat

Critical habitat was designated on August 27, 1993 for both eastern and western DPS Steller sea lions in California, Oregon and Alaska (58 FR 45269). However, the eastern DPS was delisted in 2013 (78 FR 66139). Steller sea lion critical habitat includes all major rookeries in California, Oregon and Alaska as well as major haulouts in Alaska and includes a 37 km buffer around these locations. Essential features of Steller sea lion critical habitat include the physical and biological habitat features that support reproduction, foraging, rest and refuge, and include terrestrial, air and aquatic areas. Specific terrestrial areas include rookeries and haul-outs where breading, pupping, refuge and resting occurs. More than 100 major haulouts are documented. The principal, essential aquatic areas are the nearshore waters around rookeries and haulouts, their forage resources and habitats, and traditional rafting sites. Air zones around terrestrial and aquatic habitats are also designated as critical habitat to reduce disturbance in these essential areas. Specific activities that occur within the habitat that may disrupt the essential life functions include: (1) wildlife viewing, (2) boat and airplane traffic, (3) research activities, (4) timber harvest, (5) hard mineral extraction, (6) oil and gas exploration, (7) coastal development and pollutant discharge, and others.

Critical habitat that has been designated for the western population of Steller sea lions includes an air zone that extends 3,000 feet (0.9 km) above areas historically occupied by sea lions at each major rookery in California and Oregon, measured vertically from sea level. Critical habitat includes an aquatic zone that extends 20 nm (37 km) seaward in State and Federally managed waters from the baseline or basepoint of each major rookery and major haulout in Alaska that is west of 144° W longitude.

Critical habitat includes Alaskan rookeries, haulouts and associated areas. In Alaska, all major Steller sea lion rookeries and major haulouts and associated terrestrial, air, and aquatic zones have been included in the critical habitat designation. Three special aquatic foraging areas are in Alaska, including the Shelikof Strait area, the Bogoslof area and the Seguam Pass area.

1. Critical habitat includes the Shelikof Strait area in the Gulf of Alaska which consists of the area between the Alaska Peninsula and Tugidak, Sitkinak, Aiaktilik, Kodiak, Raspberry, Afognak and Shuyak Islands (connected by the shortest lines): bounded on the west by a line connecting Cape Kumlik (56°38/157°26´W) and the southwestern tip of Tugidak Island (56°24./154°41.W) and bounded in the east by a line connecting Cape Douglas (58°51´N/153°15´W)and the northernmost tip of Shuyak Island (58°37´N/152°22´W).

2. Critical habitat includes the Bogoslof area in the Bering Sea shelf which consists of the area between 170°00´W and 164°00´W, south of straight lines connecting 55°00´N/170 00´W and 55°00´N/168°00´W; 55°30´N/168°00´W and 55°30´N/166°00´W; 56°00´N/166°00´W and 56°00´N/164°00´W and north of the Aleutian Islands and straight lines between the islands connecting the following coordinates in the order listed: 52°49.2´N/169°40.4´W; 52°49.8´N/169°06.3´W; 53°23.8´N/167°50.1´W; 53°18.7´N/167°51.4´W; 53°59.0´N/166°17.2´W; 54°02.9´N/163°03.0´W; 54°07.7´N/165°40.6´W; 54°08.9´N/165°38.8´W; 54°11.9´N/165°23.3´W; 54°23.9´N/164°44.0´W

3. Critical habitat includes the Seguam Pass area which consists of the area between 52°00´N and 53°00´N and between 173°30´W and 172°30´W.

Specific activities that occur within the habitat that may disrupt the essential life functions that occur there include: (1) wildlife viewing, (2) boat and airplane traffic, (3) research activities, (4) timber harvest, (5) hard mineral extraction, (6) oil and gas exploration, (7) coastal development and pollutant discharge, and others. Recent modeling efforts suggest that only 37% of Steller sea lion high use areas are within critical habitat (Himes *et al.* 2012).

In addition, British Columbia has established protective areas in which Steller sea lion rookeries occur at Triangle Island and Cape St. James. Several other haul-out sites occur within Canadian national and provincial parks. Further, the Canadian government is moving to establish a marine wildlife area for the Scott Islands, where Steller sea lions haul-out and breed.

3.2.15 Seal, Bearded (Beringia)

On December 20, 2012, NMFS filed a final determination with the Federal Register to list the Beringia DPS of bearded seals as threatened under the ESA (77 FR 76739). No critical habitat has been designated for this species. We used information available in the final listing (77 FR 76739) and other data to summarize the status of the DPS, as follows.

Distribution

The Beringia DPS of the bearded seal includes all bearded seals from breeding populations in the Arctic Ocean and adjacent seas in the Pacific Ocean between 145^{o} E. Longitude and 130^{o} W. Longitude, except west of 157^{o} E. Longitude or west of the Kamchatka Peninsula, where bearded seals from breeding populations of the Okhotsk DPS are listed as threatened.

Bearded seals inhabit the seasonally ice-covered seas of the Northern Hemisphere where they whelp and rear their pups, and molt their coats on the ice in the spring and early summer. Bearded seals feed primarily on benthic organisms, including epifaunal and infaunal invertebrates, and demersal fishes and so are closely linked to areas where the seafloor is shallow (less than 200 m).

Status

On December 20, 2012, NMFS filed a final determination with the *Federal Register* to list the Beringia DPS of bearded seals as threatened under the ESA (77 FR 76739). No critical habitat has been designated for this species. A reliable population estimate for this stock is not available. However, some crude estimates are available from surveys completed in a few regions over the past four decades. Many of the assumptions used to derive these estimates are conservative (e.g., seals in the water were often not included, some areas were not surveys or omitted from the analysis). However, methodology developed by Ver Hoef *et al.* (2010), Fedoseev (2000) and Bengtson *et al.* (2005), Cameron *et al.* (2010) estimated about 125,000 bearded seals in the Bering Sea and 27,000 bearded seals in the Chukchi Sea. The authors did not present population estimates for the East Siberian and Beaufort Seas, but did estimate that the Beringia DPS contained approximately 155,000 bearded seals. However, given that these numbers are outdated, this estimate cannot necessarily be considered strictly minimum or conservative overall (Cameron *et al.* 2010).

Subsistence hunting of bearded seals likely occurred for hundreds if not thousands (Krupnik 1984; Riewe 1991). Monitoring from 1966-1979 support annual harvests of roughly 1,700 individuals from the Bering, Chukchi, and East Siberian Seas, with a peak of 4,750-6,308 individuals occurring in 1977 (Burns 1981, Matthews 1978). From 1990-1998, levels had risen to a mean harvest of 6,788 individuals annually which are believed to persist currently (Allen and Angliss 2010; Coffing *et al.* 1998;; Georgette *et al.* 1998; Wolfe and Hutchinson-Scarbrough 1999). The main concern about the conservation status of bearded seals stems from the likelihood that their sea-ice habitat has been modified by the warming climate and, more so, that the scientific consensus projections are for continued and perhaps accelerated warming in the foreseeable future (Cameron *et al.* 2010)

3.2.16 Seal, Ringed (Arctic)

On December 20, 2012, NMFS filed a final determination (77 FR 76705) to list the Arctic DPS of ringed seals as threatened under the ESA, primarily due to concern about threats to the species' habitat from climate warming and diminishing ice and snow cover. No critical habitat has been designated for this species. We used information available in the final listing (77 FR 76705) and other data to summarize the status of the DPS, as follows.

Distribution

The Arctic subspecies of the ringed seal includes all ringed seals from breeding populations in the Arctic Ocean and adjacent seas except west of 157° E. Long., or west of the Kamchatka Peninsula, where breeding populations of ringed seals of the Okhotsk subspecies are listed as threatened or in the Baltic Sea where breeding populations of ringed seals are listed as threatened. The BRT divided the distribution of Arctic ringed seals into five regions: Greenland Sea and Baffin Bay, Hudson Bay, Beaufort Sea, Chukchi Sea, and the White, Barents and Kara Seas. These regions were largely chosen to reflect the geographical groupings of published studies and not to imply any actual population structure. These areas also do not represent the full distribution of Arctic ringed seals as estimates are not available in some areas (*e.g.,* areas of the Russian Arctic coast and the Canadian Arctic Archipelago) (Kelly *et al.* 2010a, 75 FR 77476).

Status

The Arctic subspecies, due to its wide distribution, is believed to be the most abundant subspecies of ringed seal. Based on an analysis of surveys conducted during the 1970s, Frost (1985) estimated one to 1.5 million ringed seals in Alaskan waters, of which 250,000 were estimated in shorefast ice. These estimates were considered conservative when compared with polar bear predation rates (Frost 1985); however, details of the analysis were not published. Frost *et al. (*1988) reported total numbers of hauled out ringed seals in shorefast ice in the Chukchi Sea ranged from 18,400 ± 1,700 in 1985 to 35,000 ± 3,000 in 1986. The 1987 estimate of 20,200 ± 2,300 was similar to numbers reported in 1985. In the Beaufort Sea, the estimated number of ringed seals hauled out within the 20-m depth contour ranged from 9,800 ± 1,800 in 1985 to 13,000 ± 1,600 in 1986. The 1987 estimate (19,400 ± 3,700) was considerably higher but may have included seals that had moved in from other areas as the ice began to break up (Frost *et al.* 1988). Bengtson *et al. (*2005) conducted surveys in the Alaskan Chukchi Sea during May- June 1999 and 2000and reported abundance estimates of 252,488 (SE = 47,204) in 1999 and 208,857 (SE = 25,502) in 2000 for the entire survey area.

Throughout their range, ringed seals have an affinity for ice-covered waters and are well adapted to occupying both shorefast and pack ice (Kelly 1988). They remain in contact with ice most of the year and use it as a platform for pupping and nursing in late winter to early spring, for molting in late spring to early summer, and for resting at other times of the year.

In Alaskan waters, during winter and early spring when sea ice is at its maximal extent, ringed seals are abundant in the northern Bering Sea, Norton and Kotzebue Sounds, and throughout the Chukchi and Beaufort Seas. They occur as far south as Bristol Bay in years of extensive ice coverage but generally are not abundant south of Norton Sound except in nearshore areas (Frost 1985). Although details of their seasonal movements have not been adequately documented, it is generally considered that most ringed seals that winter in the Bering and Chukchi Seas migrate north in spring as the seasonal ice melts and retreats (Burns 1970) and spend summer in the pack ice of the northern Chukchi and Beaufort Seas, as well as in nearshore ice remnants in the Beaufort Sea (Frost 1985).

During summer, ringed seals range hundreds to thousands of kilometers to forage along ice edges or in highly productive open-water areas (Freitas *et al.* 2008, Kelly *et al.* 2010b). With the onset of freeze up in the fall, ringed seal movements become increasingly restricted and seals that have summered in the Beaufort Sea are thought to move west and south with the advancing ice pack, with many seals dispersing throughout the Chukchi and Bering Seas while some remain in the Beaufort Sea (Frost and Lowry 1984).

Frost *et al.* (2002) reported that a trend analysis based on an ANOVA comparison of observed seal densities in the central Beaufort Sea suggested marginally significant but substantial declines of 50% on shorefast ice and 31% on all ice types combined from 1985-1987 and 1996-1999. A Poisson regression model indicated highly significant density declines of 72% on shorefast ice and 43% on pack ice over the same 15-year period. These trends are considered out of date and only represent a fraction of the species' current range. However, no current and reliable data on population trends for the species was available at the time of this consultation.

3.2.17 Sea Turtle, Green

Green sea turtles were listed as threatened (except for breeding populations found in Florida and the Pacific coast of Mexico) on July 28, 1978. Breeding populations of green sea turtles found in Florida and the Pacific coast of Mexico are listed as endangered. We used information available in the 5-Year Review (NMFS and USFWS 2007a) to summarize the status of the species, as follows.

Distribution

The genus *Chelonia* is composed of two taxonomic units at the population level, the eastern Pacific green turtle (referred to by some as "black turtle," *C. mydas agassizii*), which ranges from Baja California south to Peru and west to the Galapagos Islands, and the nominate *C. m. mydas*, which occurs in tropical regions of the Atlantic, Indian, and Pacific Oceans and most seas, associated with these oceans, except for the Bering and Beaufort Seas. They are most common along a north-south band from 15°N to 5°S along 90°W, and between the Galapagos Islands and Central American Coast (NMFS and USFWS, 1998a).

In U.S. Atlantic and Gulf of Mexico waters, green turtles are found in inshore and nearshore waters from Texas to Massachusetts. Important feeding areas in Florida include the Indian River Lagoon System, the Florida Keys, Florida Bay, Homosassa, Crystal River, Cedar Key, St. Joseph

Bay and the Atlantic Ocean off Florida from Brevard through Broward counties (Wershoven and Wershoven, 1992; Guseman and Ehrhart, 1992). 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 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.

Status

The principal cause of the historical, worldwide decline of the green sea turtle was long-term harvest of eggs and adults on nesting beaches and juveniles and adults on feeding grounds. Egg removal and poaching of nesting females continues to be a problem for the greater threatened populations nesting throughout the South Pacific, Eastern Atlantic, Indian Ocean and some areas in the Caribbean (as summarized in Seminoff, 2004). Removal of eggs each nesting season can severely impact juvenile cohorts that would have recruited from the post-hatchling phase while poaching of nesting females reduces the abundance of reproductive adults as well as potential for annual egg production. Both these impacts led to declines in overall survival and reproduction for these respective populations. In addition to illegal poaching, direct harvest of adult and juveniles occurs heavily in the Caribbean Sea, Southeast Asia, Eastern Pacific and Western Indian Ocean (NMFS and USFWS, 2007). Despite substantial declines in the population of green sea turtles in these respective regions, intentional harvest remains legal in many countries and remains a threat to populations worldwide.

Green sea turtles have been impacted historically by domestic fishery operations that often capture, injure and even kill sea turtles at various life stages. In the U.S., the bottom trawl, sink gillnets, hook and line gear, and bottom longline managed in the Northeast Multispecies Fishery are known to frequently capture sea turtles during normal fishery operations (Watson *et al.* 2004; Epperly *et al.* 1995a; Lewison *et al.* 2003, Lewison *et al.* 2004; Richards, 2007) while the lines used for pot gear for the U.S. Lobster and Red Crab fisheries cause entanglement resulting in injury to flippers, drowning, and increased vulnerability to boat collisions (Lutcavage *et al.* 1997). In addition, various trawl, gillnet, longline, and hook gears used for the Monkfish, Spiny Dogfish, Summer Flounder, Scup, Black Sea Bass, and Atlantic Highly Migratory Species fisheries managed in the U.S. impact sea turtles at various degrees. While sea turtle bycatch varies depending on the fishery, the Southeast shrimp trawl fishery affects more sea turtles than all other activities combined [National Research Council (NRC), 1990]. Although participants in these fisheries are required to use Turtle Exclusion Devices (TEDs) that reduce the number of sea turtle captures by an estimated 97 percent, these fisheries are still expected to capture about 185,000 sea turtles each year, of which 5,000 end up dead (NMFS, 2002). In the Caribbean region, sea turtles are impacted by the Atlantic pelagic longline, Caribbean reef fish and spiny lobster fisheries in addition to various State and artisanal fisheries.

Green turtles depend on shallow foraging grounds with sufficient benthic vegetation. Therefore, direct destruction of foraging areas due to dredging, boat anchorage, deposition of spoil, and siltation may have considerable effects on the distribution of foraging green turtles (Coston-Clements and Hoss, 1983; Williams, 1988). Eutrophication, heavy metals, radioactive elements and hydrocarbons all may reduce the extent, quality and productivity of foraging grounds as well (Frazier, 1980; McKenzie *et al.* 1999; Storelli and Marcotrigiano, 2003). Various types of marine debris such as plastics, oil, and tar tends to collect on pelagic drift lines that young green turtles inhabit (Carr, 1987; Moore *et al.* 2001) and can lead to death through ingestion (Balazs, 1985; Bjorndal *et al.* 1994). Another major threat from man-made debris is the entanglement of turtles in discarded monofilament fishing line and abandoned netting (Balazs, 1985).

Fibropapillomatosis, an epizootic disease producing lobe-shaped tumors on the soft portion of a turtle's body, has been found to infect green sea turtles, most commonly juveniles (Williams *et al.* 1994). The occurrence of fibropapilloma tumors may result in impaired foraging, breathing or swimming ability possibly leading to death in some cases making it a serious threat to the survival and recovery of the species.

Another growing problem affecting green sea turtles is the increasing female bias in the sex ratio of green sea turtle hatchlings, likely related to global climate change and imperfect egg hatchery strategies (Tiwol and Cabanban, 2000; Hays *et al.* 2003a; Baker *et al.* 2006). At least one site (i.e., Ascension Island) has had an increase of mean sand temperature in recent years (Hays *et al.* 2003). It is expected that similar rises in sand temperatures on nesting beaches may alter sex rations towards a female bias and significantly impact the ability of the species to survive and recover in the wild.

A summary of current nesting trends[22] is provided in the most recent status review for the species (i.e., NMFS and USFWS, 2007a) 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 found it was possible 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). We must note that 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.

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

[22] Estimates of abundance were largely based on annual numbers of nesting females or deposited nests at each site. In some cases, abundance was based on egg production or egg harvest rates (see NMFS and USFWS, 2007b).

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 (2005) collected nest counts from 1999-2003 and also reported increasing trends in the population consistent with the earlier studies.

In the continental U.S., 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.* 1995; 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. 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 1990s to a high of 10,701 measured most recently in 2011 (FWC, 2011). While the increase in nest counts seen across Florida beaches is encouraging, these numbers only reflect one segment of the population (nesting females) and thus should not be taken to reflect the true population trend for the region.

After emerging from the nest, hatchlings swim to offshore areas and go through a post-hatchling pelagic stage where they are believed to live for several years, feeding close to the surface on a variety of marine algae 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, 2007). However, growth studies using skeletochronology indicate that green sea turtles in the Western Atlantic shift from this oceanic phase to nearshore development habitats (protected lagoons and open coastal areas rich in sea grass and marine algae) after approximately 5-6 years (Zug and Glor, 1998; Bresette *et al.* 2006). As adults, they feed almost exclusively on sea grasses and algae in shallow bays, lagoons, and reefs (Rebel, 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).

Some of the principal feeding pastures in the Gulf of Mexico include inshore south Texas waters, the upper west coast of Florida and the northwestern coast of the Yucatan Peninsula. Additional important foraging areas in the western Atlantic include the Indian River Lagoon System in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971). The preferred food in these areas is *Cymodocea, Thalassia, Zostera, Sagittaria* and *Vallisneria* (Babcock 1937, Underwood 1951, Carr 1952, 1954).

Ninety percent of the nesting and breeding activity of the Hawaiian green turtle occurs at the French Frigate Shoals, where 200-700 females are estimated to nest annually (NMFS and USFWS, 1998a). Important resident areas have been identified and are being monitored along the coastlines of Oahu, Molokai, Maui, Lanai, Hawaii and at large nesting areas in the reefs surrounding the French Frigate Shoals, Lisianski Island, and Pearl and Hermes Reef (Balazs 1982; Balazs *et al.* 1987).

Critical Habitat

On September 2, 1998, critical habitat for green sea turtles was designated in coastal waters surrounding Culebra Island, Puerto Rico (63 FR 46693). Aspects of these areas that are important for green sea turtle survival and recovery include important natal development habitat, refuge from predation, shelter between foraging periods, and food for green sea turtle prey. The effects of vessel traffic, coastal construction activities, pollution and dredge and fill activities all significantly threaten these habitat features.

3.2.18 Sea Turtle, Hawksbill

The hawksbill sea turtle was listed as endangered under the ESA on June 2, 1970 (35 FR 8491). The species is also protected by CITES and is classified as critically endangered on the IUCN's Red List of Threatened Species. We used information available in the 5-year reviews (NMFS and USFWS 2007b, NMFS 2013c, NMFS and USFWS 2013) to summarize the status of the species, as follows.

Distribution

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 U.S., in the Greater and Lesser Antilles, and along the mainland of Central America south to Brazil (Lund, 1985; Plotkin and Amos, 1988; Amos, 1989; Groombridge and Luxmoore, 1989; Plotkin and Amos, 1990; NMFS and USFWS, 1998b; Meylan and Donnelly, 1999). 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 Buck Island Reef National Monument off St. Croix in the U.S. Virgin Islands (USVI) 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, 2007). 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 U.S. occurs in Puerto Rico and the USVI, specifically on Mona Island and Buck Island, respectively. Although nesting within the continental U.S. is typically rare, it can also occur along the southeast coast of Florida and the Florida Keys. In addition to nesting beaches in the U.S. Caribbean, the largest hawksbill nesting population in the Western Atlantic occurs in the Yucatán Peninsula of Mexico, where several thousand nests are recorded annually in the States of Campeche, Yucatán and Quintana Roo (Spotila, 2004; Garduño-Andrade *et al.* 1999). 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 five-year status review for the species (NMFS and USFWS, 2007).

Status

There are currently no reliable estimates of population abundance and trends for non-nesting 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, 2007a). 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 nests in the Republic of Seychelles (Spotila, 2004). In the U.S., 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, USVI (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 although among the 42 sites where recent trend data was 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 in either the Atlantic or Indian Oceans (Mortimer and Donnelly, 2008). More information about site-specific trends for can be found in the most recent five-year status review for the species (see NMFS and USFWS, 2007b).

The historical decline of the species is primarily attributed to centuries of exploitation for the beautifully patterned shell that 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* Bräutigam 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.

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 neritic, coastal foraging grounds.

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 beach or to courtship stations along the migratory corridor. Hawksbill turtles mate in shallow water off their nesting beaches. Hawksbill turtles usually select nest sites under cover of woody vegetation, although they will build nests without such cover if it is not available.

Hawksbills show a high fidelity to their foraging areas as well (van Dam and Diez, 1998). Foraging sites are typically areas associated with coral reefs although hawksbills are also found around rocky outcrops and high energy shoals that 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 Diez, 1998).

Critical Habitat

On September 2, 1998, NMFS established critical habitat for hawksbill sea turtles around Mona and Monito Islands, Puerto Rico (63 FR 46693). Aspects of these areas that are important for hawksbill sea turtle survival and recovery include important natal development habitat, refuge from predation, shelter between foraging periods, and food for hawksbill sea turtle prey. The effects of vessel traffic, coastal construction activities, pollution and dredge and fill activities all significantly threaten these habitat features.

3.2.19 Sea Turtle, Kemp's ridley

The species was first listed under the Endangered Species Conservation Act (35 FR 8491) and listed as endangered under the ESA since 1973. Critical habitat has not been designated. We used information available in the revised recovery plan (NMFS *et al.* 2011) to summarize the status of the species, as follows.

Distribution

This species has a very restricted range relative to other sea turtle species with most adults occurring in shallow, nearshore waters from the Gulf of Mexico in the U.S. north to the Grand Banks and Nova Scotia (Bleakney, 1955; Watson *et al.* 2004; NMFS *et al.* 2011). Some individuals have also been identified to a lesser degree near the Azores and eastern north Atlantic (Deraniyagala, 1938; Brongersma, 1972; Fontaine *et al.* 1989; Bolten and Martins, 1990) as well as the Mediterranean region (Pritchard and Márquez, 1973; Brongersma and Carr, 1983; Tomas and Raga, 2007; Insacco and Spadola, 2010).

Nesting is essentially limited to the beaches of the western Gulf of Mexico, primarily in the Mexican State of Tamaulipas at a stretch of beach known as Rancho Nuevo (Hildebrand, 1963;

Carr, 1963; Heppell *et al.* 2005) as well as south shores of Texas (especially South Padre Island) (Shaver and Plotkin, 1998; Shaver, 2002; Shaver, 2005). Nests have also been recorded in Veracruz and Campeche in Mexico and other east coast States in the U.S. (i.e., Florida, Alabama, Georgia, South Carolina and North Carolina) although nesting is much less frequent in these areas. Kemp's ridley sea turtles display a unique mass nesting behavior where females emerge together onto the beach, usually during daylight hours. These synchronized emergences are known as arribadas and are frequently seen at Rancho Nuevo each year from April to July (Hildebrand, 1963; Carr, 1963; Márquez, 1994; Jimenez *et al.* 2005).

Status

Direct harvest of eggs and nesting adults was common in Mexico before 1967 and represented a major threat to the species causing declines in both adult survival and reproductive success. The fact that the species nests in only a few key areas as well as the mass arribadas formed during the nesting season made them particularly vulnerable to capture based on their predictability. While direct harvest no longer occurs, illegal poaching continues to be an issue affecting Kemp's ridleys nesting in Mexico and Texas although the presence of field biologists and enforcement personnel on nesting beaches has minimized the threat in recent decades. Of all commercial fisheries operating in the Gulf of Mexico and along the east coast of the U.S., shrimp trawling has had the greatest impact on sea turtle populations, including Kemp's ridleys. The National Academy of Sciences estimated that between 500 and 5,000 Kemp's ridley sea turtles were killed annually by the offshore shrimping fleet in the southeastern U.S. and Gulf of Mexico (Magnuson *et al.* 1990). While direct harvest on beaches affected eggs and adults, incidental mortalities in trawls and other commercial fisheries impacted offshore and neritic juveniles as well as adults. Before the use of TEDs, shrimp trawling was estimated to cause 10 times the mortality of any other anthropogenic factors combined.

The global population of Kemp's ridley sea turtles is the lowest of all the extant sea turtle species and a review of nesting data collected since the late 1940s suggest that species has drastically declined in abundance over the past 50 years. 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; Carr, 1963). By the early 1970s, the world population estimate of mature female Kemp's ridleys had reduced to 2,500-5,000 individuals (i.e., 88-94% decline from 1940s levels) and this trend continued through the mid-1980s with the lowest nest count of 702 recorded for Rancho Nuevo in the year 1985. The severe decline in the Kemp's ridley population was likely caused by a combination of factors including direct egg removal, direct harvest of females on beaches, and impacts from Gulf of Mexico fishery operations during that time (notably shrimp trawling) (NMFS *et al.* 2011).

Despite these drastic declines in abundance, recent nesting data collected from the National Institute of Fisheries in Mexico as well as data from the USFWS has suggested the population may be showing signs of recovery. For instance, the number of nests at Rancho Nuevo grew from a low of 702 nests in 1985, to 1,940 nests in 1995, to over 20,000 nests in 2009, which was the highest nest counts seen in over 55 years. Similar increases were documented for Texas beaches as the 911 nests documented from 2002-2010 represented an eleven-fold increase from the 81 nests counted over the period 1948-2001 (Shaver and Caillouet, 1998; Shaver, 2005).

Results for the 2010 nesting season were not as encouraging as nest counts were recorded at levels lower than the previous three years for Rancho Nuevo and the previous two years for Texas beaches (Gladys Porter Zoo, 2010; National Park Service, unpublished data[23]). However, nesting numbers rebounded in 2011 in both areas including record 199 nests recorded for Texas (National Park Service, unpublished data[24]).

The TEWG (2000) developed a population model to evaluate trends in the Kemp's ridley population through the application of empirical data and life history parameter estimates chosen by the investigators. Model results identified three trends over time in benthic immature Kemp's ridley sea turtles. Increased production of hatchlings from the nesting beach beginning in 1966 resulted in an increase in the population of benthic Kemp's ridleys (defined as 20-60 centimeters in length and approximately 2-9 years of age) that leveled off in the late 1970s. A second period of increase followed by leveling occurred between 1978 and 1989 as hatchling production was further enhanced by the cooperative program between the U.S. Fish and Wildlife Service and Mexico's Instituto Nacional de Pesca to increase nest protection and relocation. A third period of steady increase has occurred since 1990 likely due to increased hatchling production and survival of immature turtles. The original model projected that population levels could theoretically reach the Recovery Plan's intermediate recovery goal of 10,000 nesters by the year 2015 if the assumptions of age to sexual maturity and age specific survivorship rates used are correct.

More recent models developed by Heppell *et al.* (2005) predict that the population is expected to increase at least 12-16% per year [19% using updated models used for the 2011 five-year status review for the species (NMFS *et al.* 2011)] and that the population could attain at least 10,000 females nesting on Mexico beaches in this decade [by 2015 for Heppell *et al.* (2005) and by 2011 for updates to the model developed for the 2011 five -year status review (NMFS *et al.* 2011)]. 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 U.S., 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.

Little is known of the movements of the post-hatching stage within the Gulf of Mexico although the turtles during this stage are assumed to associate with floating seaweed (e.g., *Sargassum* spp.) similar to loggerhead and green sea turtles. During this stage, they presumably feed on the available seaweed and associated infauna or other epipelagic species found in the Gulf of Mexico. While many post-hatchlings remain in the Gulf of Mexico, some are transported eastward on the Florida Current into the Gulf Stream transporting them up the east coast of the

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[23] Data available at http://www.nps.gov/pais/naturescience/strp.htm.
[24] Data available at http://www.nps.gov/pais/naturescience/currentseason.htm

U.S. (Collard and Ogren, 1990; Putman *et al.* 2010).

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 colder conditions (Lutcavage and Musick, 1985; Henwood and Ogren, 1987; 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 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 (Musick and Limpus, 1997; Epperly *et al.* 1995b; Epperly *et al.* 1995c).

Those that remained in the Gulf of Mexico during their early oceanic stage apparently move into coastal waters, mainly along the northern and eastern shorelines of the Gulf (Landry and Seney, 2008). Data obtained through satellite telemetry reveal a south to southwestern winter migration by Kemp's ridleys in the northwestern Gulf of Mexico, a west to east migration in the northern Gulf, and a southern winter migration in the eastern Gulf (Renaud and Williams, 2005). Schmid (1998) reported that neritic juveniles might continue this pattern of seasonal migrations and foraging site fidelity for a number of years until maturing into the adult stage.

Adult Kemp's ridleys primarily occupy nearshore neritic habitats, typically containing muddy or sandy bottoms where their preferred 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 bycatch discards from the shrimping industry (Shaver, 1991).

3.2.20 Sea Turtle, Leatherback

The leatherback sea turtle is unique among sea turtles for its large size, wide distribution (due to thermoregulatory systems and behavior) and lack of a hard, bony carapace. It ranges from tropical to subpolar latitudes, worldwide. The species was first listed under the Endangered Species Conservation Act (35 FR 8491) and listed as endangered under the ESA since 1973. We used information available in the 5-year review (NMFS and USFWS 2007c) and the critical habitat designation (77 FR 61573) to summarize the status of the species, as follows.

Distribution

The leatherback sea turtle ranges farther than any other sea turtle species, exhibiting broad thermal tolerances and are widely distributed throughout the world's oceans (NMFS and USFWS, 1992). 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. Female leatherbacks nest from the southeastern U.S. 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, 2001). Leatherbacks also occur in the Mediterranean Sea, although they are not known to nest there. Leatherback turtles are found on the western and eastern coasts of the Pacific Ocean, with nesting aggregations in Mexico and Costa Rica (eastern Pacific) and Malaysia, Indonesia, Australia, the Solomon Islands, Papua New Guinea, Thailand, and Fiji (western Pacific). In the Indian Ocean, leatherback nesting aggregations are reported in India and Sri Lanka (NMFS and USFWS, 2007c).

Leatherback turtles are uncommon in the insular Pacific Ocean, but individual leatherback turtles are sometimes encountered in deep water and prominent archipelagoes. They range as far north as Alaska and the Bering Sea and as far south as Chile and New Zealand. In Alaska, leatherback turtles are found as far north as 60.34°N, 145.38°W and as far west as the Aleutian Islands (Hodge 1979, Stinson 1984). Leatherback turtles have been found in the Bering Sea along the coast of Russia (Bannikov *et al.* 1971). To a large extent, the oceanic distribution of leatherback turtles may reflect the distribution and abundance of their macroplanktonic prey in temperate and boreal latitudes (NMFS and USFWS, 2007c).

Previous genetic analyses of leatherbacks using only mitochondrial DNA 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.* 1999). Further genetic analyses using microsatellite markers along with the mitochondrial DNA 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).

Status

Leatherback sea turtles are threatened by several human activities, including entanglement in fishing gear (e.g., gillnets, longlines, lobster pots, weirs), direct harvest, egg collection, the destruction and degradation of nesting and coastal habitat, and ingestion of marine debris (NMFS and USFWS, 2007c). Leatherbacks are more likely to become entangled in fishing gear because they are less maneuverable and larger than other sea turtle species (Davenport, 1987). The decline in the Mexican population of leatherbacks has been suggested to coincide with the growth of the longline and coastal gillnet fisheries in the Pacific (Eckert and Sarti, 1997). Lewison *et al.* (2004) reported that between 1,000 and 1,300 leatherback sea turtles are estimated to have been captured and killed in longline fisheries in the year 2000 alone. Between 2004 and 2008, shallow-set fisheries based out of Hawaii are estimated to have captured about 19 leatherback sea turtles and leatherbacks continue to be captured and killed in the deep-set based longline fisheries based out of Hawaii and American Samoa. Leatherback sea turtles are also very susceptible to marine debris ingestion 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).

Leatherback sea turtle populations have seen dramatic declines worldwide, especially for nesting females where a majority of the data exists. For example, in the year 1980, the global leatherback population was estimated at approximately 115,000 adult females (Pritchard, 1982) that later declined to 34,500 by the year 1995 (Spotila *et al.* 1996). The most recent population estimate for leatherback sea turtles from the North Atlantic breeding groups is in the range of

34,000-90,000 adult individuals (20,000-56,000 of which are adult females) (TEWG, 2007). Increases in the number of nesting females have been noted at some sites in the Atlantic Ocean, but these are far outweighed by local extinctions (especially of island populations) and the demise of populations throughout the Pacific, such as in Malaysia and Mexico.

In the Atlantic and Caribbean, the largest nesting assemblages of leatherbacks are found in the USVI, Puerto Rico and Florida. Populations in the eastern Atlantic (i.e., off Africa) and Caribbean appear to be stable; however, information regarding the status of the entire leatherback population in the Atlantic is lacking and it is certain that some nesting populations (e.g., St. John and St. Thomas, USVI) have been extirpated (NMFS and USFWS, 2007c). The TEWG (2007) reported that nesting populations appear to be increasing for Trinidad, Suriname, Guyana and Puerto Rico while other colonies in the Caribbean, Costa Rica, Nicaragua and Honduras may be stable or slightly declining. The Florida nesting stock appears to have grown from under 100 nests per year in the 1980s (Meylan *et al.* 1995) to over 1,000 nests per year on average in the first decade of the 21st century (FWC, 2009). Using data from the index nesting beach surveys, the TEWG (2007) estimated a significant annual nesting growth rate of 1.17% between 1989 and 2005 for the Florida nesting stock.

Based on published estimates of nesting female abundance, leatherback populations are declining at all major Pacific basin nesting beaches, particularly in the past two decades (Spotila et al. 1996; Spotila et al. 2000; NMFS and USFWS, 2007c). For example, the leatherback population nesting along the east Pacific Ocean dropped from an estimated 91,000 adults in the year 1980 (Spotila et al. 1996) to 3,000 total adults and subadults by the 1990's (Spotila et al. 2000). TEWG (2007) reported catastrophic collapse of the colonies in the South China Sea and East Pacific that contributed to these declines. It should be noted that these trends are for nesting females that represent only one segment of the true leatherback abundance and should be taken with caution.

Leatherback sea turtles are highly migratory, exploiting convergence zones and upwelling areas in the open ocean, along continental margins, and in archipelagic waters (Morreale and Standora, 1998; Eckert, 1999). In a single year, a leatherback may swim more than 10,000 kilometers (Eckert, 1999). In the North Atlantic Ocean, leatherback turtles regularly occur in deep waters (over 328 feet), and an aerial survey study in the north Atlantic sighted leatherback turtles in water depths ranging from 3-13,618 feet, with a median sighting depth of 131.6 feet [Cetacean and Turtle Assessment Program (CETAP), 1982]. Leatherbacks lead a pelagic existence, foraging widely in temperate waters except during the nesting season, when gravid females return to tropical beaches to lay eggs. Males are rarely observed near nesting areas, and it has been hypothesized that leatherback sea turtles probably mate outside of tropical waters, before females swim to their nesting beaches (Eckert *et al.* 1989).
Leatherbacks are known as proficient divers with some individuals diving deeper than 1,100 meters in the Caribbean (López-Mendilaharsu *et al.* 2008). Leatherbacks appear to spend almost the entire portion of each dive traveling to and from maximum depth, suggesting that maximum exploitation of the water column is essential for the species (Eckert *et al.* 1989).

Critical Habitat

On March 23, 1979, leatherback critical habitat was identified adjacent to Sandy Point, St. Croix, U.S.V.I. from the 183 m isobath to mean high tide level between 17° 42'12" N and 65°50'00" W (44 FR 17710). This habitat is essential for nesting, which has been increasingly threatened since 1979, when tourism increased significantly, bringing nesting habitat and people into close and frequent proximity. However, studies do not currently support significant critical habitat deterioration.

On January 26, 2012, NMFS designated critical habitat for leatherback sea turtles in waters along Washington State and Oregon (Cape Flattery to Cape Blanco; 64,760 km^2) and California (Point Arena to Point Arguello; 43,798 km^2). The primary constituent element of these areas includes (1.) the occurrence of prey species, primarily scyphomedusae of the order Semaeostomeae (*Chrysaora, Aurelia, Phacellophora,* and *Cyanea*), of sufficient condition, distribution, diversity, abundance and density necessary to support individual as well as population growth, reproduction, and development of leatherbacks; and (2) migratory pathway conditions to allow for safe and timely passage and access between high use foraging areas.. At this time, there are no data to suggest that these primary constituent elements have been significantly degraded.

3.2.21 Sea Turtle, Loggerhead (Northwest Atlantic Ocean)

The loggerhead sea turtle was originally listed as threatened throughout its range on July 28, 1978 (43 FR 32800). On September 22, 2011, NMFS published a final rule to list nine separate DPSs under the ESA with four listed as threatened (i.e., Northwest Atlantic Ocean, South Atlantic Ocean, Southeast Indo-Pacific Ocean, and Southwest Indian Ocean DPSs) and five listed as endangered (i.e., Mediterranean Sea, North Indian Ocean, North Pacific Ocean, South Pacific Ocean, and Northeast Atlantic Ocean DPSs). Critical habitat has not been designated for loggerhead sea turtles but was proposed in 2013 (78 FR 43005)[25]. We used information available in the 2009 Status Review (Conant *et al.* 2009) and the final listing rule (76 FR 58868) to summarize the status of the species, as follows.

Distribution

In the most recent status review conducted for the species, the loggerhead biological review team identified 60°N latitude and the equator as the north-south boundaries and 40°W longitude as the east boundary of the Northwest Atlantic Ocean population segment based on oceanographic features, loggerhead sightings, thermal tolerance, fishery bycatch data, and information on loggerhead distribution from satellite telemetry and flipper tagging studies (Conant *et al.* 2009). The majority of loggerhead nesting in the Northwest Atlantic is concentrated along the U.S. Coast 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, off the southwestern coast of Cuba, and along the coasts of Central America, Colombia, Venezuela and the eastern Caribbean Islands (Addison and Morford, 1996; Addison, 1997; Moncada Gavilán, 2001). From a global perspective, the loggerhead nesting aggregation

[25] See http://www.nmfs.noaa.gov/pr/species/criticalhabitat_loggerhead.htm for more information.

in the southeastern U.S. is second in size only to the nesting aggregations in the Arabian Sea off Oman, making it one of the most important nesting aggregations for the species.

Non-nesting, adult female loggerheads are reported in nearshore and offshore waters throughout the U.S. and Caribbean Sea (Foley *et al.* 2008) and recent tagging studies conducted in the Gulf of Mexico suggest that sea turtles nesting along the Gulf coast of Florida and the Florida Panhandle generally do not leave the region for extended periods throughout the year (TEWG), 2009. Significant numbers of male and female loggerheads forage in shallow water habitats with large expanses of open ocean access (such as Florida Bay) year-round while juveniles are also found in enclosed, shallow water estuarine environments (Epperly *et al.* 1995a).

In terms of population structure for the Northwest Atlantic Ocean DPS, NMFS and USFWS (2008) identified and evaluated five separate recovery units (i.e., nesting subpopulations): the Northern U.S. (Florida/Georgia border to southern Virginia); Peninsular Florida (Florida/Georgia border south through Pinellas County, excluding the islands west of Key West, Florida); Dry Tortugas (islands west of Key West, Florida); Northern Gulf of Mexico (Franklin County, Florida, west through Texas); and Greater Caribbean (Mexico through French Guiana, The Bahamas, Lesser and Greater Antilles). All Northwest Atlantic recovery units are reproductively isolated from populations occurring within the Northeast Atlantic, South Atlantic and Mediterranean Sea.

Status

Loggerhead sea turtles have been impacted historically by domestic fishery operations that often capture, injure and even kill sea turtles at various life stages. In the U.S., the bottom trawl, sink gillnets, hook and line gear, and bottom longline managed in the Northeast Multispecies Fishery are known to frequently capture sea turtles during normal fishery operations (Watson *et al.* 2004; Epperly *et al.* 1995a; Lewison *et al.* 2003, Lewison *et al.* 2004; Richards, 2007) while the lines used for pot gear for the U.S. Lobster and Red Crab fisheries cause entanglement resulting in injury to flippers, drowning, and increased vulnerability to boat collisions (Lutcavage *et al.* 1997). In addition, various trawl, gillnet, longline, and hook gears used for the Monkfish, Spiny Dogfish, Summer Flounder, Scup, Black Sea Bass, and Atlantic Highly Migratory Species fisheries managed in the U.S. impact sea turtles at various degrees. While sea turtle bycatch varies depending on the fishery, the Southeast shrimp trawl fishery affects more sea turtles than all other activities combined [National Research Council (NRC), 1990]. Although participants in these fisheries are required to use Turtle Exclusion Devices (TEDs) that reduce the number of sea turtle captures by an estimated 97 percent, these fisheries are still expected to capture about 185,000 sea turtles each year, of which 5,000 end up dead (NMFS, 2002).

In the Caribbean region, sea turtles are impacted by the Atlantic pelagic longline, Caribbean reef fish and spiny lobster fisheries in addition to various State and artisanal fisheries. The estimated number of loggerhead sea turtles caught by pelagic longline fisheries during the period 1992-2002 for all geographic areas was 10,034 individuals of which 81 were estimated to be dead when brought to the vessel (NMFS, 2004). Actual mortalities associated with pelagic longline were likely substantially higher given the fact that these numbers did not include post-release mortalities as a result of hooking injuries.

In nearshore waters, 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, 1997). 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 (Lutcavage *et al.* 1997; Bouchard *et al.* 1998). 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 evoke a change in the natural behaviors of both adults and hatchlings (Ackerman, 1997; Witherington *et al.* 2003; Witherington *et al.* 2007). Mosier (1998) reported that fewer loggerheads made nesting attempts on beaches fronted by seawalls and found that when turtles did emerge in the presence of armoring structures, more returned to the water without nesting than those on non-armored beaches.

For nesting subpopulations occurring in the Northwest Atlantic, the Peninsular Florida and Northern U.S. units support the greatest numbers of nesting females (i.e., over 10,000 for the Peninsular Florida unit and over 1,000 for the Northern U.S. unit) while the other three nesting subpopulations (i.e., Northern Gulf of Mexico, Dry Tortugas, and Greater Caribbean units) contain fewer than 1,000 nesting females based on count data (Ehrhart *et al.* 2003; Kamezaki *et al.* 2003, Limpus and Limpus, 2003; Margaritoulis *et al.* 2003; TEWG, 2009).

According to the most recent status reviews for the species, all nesting subpopulations occurring in the Northwest Atlantic Ocean show declining trends in the annual number of nests for which they were adequate data (NMFS and USFWS, 2008; Conant et al, 2009; TEWG, 2009). The Peninsular Florida nesting subpopulation, which represents approximately 87% of all nesting effort in the Northwest Atlantic Ocean DPS has declined 26% over a recent 20 year study period (1989–2008) with a greater decline (41 percent) occurring in the latter 10 years of the study (NMFS and USFWS, 2008; Witherington *et al.* 2009). The second largest nesting subpopulation (i.e., Northern U.S.) also saw annual declines of 1.3% since 1983 (NMFS and USFWS, 2008) while the third largest recovery unit (i.e., Greater Caribbean) saw annual declines of over 5% occurring over the period 1995-2006 (TEWG, 2009). The two smallest nesting subpopulations (i.e., Northern Gulf of Mexico and Dry Tortugas) have also seen declines in nest counts since the mid-1990s; however, these units represent only a small fraction in loggerhead nesting and are not considered to be good indicators of the overall trend. In addition, a detailed analysis of Florida's long-term loggerhead nesting data (1989-2011) revealed that following a 24% increase between 1989 and 1998, nest counts for Florida beaches declined 16% between 1998 and 2011. More recent nest counts in 2011 were close to the average for the preceding five-year period suggesting the recent trend may be stabilizing (FWC, 2011).

At present, there are no reliable estimates of population size of loggerheads occurring in the pelagic and oceanic environments (Bjorndal and Bolten, 2000); however, recent data collected from in-water studies reveal some patterns of abundance and/or size composition of loggerheads occurring in the Northwest Atlantic. The 2009 TEWG report summarized in-water capture and strandings data[26] spanning over four decades from the late 1970's through the late 2000's. Data from the southeastern U.S. (from central North Carolina through central Florida) indicated a possible increase in the abundance of neritic loggerheads captured over the past one to two decades while aerial surveys and one other in-water study conducted in the northeastern U.S. (north of Cape Hatteras, N.C.) indicate a decrease in abundance over similar periods (TEWG, 2009). This increase in catch rates for the southeastern U.S. was not consistent with the declines in nesting seen over the same time period. The authors suggested that the apparent increase in in-water catch rates in the southeastern U.S. coupled with a shift in median size of captured juveniles may indicate there is a relatively large cohort that will be reaching sexual maturity in the near future. However, additional data from the review suggests that any increase in adults may be temporary because in-water studies throughout the entire eastern U.S. also indicated a substantial decrease in the abundance of smaller sized juveniles that, in turn, would indicate possible recruitment failure. However, the authors also stated these trends should be viewed with caution given the limited number and size of studies dedicated to assessing in-water abundance of loggerheads as well as the lack of longer term studies that could more adequately determine what impact, if any, these trends have on recruitment and/or survival rates for the population.

The loggerhead sea turtle BRT recently conducted two independent analyses using nesting data (including counts of nesting females or nests) to assess extinction risks for the identified DPS using methods developed by Snover and Heppell (2009). The analysis performed for the status review indicated that the Northwest Atlantic Ocean DPS had a high likelihood of quasi-extinction over a wide range of quasi-extinction threshold values, suggesting that the DPS is likely to continue to decline in future years (Conant *et al.* 2009).

As post-hatchlings, loggerheads hatched on U.S. beaches migrate offshore and become associated with *Sargassum spp.* habitats, driftlines and other convergence zones (Carr, 1986; Witherington, 2002). They 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) although Snover (2002) suggests a much longer oceanic juvenile stage duration with a range of 9-24 years and a mean of 14.8 years. Stranding records indicate that when immature loggerheads reach 40-60 centimeters straight carapace length, they then travel to coastal inshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico (Witzell *et al.* 2002). Other studies, however, 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 (Laurent *et al.* 1998; Bolten, 2003). 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

[26] Data was compiled from turtle captures recorded for the St. Lucie Power Plan in Florida since 1976 (see Bresette *et al.* 2003), entanglement surveys conducted in the Indian River in Florida since 1982 (see Ehrhart *et al.* 2007), fishery-independent trawl surveys off the southeastern U.S. [see South Carolina Marine Resources Research Institute (SCMRI), 2000], pound-net captures off North Carolina (see Epperly *et al.* 2007) and off New York (see Morreale and Standora, 1998; Morreale *et al.* 2005), and strandings data maintained by the Sea Turtle Stranding and Salvage Network.

coastal habitats interchangeably (Witzell *et al.* 2002).

After departing the oceanic zone, neritic juvenile loggerheads in the Northwest Atlantic inhabit continental shelf waters from Cape Cod Bay south to Florida, the Bahamas, Cuba and the Gulf of Mexico (neritic refers to the inshore marine environment from the surface to the sea floor where water depths do not exceed 200 meters). Benthic, immature loggerheads foraging in northeastern U.S. waters are also known to migrate southward in the fall as water temperatures cool and then migrate back northward in spring (Epperly *et al.* 1995a; Keinath, 1993; Morreale and Sandora, 1998; Shoop and Kenney, 1992). 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.

Critical Habitat

On July 10, 2014 critical habitat was designated for the Northwest Atlantic Ocean DPS of loggerhead sea turtles proposed Critical habitat (78 FR 43005). PCEs for this species include: (1) Nearshore waters directly off the highest density nesting beaches as identified in 78 FR 18000 (March 25, 2013) to 1.6 km offshore; (2) Waters sufficiently free of obstructions or artificial lighting to allow transit through the surf zone and outward toward open water; and (3) Waters with minimal manmade structures that could promote predators (i.e., nearshore predator concentration caused by submerged and emergent offshore structures), disrupt wave patterns necessary for orientation, and/or create excessive longshore currents

3.2.22 Sea Turtle, Loggerhead (North Pacific Ocean)

The loggerhead sea turtle was originally listed as threatened throughout its range on July 28, 1978 (43 FR 32800). On September 22, 2011, NMFS published a final rule to list nine separate DPSs under the ESA with four listed as threatened (i.e., Northwest Atlantic Ocean, South Atlantic Ocean, Southeast Indo-Pacific Ocean, and Southwest Indian Ocean DPSs) and five listed as endangered (i.e., Mediterranean Sea, North Indian Ocean, North Pacific Ocean, South Pacific Ocean, and Northeast Atlantic Ocean DPSs). Critical habitat has not been designated for loggerhead sea turtles. We used information available in the status reviews (Conant *et al.* 2009) and the final listing rule (76 FR 58868) to summarize the status of the species, as follows.

Distribution

Loggerheads can be found throughout tropical to temperate waters in the Pacific; however, their breeding grounds include a restricted number of sites. Within the North Pacific, loggerhead nesting has been documented only in Japan (Kamezaki *et al.* 2003), although low-level nesting may occur outside of Japan in areas surrounding the South China Sea (Chan *et al.* 2007). Despite this limited nesting distribution, these loggerhead sea turtles undertake extensive developmental migrations using the Kuroshio and North Pacific Currents, and some of them reach the vicinity of Baja California in the eastern Pacific. After spending years foraging in the central and eastern Pacific, loggerheads return to their natal beaches for reproduction and remain in the western Pacific for the remainder of their life cycle.

Status

Destruction and modification of loggerhead nesting habitat in the North Pacific result from coastal development and construction, placement of erosion control structures and other barriers to nesting, beachfront lighting, vehicular and pedestrian traffic, sand extraction, beach erosion, beach sand placement, beach pollution, removal of native vegetation, planting of non-native vegetation (NMFS and USFWS, 1998c). Beaches in Japan where loggerheads nest are extensively eroded due to dredging and dams constructed upstream, and are obstructed by seawalls as well. The use of loggerhead meat for food was historically popular in local communities such as Kochi and Wakayama prefectures. In addition, egg collection was common in the coastal areas during times of hunger and later by those who valued loggerhead eggs as revitalizers or aphrodisiacs and acquired them on the black market (in Kamezaki *et al.* 2003; Takeshita, 2006).

Overutilization for commercial purposes in both Japan and Mexico likely was a factor that contributed to the historical declines of this DPS. Current illegal harvest of loggerheads in Baja, California for human consumption continues as a significant threat to the persistence of this DPS. Also fishery bycatch that occurs throughout the North Pacific Ocean, including the coastal pound net fisheries off Japan, coastal fisheries impacting juvenile foraging populations off Baja California, Mexico, and undescribed fisheries likely affecting loggerheads in the South China Sea and the North Pacific Ocean is a significant threat to the persistence of this DPS. Kamezaki *et al.* (2003) concluded a substantial decline (50–90%) in the size of the annual loggerhead nesting population in Japan since the 1950s. Snover (2008) combined nesting data from the Sea Turtle Association of Japan and data from Kamezaki *et al.* (2002) to analyse an 18-year time series of nesting data from 1990–2007. Nesting declined from an initial peak of approximately 6,638 nests in 1990– 1991, followed by a steep decline to a low of 2,064 nests in 1997. During the past decade, nesting increased gradually to 5,167 nests in 2005 declined and then rose again to a high of just under 11,000 nests in 2008. Estimated nest numbers for 2009 were on the order of 7,000–8,000 nests. While nesting numbers have gradually increased in recent years and the number for 2009 was similar to the start of the time series in 1990, historical evidence from Kaunda Beach (census data dates back to the 1950s) indicates that there has been a substantial decline over the last half of the 20th century (Kamezaki *et al.* 2003) and that current nesting represents a fraction of historical nesting levels.

North Pacific loggerhead sea turtles occur in coastal waters of Hawaii, American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands. Other important juvenile turtle foraging areas have been identified off the coast of Baja California Sur, Mexico (Pitman, 1990; Peck ham and Nichols, 2006; Peck ham *et al.* 2007).

3.2.23 Sea Turtle, Olive Ridley

The olive ridley sea turtle is a small, mainly pelagic, sea turtle with a circumtropical distribution. The species was listed under the ESA on July 28, 1978 (43 FR 32800). The species was separated into two listing designations: endangered for breeding populations on the Pacific coast of Mexico, and threatened wherever found except where listed as endangered (i.e., in all other areas throughout its range). We used information available in the 5-year review (NMFS and USFWS 2007e) to summarize the status of the threatened listing, as follows.

Distribution

Olive ridley sea turtles occur in the tropical waters of the Pacific and Indian Oceans from Micronesia, Japan, India and Arabia south to northern Australia and southern Africa. In the Atlantic Ocean off the western coast of Africa and the coasts of northern Brazil, French Guiana, Surinam, Guyana, and Venezuela in South America, and occasionally in the Caribbean Sea as far north as Puerto Rico. In the eastern Pacific Ocean, olive ridley sea turtles are found from the Galapagos Islands north to California. While olive ridley turtles have a generally tropical to subtropical range, individual turtles have been reported as far as the Gulf of Alaska (Hodge and Wing 2000).

Status

The Mexican turtle fishery caused rapid, large declines at olive ridley arribada beaches in Mexico (Cliffion *et al.* 1982) that were so dramatic they have been widely referred to in the literature as population collapses, crashes, or extinctions. An estimated 75,000 turtles were taken each year over two decades until 1990 when the fishery closed (Aridjis 1990). The fishery closure is generally believed to have resulted in an increase in the population (Marquez-M. *et al.* 1996, Godfrey 1997, Pritchard 1997), while others caution the interpretation of the data (Ross 1996).

Large-scale egg use historically occurred at arribada beaches in Mexico, concurrent with the use of adult turtles at these beaches (Cliffion *et al.* 1982*).* The nationwide ban on harvest of nesting females and eggs has decreased the threat to the endangered population. The nesting population at La Escobilla, Oaxaca, Mexico, has increased from 50,000 nests in 1988 to more than a million nests in 2000 because of the harvest prohibitions and the closure of a nearshore turtle fishery (Cornelius *et al.* 2007). However, illegal egg use is still believed to be widespread. Approximately 300,000-600,000 eggs were seized each year from 1995-1998 (Trinidad and Wilson 2000).

Incidental capture in fisheries remains a serious threat in the eastern Pacific (Frazier *et al.* 2007) where olive ridleys aggregate in large numbers off nesting beaches (Kalb *et al.* 1995, Kalb 1999), but the information available is incomplete (Pritchard and Plotkin 1995, NMFS and USFWS, 1998d). Incidental captures of olive ridleys in this region have been documented in shrimp trawl fisheries, longline fisheries, purse seine fisheries, and gillnet fisheries (Frazier *et al.* 2007). Incidental capture of sea turtles in shrimp trawls is a serious threat along the coast of Central America, with an estimated annual capture for all species of marine turtles exceeding 60,000 turtles, most of which are olive ridleys (Arauz 1996). Recent growth in the longline fisheries of this region is also a serious and growing threat to olive ridleys and has the potential to capture hundreds of thousands of ridleys annually (Frazier *et al.* 2*007).*

The current abundance of olive ridleys compared with former abundance at each of the large arribada beaches indicates the populations experienced steep declines (Cliffton *et al.* 1982). Based on qualitative information, Cliffton *et al.* (1982) derived a conservative estimate of 10 million adults prior to 1950. By 1969, after years of adult harvest, the estimate was just over one million (Cliffion *et al.* 1982). Abundance estimates in recent years indicate that the Mismaloya and Moro Ayuta nesting populations appear to be stable and the nesting population at La

Escobilla is increasing while nesting at La Escobilla rebounded from approximately 50,000 nests in 1988 to over 700,000 nests in1994 (Marquez-M. *et al.* 1996) and more than a million nests by 2000 (Marquez-M. *et al.* 2*005).* At-sea estimates of density and abundance of the olive ridley were determined by shipboard line-transects conducted along the Mexico and Central American coasts in 1992, 1998, 1999, 2000, 2003 and 2006 (Eguchi *et al.* 2007). A weighted average of the yearly estimates was 1.39 million, which is consistent with the increases seen on the eastern Pacific nesting beaches over the last decade (Eguchi *et al.* 2007).

Olive ridley sea turtles may move between the oceanic zone (the vast open ocean environment from the surface to the sea floor where water depths are greater than 200 meters) and the neritic zone (the inshore marine environment from the surface to the sea floor where water depths do not exceed 200 meters) (Plotkin *et al.* 1995, Shanker *et al.* 2003) or just occupy neritic waters (Pritchard 1976, Reichart 1993). They nest along continental margins and oceanic islands. Most records of olive ridley turtles are from protected, relative shallow marine waters particularly between reefs and shore, larger bays, and lagoons (Deraniyagalia 1939).

3.2.24 Eulachon, Pacific (Southern)

The southern population of eulachon was listed as threatened under the ESA on March 18, 2010 (74 FR 10857). On October 20, 2011, NMFS published final regulations to designate 16 specific areas as critical habitat within the States of California, Oregon and Washington as critical habitat for this species.

Distribution

The southern population of Pacific eulachon consists of populations spawning in rivers south of the Nass River in British Columbia, Canada, to, and including, the Mad River in California (74 FR 10857).

Status

Southern eulachon are primarily threatened by increasing temperatures in the marine, coastal, estuarine, and freshwater environments of the Pacific Northwest that are at least causally related to climate change; dams and water diversions, water quality degradation, dredging operations in the Columbia and Fraser Rivers; commercial, recreational, and subsistence fisheries in Oregon and Washington that target eulachon; and bycatch in commercial fisheries.

Eulachon are particularly vulnerable to capture in shrimp fisheries in the United States and Canada as the marine areas occupied by shrimp and eulachon often overlap. In Oregon, the bycatch of various species of smelt (including eulachon) has been as high as 28% of the total catch of shrimp by weight (Hannah and Jones, 2007). In Canada, bycatch of eulachon in shrimp fisheries has been significant enough to cause the Canadian Department of Fisheries and Oceans to close the fishery in some years (DFO, 2008).

The current abundance of eulachon is low and declining in all surveyed populations throughout the DPS. Future declines in abundance are likely to occur because of climate change and continued bycatch in the shrimp fishery (75 FR 13012).

Eulachon are an anadromous species that spawns in the lower portions of certain rivers draining into the northeastern Pacific Ocean ranging from Northern California to the southeastern Bering

Sea in Bristol Bay, Alaska (Hubbs 1925, Schultz and DeLacy 1935, McAllister 1963, Scott and Crossman 1973, Willson *et al.* 2006). Eulachon have been described as "common" in Grays Harbor and Willapa Bay on the Washington coast, "abundant" in the Columbia River, "common" in Oregon's Umpqua River and "abundant" in the Klamath River in northern California. They have been described as "rare" in Puget Sound and Skagit Bay in Washington; Siuslaw River, Coos Bay, and Rogue River in Oregon; and Humboldt Bay in California (Emmett *et al.* 1991, Monaco *et al.* 1990). However, Hay and McCarter (2000) and Hay (2002) identified 33 eulachon spawning rivers in British Columbia and 14 of these were classified as supporting regular yearly spawning runs.

Critical Habitat

On October 20, 2011, NMFS designated critical habitat for the southern DPS of eulachon, including roughly 539 km of riverine and estuarine habitat in Washington State (Grays, Skamokawa, Elochoman, Cowlitz, Kalama, Toutle, Lewis, Quinault, and Elwa rivers/creeks), Oregon (Columbia River) and California (Mad, Klamath, Redwood, Umpqua, and Sandy rivers as well as Tenmile Creek)(76 FR 65324). These areas contain physical or biological features essential to the conservation of the DPS, including (1) freshwater spawning and incubation sites with suitable water flow, quality and temperature conditions and substrate; (2) freshwater and estuarine migration corridors free of obstruction and with water flow, quality and temperature conditions supporting larval and adult mobility, and with abundant prey items supporting larval feeding after the yolk sac is depleted; and (3) nearshore and offshore marine foraging habitat with water quality and available prey, supporting juveniles and adult survival. The designation includes the following:

- Mad River, California, from the mouth of the Mad River (40°57′37″ N. /124°7′36″ W.) upstream to the confluence with the North Fork Mad River (40°52′32″ N. /123°59′30″ W.)
- Redwood Creek, California, from the mouth of Redwood Creek (41°17′35″ N. /124°5′30″ W.) upstream to the confluence with Tom McDonald Creek (41°12′25″ N. /124°0′39″ W.)
- Klamath River, California, from the mouth of the Klamath River (41°32′52″ N. /124°4′58″ W.) upstream to the confluence with Omogar Creek (41°29′13″ N. /123°57′39″ W.)
- Umpqua River, Oregon, from the mouth of the Umpqua River (43°40′7″ N. /124°13′6″ W.) upstream to the confluence with Mill Creek (43°39′20″ N. /123°52′35″ W.)
- Tenmile Creek, Oregon, from the mouth of Tenmile Creek (44°13′34″ N. /124°6′45″ W.) upstream to the Highway 101 bridge crossing (44°13′27″ N. / 124°6′35″ W.)
- Sandy River, Oregon, from the confluence with the Columbia River upstream to the confluence with Gordon Creek (45°29′45″ N. /122°16′41″ W.).
- Columbia River, Oregon and Washington from the mouth of the Columbia River (46°14′48″ N. /124°4′33″ W.) upstream to Bonneville Dam (45°38′40″ N. /121°56′28″ W.).
- Grays River, Washington, from the confluence with the Columbia River upstream to Covered Bridge Road (46°21′18″ N. /123°34′52″ W.).
- Skamokawa Creek, Washington, from the confluence with the Columbia River upstream to Peterson Road Bridge (46°18′52″ N. /123°27′10″ W.).
- Elochoman River, Washington, from the confluence with the Columbia River upstream to Monroe Road bridge crossing (46°13′33″ N. /123°21′34″ W.).

- Cowlitz River, Washington, from the confluence with the Columbia River upstream to the Cowlitz Salmon Hatchery barrier dam (46°30′45″ N. / 122°38′0″ W.).
- Toutle River, Washington, from the confluence with the Cowlitz River upstream to Tower Road Bridge (46°20′4″ N. /122°50′26″ W.).
- Kalama River, Washington, from the confluence with the Columbia River upstream to the confluence with Indian Creek (46°2′22″ N. /122°46′7″ W.).
- Lewis River, Washington. Lewis River mainstem, from the confluence with the Columbia River upstream to Merwin Dam (45°57′24″ N. /122°33′22″ W.); East Fork of the Lewis River, from the confluence with the mainstem of the Lewis River upstream to the confluence with Mason Creek (45°50′13″ N. /122°38′37″ W.).
- Quinault River, Washington, from the mouth of the Quinault River (47°20′58″ N. /124°18′2″ W.) upstream to 47°19′58″ N. /124°15′1″ W.
- Elwha River, Washington, from the mouth of the Elwha River (48°8′51″ N. /123°34′1″ W.) upstream to Elwha Dam (48°5′42″ N. /123°33′22″ W.)

The Tribal lands of four Indian Tribes (Lower Elwha Tribe, Washington; Quinault Tribe, Washington; Yurok Tribe, California; and Resighini Rancheria, California) were excluded from designation after evaluating the impacts of designation and benefits of exclusion associated with Tribal land ownership and management by the Tribes.

The physical or biological features essential for conservation of the southern DPS of eulachon are (1) Freshwater spawning and incubation sites with water flow, quality and temperature conditions and substrate supporting spawning and incubation; (2) Freshwater and estuarine migration corridors free of obstruction and with water flow, quality and temperature conditions supporting larval and adult mobility, and with abundant prey items supporting larval feeding after the yolk sac is depleted; and (3) Nearshore and offshore marine foraging habitat with water quality and available prey, supporting juveniles and adult survival (76 FR 65323).

Dams and water diversions are threats to eulachon in the Columbia and Klamath rivers where hydropower generation and flood control are major activities. Degraded water quality is also common in some areas occupied by southern DPS eulachon. In the Columbia and Klamath rivers, large-scale impoundment of water has increased winter water temperatures and may alter the water temperature during eulachon spawning periods (Gustafson *et al.* 2010). Numerous chemical contaminants are also present in spawning rivers, but the exact effect these compounds have on spawning and egg development is unknown (Gustafson *et al.* 2010).

Dredging is a low to moderate threat to eulachon in the Columbia River because eggs could be destroyed by mechanical disturbance or smothered by in-water disposal of dredged materials. The lower Columbia River mainstem provides spawning and incubation sites, and a large migratory corridor to spawning areas in the tributaries.

3.2.25 Bocaccio (Puget Sound/Georgia Basin)

Georgia Basin bocaccio were listed as endangered on April 28, 2010 (75 FR 22276).

Distribution

The bocaccio that occur in the Georgia Basin are listed as an endangered "species," which, in this case, refers to a distinct segment of a vertebrate population (75 FR 22276). The listing includes bocaccio throughout Puget Sound, which encompasses all waters south of a line connecting Point Wilson on the Olympic Peninsula and Partridge on Whidbey Island; West Point on Whidbey Island, Deception Island, and Rosario Head on Fidalgo Island; and the southern end of Swinomish Channel between Fidalgo Island and McGlinn Island (U.S. Geological Survey 1979), and the Strait of Georgia, which encompasses the waters inland of Vancouver Island, the Gulf Islands, and the mainland coast of British Columbia.

Status

From 1975 through 1979, bocaccio were reported as representing an average of 4.63% of the total rockfish catch. From 1980–1989, they represented about 0.24% of the rockfish identified, and from 1996 to 2007, bocaccio were not reported in a sample of 2,238 rockfish captured in recreational fisheries (in a sample of that size, there was a 99.5% probability of observing at least one bocaccio, assuming their relative frequency was the same as it had been in the 1980s). Bocaccio have always been rare in recreational fisheries that occur in North Puget Sound and the Strait of Georgia; however, there have been no confirmed reports of bocaccio in Georgia Basin for several years. NMFS proposed critical habitat designation of approximately 1,185 mi^2 of marine habitat for bocaccio in Puget Sound, Washington, on August 6, 2013 (78 FR 47635)[27].

Although their abundance cannot be estimated directly, NMFS' BRT estimated that the populations of bocaccio, canary rockfish and yelloweye rockfish are small in size, probably numbering fewer than 10,000 individuals in Georgia Basin and fewer than 1,000 total individuals in Puget Sound (74 FR 18532) (Drake *et al.* 2010). Georgia Basin bocaccio are most common at depths between 50 and 250 meters (160 and 820 feet).

Critical Habitat

Critical habitat was designated for bocaccio on November 13, 2014 (79 FR 68042). Physical or biological features essential to adult bocaccio include the benthic habitats or sites deeper than 30m (98ft) that possess or are adjacent to areas of complex bathymetry consisting of rock and or highly rugose habitat are essential to conservation because these features support growth, survival, reproduction, and feeding opportunities by providing the structure for rockfish to avoid predation, seek food and persist for decades. Several attributes of these sites determine the quality of the habitat and are useful in considering the conservation value of the associated feature, and whether the feature may require special management considerations or protection. These attributes are also relevant in the evaluation of the effects of a proposed action in a section 7 consultation if the specific area containing the site is designated as critical habitat. These attributes include: (1) Quantity, quality and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities, (2) water quality and sufficient levels of dissolved oxygen to support growth, survival, reproduction, and feeding opportunities, and (3) the type and amount of structure and rugosity that supports feeding opportunities and predator avoidance.

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[27] See http://www.nmfs.noaa.gov/pr/species/fish/bocaccio.htm for more information.

Physical or biological features essential to juvenile bocaccio conservation include settlement habitats located in the nearshore with substrates such as sand, rock or cobble compositions that also support kelp because these features enable forage opportunities and refuge from predators and enable behavioral and physiological changes needed for juveniles to occupy deeper adult habitats. Several attributes of these sites determine the quality of the area and are useful in considering the conservation value of the associated feature and, in determining whether the feature may require special management considerations or protection. These attributes include: (1) Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities; and (2) water quality and sufficient levels of dissolved oxygen to support growth, survival, reproduction, and feeding opportunities.

3.2.26 Nassau Grouper

Distribution

The Nassau grouper (*Epinephelus striatus*) is primarily a shallow-water, insular fish species found from inshore to about 330 feet (100m) depth. The species is distributed throughout the islands of the western Atlantic including Bermuda, the Bahamas, southern Florida and along the coasts of central and northern South America. It is also found in the Gulf of Mexico at Campeche Bank off the coast of the Yucatan Peninsula, and at the Dry Tortugas and Key West in Florida. Adults are generally found near coral reefs and rocky bottoms while juveniles are found in shallower waters in and around coral and submerged aquatic vegetation. Juveniles feed mostly on crustaceans, while adults forage mainly on fish.

Nassau grouper reproduce in site-specific spawning aggregations. Spawning aggregations, of a few dozen up to perhaps thousands of individuals have been reported from the Bahamas, Jamaica, Cayman Islands, Belize, and the Virgin Islands. These aggregations occur in depths of 20-40 m (65.6-131.2 ft.) at specific locations of the outer reef shelf edge. Spawning takes place in December and January, around the time of the full moon, in waters 25-26 degrees C (77-78.8 degrees F).

Status

Under the authority of the Magnuson-Stevens Fisheries Act, NMFS classified the Nassau grouper as “overfished” in its October 1998 “Report to Congress on the status of Fisheries and Identification of overfished Stocks.” Because Nassau grouper spawn in aggregations at historic areas and at very specific times, they are easily targeted during reproduction. Because Nassau grouper mature relatively late (4-8 years), many juveniles may be taken by the fishery before they have a chance to reproduce[28]. The species was proposed for listing as a threatened species under the ESA September 2, 2014 (79 FR 51929).

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[28] See the Nassau Grouper Biological Report at: http://sero.nmfs.noaa.gov/protected_resources/listing_petitions/documents/biological_report.pdf for more information.

3.2.27 Rockfish, Canary (Puget Sound/Georgia Basin)

Georgia Basin canary rockfish were listed as threatened under the ESA on April 28, 2010 (75 FR 22276).

Distribution

Georgia Basin canary rockfish occur throughout Puget Sound, which encompasses all waters south of a line connecting Point Wilson on the Olympic Peninsula and Partridge on Whidbey Island; West Point on Whidbey Island, Deception Island, and Rosario Head on Fidalgo Island; and the southern end of Swinomish Channel between Fidalgo Island and McGlinn Island and the Strait of Georgia, which encompasses the waters inland of Vancouver Island, the Gulf Islands, and the mainland coast of British Columbia.

Status

The frequency of canary rockfish in Puget Sound appears to have been highly variable; frequencies were less than 1% in the 1960s and 1980s and about 3% in the 1970s and 1990s. In North Puget Sound, however, the frequency of canary rockfish has been estimated to have declined from a high of greater than 2% in the 1970s to about 0.76% by the late 1990s. This decline combined with their low intrinsic growth potential, threats from bycatch in commercial and recreational fisheries, loss of nearshore rearing habitat, chemical contamination, and the proportion of coastal areas with low dissolved oxygen levels led to this species' listing as threatened under the ESA.

Although their abundance cannot be estimated directly, NMFS' BRT estimated that the populations of bocaccio, canary rockfish and yelloweye rockfish are small in size, probably numbering fewer than 10,000 individuals in Georgia Basin and fewer than 1,000 total individuals in Puget Sound (74 FR 18532) (Drake *et al.* 2010).

Georgia Basin canary rockfish are most common at depths between 50 and 250 meters (160 and 820 feet) and may occur at depths of 425 meters (1,400 feet). Larval rockfish occur over areas that extend several hundred miles offshore where they are passively dispersed by ocean currents and remain in larval form and as small juveniles for several months (Auth and Brodeur 2006, Moser and Boehlert 1991). They appear to concentrate over the continental shelf and slope, but have been captured more than 250 nautical miles offshore of the Oregon coast (Moser and Boehlert 1991.). Larval rockfish have been reported to be uniformly distributed at depths of 13, 37 and 117 meters below the surface (Lenarz *et al.* 1991). Larval canary rockfish were captured at all three depths, but their densities were highest at the 37- and 177-meter depths (Lenarz *et al.* 1991).

At these depths, canary rockfish are not likely to be exposed to the direct or indirect effects of most of the activities that would be authorized by the Nationwide Permits. However, both adult and larval canary rockfish may be exposed to water-based renewable energy generation pilot projects, such as one that is being considered for Admiralty Inlet in northern Puget Sound that would be authorized by Nationwide Permit 52.

Critical Habitat

Critical habitat was designated for canary rockfish on November 13, 2014 (79 FR 68042).

Physical or biological features essential to the conservation of juvenile canary rockfish are the same as for juvenile bocaccio. Physical or biological features essential to the conservation of adult canary rockfish are the same as for adult bocaccio.

3.2.28 Rockfish, Yelloweye (Puget Sound/Georgia Basin)

Georgia Basin yelloweye rockfish were listed as threatened under the ESA on April 28, 2010 (75 FR 22276).

Distribution

Georgia Basin yelloweye rockfish occur through Puget Sound, which encompasses all waters south of a line connecting Point Wilson on the Olympic Peninsula and Partridge on Whidbey Island; West Point on Whidbey Island, Deception Island, and Rosario Head on Fidalgo Island; and the southern end of Swinomish Channel between Fidalgo Island and McGlinn Island (U.S. Geological Survey 1979), and the Strait of Georgia, which encompasses the waters inland of Vancouver Island, the Gulf Islands, and the mainland coast of British Columbia.

Status

The frequency of yelloweye rockfish in collections from Puget Sound appears to have been highly variable; frequencies were less than 1% in the 1960s and 1980s and about 3% in the 1970s and 1990s. In North Puget Sound, however, the frequency of yelloweye rockfish has been estimated to have declined from a high of greater than 3% in the 1970s to about 0.65% in more recent samples. This decline combined with their low intrinsic growth potential, threats from bycatch in commercial and recreational fisheries, loss of nearshore rearing habitat, chemical contamination, and the proportion of coastal areas with low dissolved oxygen levels led to this species' listing as threatened under the ESA.

Although their abundance cannot be estimated directly, NMFS' BRT estimated that the populations of bocaccio, yelloweye rockfish and canary rockfish are small in size, probably numbering fewer than 10,000 individuals in Georgia Basin and fewer than 1,000 total individuals in Puget Sound (74 FR 18532) (Drake *et al.* 2010).

Georgia Basin yelloweye rockfish are most common at depths between 91 and 180 meters (300 to 580 feet), although they may occur in waters 50 to 475 meters (160 and 1,400 feet) deep. Larval rockfish occur over areas that extend several hundred miles offshore where they are passively dispersed by ocean currents and remain in larval form and as small juveniles for several months (Auth and Brodeur 2006, Moser and Boehlert 1991). They appear to concentrate over the continental shelf and slope, but have been captured more than 250 nautical miles offshore of the Oregon coast (Moser and Boehlert 1991, Richardson *et al.* 1980). Larval rockfish have been reported to be uniformly distributed at depths of 13, 37 and 117 meters below surface (Lenarz *et al.* 1991). Like the other rockfish we have discussed, larval yelloweye rockfish were captured at all three depths, but their densities were highest at the 37- and 177-meter depths (Lenarz *et al.* 1991).

Critical Habitat

Critical habitat was designated for yelloweye rockfish on November 13, 2014 (79 FR 68042).

Physical or biological features essential to the conservation of both adult and juvenile yelloweye rockfish are the same as for adult bocaccio and adult canary rockfish.

3.2.29 Shark, Scalloped Hammerhead (Eastern Pacific, Central and Southwest Atlantic DPS)

The Eastern Pacific DPS of scalloped hammerhead was listed as endangered and the Central and Southwest Atlantic DPSs were listed as threatened in July 2014 (79 FR 38213).Critical habitat has not yet been designated for any of the DPSs.

Distribution

Scalloped hammerhead sharks are moderately large coastal pelagic sharks with a global distribution. They are characterized by an indentation located centrally on the front margin of the flat, extended, broadly arched head. Two more indentations flank the main central indentation, giving this species a "scalloped" appearance. They feed on crustaceans, fish and cephalopods. Scalloped hammerhead sharks are found worldwide residing in coastal warm temperate and tropical seas in the Atlantic, Pacific and Indian Oceans between 46°N and 36°S to depths of 1000 meters (Miller *et al.*, 2014).

Status

This species is prized by the shark fin trade because of its fin size and high fin ray count and are caught in a variety of (Miller *et al.*, 2014). Threats include mortality from artisanal fisheries, overutilization by artisanal fisheries, poorly regulated fisheries and evidence of significant declines in abundance. The primary factors responsible for the decline of the DPSs are overutilization, due to both catch and bycatch of these sharks in fisheries, and inadequate regulatory mechanisms for protecting these sharks, with illegal fishing identified as a significant problem (79 FR 38213).

3.2.30 Salmon, Chinook

In this section, we discuss Chinook salmon generally and we address the distribution and status of each of the nine listed Chinook salmon species separately in the sections that follow. We used information available in status reviews (Good *et al.* 2005, Ford 2011) and various salmon evolutionarily significant unit (ESU) listing documents to summarize the status of the species.

Chinook salmon are the largest of the Pacific salmon and historically ranged from the Ventura River in California to Point Hope, Alaska in North America, and in northeastern Asia from Hokkaido, Japan to the Anadyr River in Russia (Healey 1991). In addition, Chinook salmon have been reported in the Canadian Beaufort Sea (McPhail and Lindsey 1970).

Over the past few decades, the size and distribution of Chinook salmon populations have declined because of natural phenomena and human activity, including the operation of hydropower systems, over-harvest, hatcheries and habitat degradation. Natural variations in freshwater and marine environments have substantial effects on the abundance of salmon populations. Of the various natural phenomena that affect most populations of Pacific salmon, changes in ocean productivity are generally considered most important.

Chinook salmon are exposed to high rates of natural predation, particularly during freshwater rearing and migration stages. Ocean predation probably contributes to significant natural mortality, although the levels of predation are largely unknown. In general, Chinook are prey for pelagic fishes, birds and marine mammals, including harbor seals, sea lions and killer whales. There have been recent concerns that the increasing size of tern, seal and sea lion populations in the Pacific Northwest has dramatically reduced the survival of adult and juvenile salmon.

As fish (exempting the few species of fish that can survive for short periods of time out of water), Chinook salmon survive only in aquatic ecosystems and, therefore, depend on the quantity and quality of those aquatic systems. "Stream-type" Chinook salmon reside in freshwater for a year or more following emergence, whereas "ocean-type" Chinook salmon migrate to the ocean predominantly within their first year (Good *et al.* 2005). Ocean-type juveniles emigrate to the ocean as fry, subyearling juveniles (during their first spring or fall), or as yearling juveniles (during their second spring), depending on environmental conditions. The timing of the return to freshwater and spawning is closely related to the ecological characteristics of a population's spawning habitat. Five different run times are expressed by different ocean-type Chinook salmon populations: spring, summer, fall, late-fall, and winter. In general, early run times (spring and summer) are exhibited by populations that use high spring flows to access headwater or interior regions. Stream-type populations appear to be nearly obligate yearling outmigrants (some 2-year-old smolts have been identified); they undertake extensive offshore ocean migrations and generally return to freshwater as spring- or summer-run fish. Stream-type populations are found in northern British Columbia, Alaska and the headwater regions of the Fraser River and Columbia River interior tributaries (Good *et al.* 2005).

Chinook salmon, like the other salmon NMFS has listed, have declined under the combined effects of overharvests in fisheries; competition from fish raised in hatcheries and native and non-native exotic species, dams that block their migrations and alter river hydrology; gravel mining that impedes their migration and alters the dynamics (hydrogeomorphology) of the rivers and streams that support juveniles, water diversions that deplete water levels in rivers and streams, destruction or degradation of riparian habitat that increase water temperatures in rivers and streams sufficient to reduce the survival of juvenile Chinook salmon, and land use practices (logging, agriculture, urbanization) that destroy wetland and riparian ecosystems while introducing sediment, nutrients, biocides, metals, and other pollutants into surface and ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest.

Salmon, Chinook (California Coastal)

California Coastal Chinook salmon were listed as threatened in 1999 (64 FR 50393). We used information available in status reviews (Good *et al.* 2005, Ford 2011), "An analysis of historical population structure for evolutionarily significant units of Chinook salmon, coho salmon, and steelhead in the North-Central California Coast Recovery Domain" (Bjorkstedt *et al.* 2005), "A framework for assessing the viability of Threatened and Endangered Salmon and Steelhead in the North-central California Coast Recovery Domain" (Spence *et al.* 2008) and listing documents (64 FR 50393; 70 FR 37160) to summarize the status of the species.

Distribution

The California Coastal Chinook salmon ESU includes all naturally spawned populations of Chinook salmon from rivers and streams south of the Klamath River to the Russian River, California.

Status

California Coastal Chinook salmon were listed as threatened due to the combined effects of dams (that prevent them from reaching spawning habitat), logging, agricultural activities, urbanization and water withdrawals in the river drainages that support them. The species exists as small populations with highly variable cohort sizes. The Russian River probably contains some natural production, but the origin of those fish is not clear because of a number of introductions of hatchery fish over the last century. The Eel River contains a substantial fraction of the remaining Chinook salmon spawning habitat for this species. Critical habitat was designated for this species on September 2, 2005 (70 FR 52537).

Historical and current information indicates that abundance in putatively independent populations of California coastal Chinook is depressed in many of those basins where they have been monitored. The relevance of recent strong returns to the Russian River to ESU status is not clear because the genetic composition of these fish is unknown. Reduction in geographic distribution, particularly for spring-run Chinook and for basins in the southern portion of the ESU, continues to present substantial risk (Good *et al.* 2005).

All spring-run populations once occupying the North Mountain Interior are considered extinct or nearly so. Redd counts in Mattole River in the northern portion of the ESU indicate a small but consistent population; the cooler northern climate likely provides for favorable conditions for these populations. The Eel River interior fall-run populations are severely depressed. Two functionally independent populations are believed to have existed along the southern coastal portion of the ESU; of these two, only the Russian River currently has a run of any significance. This is also the only population with abundance time series. The 2000 to 2007 median observed (at Mirabel Dam) Russian River Chinook salmon run size is 2,991 with a maximum of 6,103 (2003) and a minimum of 1,125 (2008) adults (Cook 2008). The number of spawners has steadily decreased since its high returns in 2003 with 1,963 fish observed in 2007 and 1,125 observed by December 22, 2008.

Critical Habitat

NMFS designated critical habitat for California coastal Chinook salmon on September 2, 2005 (70 FR 52537). Specific geographic areas designated include the following hydrological units: Redwood Creek, Trinidad, Mad River, Eureka Plain, Eel River, Cape Mendocino, Mendocino Coast and the Russian River. These areas are important for the species' overall conservation by protecting quality growth, reproduction and feeding.

The critical habitat designation for California coastal Chinook salmon identifies primary constituent elements that include sites necessary to support one or more Chinook salmon life stages. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, nearshore marine habitat and estuarine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity. The critical habitat designation (70 FR 52488) contains additional details on the sub-areas that are included as part of this designation, and the areas that were excluded from designation.

In total, California Coastal Chinook salmon occupy 45 watersheds (freshwater and estuarine). The total area of habitat designated as critical includes about 1,500 miles of stream habitat and about 25 square miles of estuarine habitat, mostly within Humboldt Bay. This designation includes the stream channels within the designated stream reaches, and includes a lateral extent as defined by the ordinary high water line. In areas where the ordinary high-water line is not defined, the lateral extent is defined as the bank-full elevation. In estuarine areas the lateral extent is defined by the extreme high water because extreme high tide areas encompass those areas typically inundated by water and regularly occupied by juvenile salmon during the spring and summer, when they are migrating in the nearshore zone and relying on cover and refuge qualities provided by these habitats, and while they are foraging. Of the 45 watershed reviewed in NMFS' assessment of critical habitat for California coastal chinook salmon, eight watersheds received a low rating of conservation value, 10 received a medium rating, and 27 received a high rating of conservation value for the species (NMFS 2005).

Critical habitat for California coastal Chinook salmon consists of limited quantity and quality summer and winter rearing habitat, as well as marginal spawning habitat. Compared to historical conditions, there are fewer pools, limited cover, and reduced habitat complexity. The limited instream cover that does exist is provided mainly by large cobble and overhanging vegetation. Instream large woody debris needed for foraging sites, cover and velocity refuges is especially lacking in most of the streams throughout the basin. NMFS has determined that these degraded habitat conditions are, in part, the result of many human-induced factors affecting critical habitat including dam construction, agricultural and mining activities, urbanization, stream channelization, water diversion and logging, among others.

Critical habitat in this ESU consists of limited quantity and quality summer and winter rearing habitat, as well as marginal spawning habitat. Compared to historical conditions, there are fewer pools, limited cover, and reduced habitat complexity. The current condition of PCEs of the critical habitat indicates that PCEs are not currently functioning or are degraded; their conditions are likely to maintain a low population abundance across the ESU. California coastal Chinook salmon spawning PCEs in coastal streams is degraded by years of timber harvest that has produced large amounts of sand and silt in spawning gravel and reduced water quality by increased turbidity.

Agriculture and urban areas has impacted rearing and migration PCEs in the Russian River by degrading water quality and by disconnecting the river from it floodplains by the construction of levees. Water management from dams within the Russian and Eel River watersheds maintain high flows and warm water during summer, which benefits the introduced predatory Sacramento pikeminnow. This has resulted in excessive predation along migration corridors. Breaches of the sandbar at the mouth of the Russian River result in periodic mixing of salt water. This condition degrades the estuary PCE by altering water quality and salinity conditions that support juvenile physiological transitions between fresh- and salt water.

Salmon, Chinook (Central Valley Spring-Run)

NMFS originally listed Central Valley spring-run Chinook salmon as threatened on September 16, 1999 (64 FR 50393), and reaffirmed their status on June 28, 2005 (70 FR 37160). We used information available in status reviews (Good et al. 2005, 2011); listing documents (64 FR 50393; 70 FR 37160) and the draft recovery plan (NMFS 2009c) to summarize the status of the species.

Distribution

The Central Valley spring-run Chinook salmon ESU includes all naturally spawned populations of spring-run Chinook salmon in the Sacramento River and its tributaries in California. Central Valley spring-run Chinook salmon have been extirpated from the San Joaquin River and its tributaries and the American River due to the construction of Friant and Folsom dams, respectively. Naturally spawning populations of Central Valley spring-run Chinook salmon currently are restricted to accessible reaches of the upper Sacramento River, and its tributaries Butte, Deer and Mill Creeks and limited spawning occurs in the basins of smaller tributaries (California Department of Fish and Game 1998). This ESU includes one artificial propagation program.

Status

This species was listed because dams isolate them from most of their historic spawning habitat and the habitat remaining to them is degraded. Central Valley spring-run Chinook historically occupied the upper reaches of all major tributaries to the Sacramento and San Joaquin rivers. The Central Valley drainage as a whole is estimated to have supported spring-run Chinook salmon runs as large as 700,000 fish between the late 1880s and the 1940s (Fisher 1994), although these estimates may reflect an already declining population, in part from the commercial gillnet fishery that occurred for this ESU. Median natural production of spring-run Chinook salmon from 1970 to 1989 was 30,220 fish. In the 1990s, the population experienced a substantial production failure with an estimated natural production ranging between 3,863 and 7,806 fish (with the exception of 1995 which had a natural production of an estimated 35,640 adults) during the years between 1991 and 1997. Numbers of naturally produced fish increased significantly in 1998 to an estimated 48,755 adults and estimated natural production has remained above 10,000 fish since then (USFWS and U.S. Bureau of Reclamation 2007).

The Sacramento River trends show long- and short-term negative trend and negative population growth. Meanwhile, the median production of Sacramento River tributary populations increased from a low of 4,248 with only one year exceeding 10,000 fish before 1998 to a combined natural production of more than 10,000 spring-run Chinook in all years after 1998 (USFWS and U.S. Bureau of Reclamation 2007). Time series data for Mill, Deer, Butte and Big Chico Creeks spring-run Chinook salmon (through 2006) indicate that all three tributary spring-run Chinook populations experienced population growth. Although the populations are small, Central Valley spring-run Chinook salmon have some of the highest population growth rates of Chinook salmon in the Central Valley.

As noted in the 2011 NMFS status review, declines in abundance place the Mill and Deer Creek populations in the high extinction risk category due to their rate of decline, and in the case of Deer Creek, also the level of escapement. Butte Creek continues to satisfy the criteria for low extinction risk, although the rate of decline is close to triggering the population decline criterion for high risk. Overall, the recent declines have been significant but not severe enough to qualify as a catastrophe under the criteria of Lindley *et al.* (2007). On the positive side, spring-run Chinook salmon appear to be repopulating Battle Creek, home to a historical independent population in the Basalt and Porous Lava diversity group that was extirpated for many decades. This population has increased in abundance to levels that would qualify it for a moderate extinction risk score. Similarly, the spring-run Chinook salmon population in Clear Creek has been increasing, although Lindley *et al.* (2004) classified this population as a dependent population, and thus it is not expected to exceed the low-risk population size threshold of 2500 fish (i.e., annual spawning run size of about 833 fish).

There is also a spring-run Chinook salmon population in the Yuba River, which is a tributary to the Feather River. The annual spawning run size of spring-run Chinook salmon on the Yuba River generally ranges from a few hundred to a few thousand fish with the annual trend closely following the annual abundance trend of the Feather River Hatchery spring-run Chinook salmon population. The Yuba River spring-run Chinook salmon population satisfies the moderate extinction risk criteria for abundance, but likely falls into the high-risk category for hatchery influence.

Critical Habitat

NMFS designated critical habitat for Central Valley spring-run Chinook salmon on September 2, 2005 (70 FR 52488). In total, Central Valley spring-run Chinook salmon occupy 37 watersheds (freshwater and estuarine). The total area of habitat designated as critical includes about 1,100 miles of stream habitat and about 250 square miles of estuarine habitat in the San Francisco-San Pablo-Suisun Bay complex. PCEs include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, nearshore marine habitat and estuarine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity. Spawning and rearing PCEs are degraded by high water temperature caused by the loss of access to historic spawning areas in the upper watersheds, which maintained cool and clean water throughout the summer.

The rearing PCE is degraded by floodplain habitat being disconnected from the mainstem of larger rivers throughout the Sacramento River watershed, thereby reducing effective foraging. The migration PCE is degraded by lack of natural cover along the migration corridors. Juvenile migration is obstructed by water diversions along Sacramento River and by two large State and Federal water-export facilities in the Sacramento-San Joaquin Delta. Contaminants from agriculture and urban areas have degraded rearing and migration PCEs to the extent that they have lost their functions necessary to serve their intended role to conserve the species. Water quality impairments in the designated critical habitat of this ESU include inputs from fertilizers, insecticides, fungicides, herbicides, surfactants, heavy metals, petroleum products, animal and human sewage, sediment in the form of turbidity, and other anthropogenic pollutants. Pollutants enter the surface waters and riverine sediments as contaminated stormwater runoff, aerial drift and deposition, and via point source discharges. The current condition of PCEs for this ESU indicates they are not currently functioning or are degraded; these conditions are likely to maintain low population abundances across the ESU

Factors contributing to the downward trends in this species include: reduced access to spawning/rearing habitat behind impassable dams, climatic variation, water management activities, hybridization with fall-run Chinook salmon, predation and harvest (CDFG, 1998). Several actions have been taken to improve and increase the primary constituent elements of critical habitat for spring-run Chinook salmon. These include improved management of Central Valley water, implementing new and improved screen and ladder designs at major water diversions along the mainstem Sacramento River and tributaries, removal of several small dams on important spring-run Chinook salmon spawning streams and changes in ocean and inland fishing regulations to minimize harvest. Although protective measures and critical habitat restoration likely have contributed to recent increases in spring-run Chinook salmon abundance, the species is still below levels observed from the 1960s through 1990.

Salmon, Chinook (Lower Columbia River)

NMFS listed Lower Columbia River Chinook salmon as threatened on March 24, 1999 (64 FR 14308) and reaffirmed their threatened status on June 28, 2005 (70 FR 37160). We used information available in status reviews (Good *et al.* 2005, Ford 2011, NMFS 2011), "Historical population structure of Pacific salmonids in the Willamette River and Lower Columbia River Basins" (Myers *et al.* 2006), the recovery plan (NMFS 2013a) and listing documents (64 FR 14308; 70 FR 37160), to summarize the status of the species.

Distribution

This Chinook salmon ESU includes all naturally spawned populations of Chinook salmon from the Columbia River and its tributaries from its mouth at the Pacific Ocean upstream to a transitional point between Washington and Oregon, east of the Hood River and the White Salmon River, and includes the Willamette River to Willamette Falls, Oregon, exclusive of spring-run Chinook salmon in the Clackamas River. Fifteen artificial propagation programs are included in the ESU (70 FR 37160; 76 FR 50448; 79 FR 20802).

Status

This ESU was listed due to the combined effect of dams that reduce access to spawning habitat, logging, agricultural activities, urbanization, threats to genetic diversity from hatchery salmon, and overexploitation. Though the basin-wide spatial structure has remained generally intact, the loss of about 35 percent of historical habitat has affected distribution within several Columbia River subbasins. The ESU is at risk from generally low abundances in all but one population, combined with most populations having a negative or stagnant long-term population growth. Though fish from conservation hatcheries do help to sustain several LCR Chinook salmon runs in the short-term, hatchery production is unlikely to result in sustainable wild populations in the long-term. Further, the genetic diversity of all populations (except the late fall-run) has been eroded by large hatchery influences. Having only one population that may be viable puts the ESU at considerable risk from environmental stochasticity and random catastrophic events. The near-loss of the spring-run life history type limits the ESU's ability to maintain its fitness in the face of environmental change. Based on these factors, this ESU would likely have a moderate (late fall-run salmon in Lewis River) to low (all other populations) resilience to additional perturbations.

Critical Habitat

NMFS designated critical habitat for LCR Chinook salmon on September 2, 2005 (70 FR 52630). It includes all Columbia River estuarine areas and river reaches proceeding upstream to the confluence with the Hood Rivers as well as specific stream reaches in a number of tributary subbasins. PCEs include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, nearshore marine habitat and estuarine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity. Timber harvest, agriculture and urbanization have degraded spawning and rearing PCEs by reducing floodplain connectivity and water quality, and by removing natural cover in several rivers. Hydropower development projects have reduced timing and magnitude of water flows, thereby altering the water quantity needed to form and maintain physical habitat conditions and support juvenile growth and mobility. Adult and juvenile migration PCEs are affected by several dams along the migration route.

Salmon, Chinook (Puget Sound)

NMFS listed Puget Sound Chinook salmon as threatened in 1999 (64 FR 14308) and reaffirmed its status as threatened on June 28, 2005 (70 FR 37160). We used information available in status reviews (Good *et al.* 2005, Ford 2011), "Independent populations of Chinook salmon in Puget Sound" (Ruckelshaus *et al.* 2006) and listing documents (63 FR 11482; 64 FR 14308; 70 FR 37160) to summarize the status of the species.

Distribution

The Puget Sound Chinook salmon ESU includes all naturally spawned populations of Chinook salmon from rivers and streams flowing into Puget Sound from the North Fork Nooksack River to the Elwha River on the Olympic Peninsula in Washington. Twenty-six hatchery populations were included as part of the ESU and five were considered essential for recovery and listed (spring-run salmon from Kendall Creek, North Fork Stillaguamish River, White River and Dungeness River, and fall-run salmon from the Elwha River) (79 FR 20802)..

Status

WDF *et al.* (1993) cited diking for flood control, draining and filling of freshwater and estuarine wetlands and sedimentation due to forest practices and urban development as problems throughout the ESU. Blockages by dams, water diversions and shifts in flow regime due to hydroelectric development and flood control projects are major habitat problems in several basins. Bishop and Morgan (1996) identified a variety of critical habitat issues for streams in the range of this ESU, including changes in flow regime (all basins), sedimentation (all basins), high temperatures (Dungeness, Elwha, Green/Duwamish, Skagit, Snohomish, and Stillaguamish rivers), streambed instability (most basins), estuarine loss (most basins), loss of large woody debris (Elwha, Snohomish, and White rivers), loss of pool habitat (Nooksack, Snohomish, and Stillaguamish rivers), and blockage or passage problems associated with dams or other structures (Cedar, Elwha, Green/Duwamish, Snohomish, and White rivers).

The estimated total run size of Chinook salmon to Puget Sound in the early 1990s was 240,000 Chinook, down from an estimated 690,000 historical run size. The 5-year geometric mean of spawning escapement of natural Chinook salmon runs in north Puget Sound during the period from 1992 to 1996 was approximately 13,000. Both long- and short-term trends for these runs were negative, with few exceptions. In south Puget Sound, spawning escapement of the natural runs averaged 11,000 spawners at the time of the last status review update. In this area, both long- and short-term trends were predominantly positive. Long-term trends in abundance for naturally spawning populations of Chinook salmon in Puget Sound indicate that approximately half the populations are declining, and half are increasing in abundance over the length of available time series (Good *et al.* 2005).

Indices of spatial distribution and diversity have not been developed at the population level. Based on a Shannon Diversity Index at the ESU level, diversity is declining (due primarily to the increased abundance of returns to the Whidbey Basin region) for both distribution among populations and among regions (Ford 2011). Overall, the new information on abundance, productivity, spatial structure and diversity since the 2005 status review does not indicate a change in the biological risk category (Ford 2011).

Critical Habitat

NMFS designated critical habitat for Puget Sound Chinook salmon on September 2, 2005 (70 FR 52685). The specific geographic area includes portions of the Nooksack River, Skagit River, Sauk River, Stillaguamish River, Skykomish River, Snoqualmie River, Lake Washington, Green River, Puyallup River, White River, Nisqually River, Hamma Hamma River and other Hood Canal watersheds, the Dungeness/ Elwha Watersheds, and nearshore marine areas of the Strait of Georgia, Puget Sound, Hood Canal and the Strait of Juan de Fuca. This designation includes the stream channels within the designated stream reaches, and includes a lateral extent as defined by the ordinary high water line. In areas where the ordinary high-water line is not defined, the lateral extent is defined as the bankfull elevation.

The designation for this species includes sites necessary to support one or more Chinook salmon life stages. These areas are important for the species' overall conservation by protecting quality growth, reproduction and feeding. Specific primary constituent elements include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, nearshore marine habitat and estuarine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity.

Forestry practices have heavily impacted migration, spawning and rearing PCEs in the upper watersheds of most rivers systems within critical habitat designated for the Puget Sound Chinook salmon. Degraded PCEs include reduced conditions of substrate supporting spawning, incubation and larval development caused by siltation of gravel; and degraded rearing habitat by removal of cover and reduction in channel complexity. Urbanization and agriculture in the lower alluvial valleys of mid- to southern Puget Sound and the Strait of Juan de Fuca have reduced channel function and connectivity, reduced available floodplain habitat and affected water quality. Thus, these areas have degraded spawning, rearing, and migration PCEs. Hydroelectric development and flood control also obstruct Puget Sound Chinook salmon migration in several basins. The most functional PCEs are found in northwest Puget Sound: the Skagit River basin, parts of the Stillaguamish River basin, and the Snohomish River basin where Federal land overlap with critical habitat designated for the Puget Sound Chinook salmon. However, estuary PCEs are degraded in these areas by reduction in the water quality from contaminants, altered salinity conditions, lack of natural cover, and modification and lack of access to tidal marshes and their channels.

Salmon, Chinook (Sacramento River Winter-Run)

The Sacramento River winter-run Chinook salmon ESU was first listed as threatened on August 4, 1989 under an emergency rule (54 FR 32085). On January 4, 1994, NMFS reclassified the ESU as an endangered species due to several factors, including: (1) the continued decline and increased variability of run sizes since its listing as a threatened species in 1989; (2) the expectation of weak returns in coming years as the result of two small year classes (1991 and 1993); and (3) continuing threats to the species (59 FR 440). On June 14, 2004, NMFS proposed to reclassify the ESU as threatened (69 FR 33102), but its status as endangered was upheld in the final listing determination on June 28, 2005 (70 FR 37160).

We used information available in status reviews (Good *et al.* 2005, NMFS 2011); listing documents (54 FR 32085, 55 FR 10260, 69 FR 33102, 70 FR 37160) and the draft recovery plan (NMFS 2009c) to summarize the status of the species.

Distribution

The Sacramento River winter-run Chinook salmon ESU includes all naturally spawned populations of winter-run Chinook salmon entering and using the Sacramento River system in the Central Valley, California. The ESU now consists of a single spawning population. Two hatchery populations were included as part of the ESU, however on April 14, 2014, NMFS removed one artificial propagation program from the ESU, as the program had been terminated (79 FR 20802).

Status

Good *et al.* (2005) found that the Sacramento River winter-run Chinook salmon ESU was in danger of extinction. The major concerns of the BRT were that there is only one extant population, and it is spawning outside of its historical range in artificially maintained habitat that is vulnerable to drought and other catastrophes. Additionally, the ESU is expected to have lost some genetic diversity through bottleneck effects in the late 1980s and early 1990s and hatchery releases may have affected population genetics. Abundance data showed an increase in spawner returns from 1990s to mid-2005, though this increase was not sustained in subsequent years. The population growth rate for this ESU is negative, indicating the population has been declining and is not self-sustaining. Based on these factors, this ESU would likely have a very low resilience to additional perturbations.

When NMFS listed Sacramento River winter-run Chinook salmon as endangered and designated critical habitat for the species, its final rules to list the species and designated its critical habitat identified CWA section 404 permits the Corps issued in the Sacramento River, Sacramento River-San Joaquin Delta, and San Francisco Bay as one of the reasons for the listing (57 FR 36626, 59 FR 440).

Critical Habitat

NMFS designated critical habitat for this species on June 16, 1993 (58 FR 33212). The designation includes: the Sacramento River from Keswick Dam, Shasta County (river mile 302) to Chipps Island (river mile 0) at the westward margin of the Sacramento-San Joaquin Delta, and other specified estuarine waters. PCEs include specific water temperature criteria, minimum instream flow criteria and water quality standards. In addition, biological features vital for the ESU include unimpeded adult upstream migration routes, spawning habitat, egg incubation and fry emergence areas, rearing areas for juveniles, and unimpeded downstream migration routes for juveniles. As there is overlap in designated critical habitat for both the Sacramento River Winter-run Chinook salmon and the spring-run Chinook salmon, the conditions of PCEs for both ESUs are similar. Spawning and rearing PCEs are degraded by high water temperature caused by the loss of access to historic spawning areas in the upper watersheds where water maintain lower temperatures. The rearing PCE is further degraded by floodplain habitat disconnected from the mainstems of larger rivers throughout the Sacramento River watershed. The migration PCE is also degraded by the lack of natural cover along the migration corridors. Pollutants entering the surface waters and riverine sediments as contaminated stormwater runoff, aerial drift and deposition, and via point source discharges further affect rearing and migration PCEs. Juvenile migration is obstructed by water diversions along Sacramento River and by two large State and Federal water-export facilities in the Sacramento-San Joaquin Delta. The current condition of PCEs for the Sacramento River Winter-run Chinook salmon indicates that the species is not currently functioning or degraded. Their conditions are likely to maintain low population abundances across the ESU.

Salmon, Chinook (Snake River Fall-Run)

NMFS listed Snake River fall-run Chinook salmon as endangered in 1992 (57 FR 14653), but reclassified their status as threatened on June 28, 2005 (70 FR 37160). We used information available in status reviews (Good *et al.* 2005, Ford 2011, NMFS 2011), listing documents (57 FR 14653, 70 FR 37160) to summarize the status of the species.

Distribution

The Snake River Fall-run Chinook salmon ESU includes all naturally spawned populations of fall-run Chinook salmon in the mainstem Snake River below Hells Canyon Dam; and in the Tucannon River, Grande Ronde River, Imnaha River, Salmon River and Clearwater River subbasins. Four artificial propagation programs are included in the ESU.

Status

The ESU was listed due to habitat loss and degradation from the combined effects of damming; forest, agricultural, mining and wastewater management practices; and overharvest. Both long- and short-term trends in natural returns are positive. Productivity is likely sustained largely by a system of small artificial rearing facilities in the lower Snake River Basin. Depending upon the assumptions made regarding the reproductive contribution of hatchery fish, long- and short-term trends in productivity are at or above replacement. Low abundances in the 1990s combined with a large proportion of hatchery derived spawners likely have reduced genetic diversity from historical levels; however, the salmon in this ESU remain genetically distinct from similar fish in other basins. The population remains at a moderate risk of becoming extinct (probability between five and 25 percent in 100 years). Based on these factors, this ESU would likely have a moderate resilience to additional perturbations

Critical Habitat

NMFS designated critical habitat for Snake River fall-run Chinook salmon on December 28, 1993 (58 FR 68543). This critical habitat encompasses the waters, waterway bottoms, and adjacent riparian zones of specified lakes and river reaches in the Columbia River that are or were accessible to listed Snake River salmon (except reaches above impassable natural falls, and Dworshak and Hells Canyon dams. Specific PCEs were not designated in the critical habitat final rule; instead four “essential habitat” categories were described: 1) spawning and juvenile rearing areas, 2) juvenile migration corridors, 3) areas for growth and development to adulthood and 4) adult migration corridors. The “essential features” that characterize these sites include substrate/spawning gravel; water quality, quantity, temperature, velocity; cover/shelter; food; riparian vegetation; space; and safe passage conditions. Hydropower operations and flow management practices have impacted spawning and rearing habitat and migration corridors throughout the ESU’s range. The major degraded essential habitat and features include: safe passage for juvenile migration; rearing habitat water quality; and spawning areas with gravel, water quality, cover/shelter, riparian vegetation and space to support egg incubation and larval growth and development. Water quality impairments in the designated critical habitat are common within the range of this ESU. Pollutants such as petroleum products, pesticides, fertilizers, and sediment in the form of turbidity enter the surface waters and riverine sediments from the headwaters of the Snake, Salmon, and Clearwater Rivers to the Columbia River estuary; traveling along with contaminated stormwater runoff, aerial drift and deposition, and via point source discharges.

Salmon, Chinook (Snake River Spring/Summer-Run)

NMFS listed Snake River spring/summer-run Chinook salmon as threatened on April 22, 1992 (57 FR 14653), and reaffirmed their status on June 28, 2005 (70 FR 37160). We used information available in status reviews (Matthews and Waples 1991, Good *et al.* 2005, NMFS 2011), Interior Columbia Basin Technical Recovery Team reports (Interior Columbia Technical Review Team 2003) and listing documents (57 FR 14653, 70 FR 37160) to summarize the status of the species.

Distribution

The Snake River Spring/Summer-run Chinook ESU includes all naturally spawned populations of spring/summer-run Chinook salmon in the mainstem Snake River and the Tucannon River, Grande Ronde River, Imnaha River and Salmon River subbasins. Fifteen artificial propagation programs are included in the ESU, however on April 14, 2014, NMFS changed the number of artificial propagation programs included in the ESU to 6 (79 FR 20802).

Status

The ESU was listed due to habitat loss and degradation from the combined effects of damming; forest, agricultural, mining, and wastewater management practices; overharvest; and artificial propagation. There is no obvious long-term positive trend, though recent trends are approaching one, indicating the population is nearly replacing itself. Risks to individual populations within the ESU may be greater than the extinction risk for the entire ESU due to low levels of annual abundance of individual populations. Multiple spawning sites are accessible and natural spawning and rearing are well distributed within the ESU. However, many spawning aggregates have also been extirpated, which has increased the spatial separation of some populations. The South Fork and Middle Fork Salmon Rivers currently support the bulk of natural production in the drainage. There is no evidence of wide-scale genetic introgression by hatchery populations. The high variability in life history traits indicates sufficient genetic variability within the ESU to maintain distinct subpopulations adapted to local environments. Based on these factors, this ESU would likely have a moderate resilience to additional perturbations

Critical Habitat

NMFS designated critical habitat for Snake River spring/summer-run Chinook salmon on December 28, 1993 (58 FR 68543). This critical habitat encompasses the waters, waterway bottoms, and adjacent riparian zones of specified lakes and river reaches in the Columbia River that are or were accessible to listed Snake River salmon (except reaches above impassable natural falls, and Dworshak and Hells Canyon dams). Specific PCEs were not designated in the critical habitat final rule; instead four “essential habitat” categories were described: 1) spawning and juvenile rearing areas, 2) juvenile migration corridors, 3) areas for growth and development to adulthood and 4) adult migration corridors. The “essential features” that characterize these sites include substrate/spawning gravel; water quality, quantity, temperature, velocity; cover/shelter; food; riparian vegetation; space; and safe passage conditions. Hydropower operations and flow management practices have impacted spawning and rearing habitat and migration corridors in some regions. The Interior Columbia Basin Technical Review Team reports that the Panther Creek population was extirpated because of legacy and modern mining-related pollutants that created a chemical barrier to fish passage. Water quality impairments are common in the range of the critical habitat designated for this ESU. Pollutants such as petroleum products, pesticides, fertilizers and sediment in the form of turbidity enter the surface waters and riverine bottom substrate from the headwaters of the Snake, Salmon and Clearwater Rivers to the Columbia River estuary as contaminated stormwater runoff, aerial drift and deposition, and via point source discharges.

Salmon, Chinook (Upper Columbia River Spring-Run)

NMFS listed Upper Columbia River Spring-run Chinook salmon as endangered on March 24, 1999 (64 FR 14308), and reaffirmed their endangered status on June 28, 2005 (70 FR 37160). We used information available in status reviews (Good *et al.* 2005, Ford 2011, NMFS 2011), listing documents (63 FR 11482; 64 FR 14308; 70 FR 37160) and the recovery plan (Upper Columbia Salmon Recovery Board 2007) to summarize the status of the species.

Distribution

The Upper Columbia River spring-run Chinook salmon ESU includes all naturally spawned populations of Chinook salmon in all river reaches accessible to Chinook salmon in Columbia River tributaries upstream of Rock Island Dam and downstream of Chief Joseph Dam in Washington, excluding the Okanogan River. Six artificial propagation programs are part of this ESU.

Status

The ESU was listed due to the combined effects of dams that prevent them from reaching spawning habitat; habitat degradation from irrigation diversions, hydroelectric development, livestock grazing and urbanization; and reduced genetic diversity from artificial propagation efforts. The Interior Columbia Basin Technical Review Team characterizes the spatial structure risk to Upper Columbia River Spring-run Chinook populations as “low” or “moderate” and the diversity risk as “high.” The high risk is a result of reduced genetic diversity from homogenization of populations that occurred under the Grand Coulee Fish Maintenance Project in 1939 to 1943. Abundance data showed an increase in spawner returns in 2000 and 2001, though this increase was not sustained in subsequent years. Population viability analyses for this species (using the Dennis Model) suggest that these Chinook salmon face a significant risk of extinction: a 75 to 100 percent probability of extinction within 100 years (given return rates for 1980 to present). Based on these factors, this ESU would likely have a very low resilience to additional perturbations.

Critical Habitat

NMFS designated critical habitat for Upper Columbia River spring-run Chinook salmon on September 2, 2005 (70 FR 52630). The designation includes all Columbia River estuaries and river reaches upstream to Chief Joseph Dam and several tributary subbasins. This designation includes the stream channels within the designated stream reaches and includes a lateral extent as defined by the ordinary high water line. In areas where the ordinary high-water line is not defined, the lateral extent is defined as the bankfull elevation. These areas are important for the species’ overall conservation by protecting quality growth, reproduction and feeding. The critical habitat designation for this species identifies primary constituent elements that include sites necessary to support one or more Chinook salmon life stages. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, nearshore marine habitat and estuarine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions and floodplain connectivity. The Upper Columbia River spring-run Chinook salmon species has 31 watersheds within its range. Five watersheds received a medium rating and 26 received a high rating of conservation value to the species. The Columbia River rearing/migration corridor downstream of the spawning range was rated as a high conservation value. Factors contributing to the downward trends in this species include mainstem Columbia River hydropower system mortality, tributary riparian degradation and loss of in-river wood, altered tributary floodplain and channel morphology, reduced tributary stream flow and impaired passage and harvest impacts.

Salmon, Chinook (Upper Willamette River)

NMFS listed Upper Willamette River Chinook salmon as threatened on March 24, 1999 (64 FR 14308) and reaffirmed their status on June 28, 2005 (70 FR 37160). We used information available in status reviews (Good *et al.* 2005, NMFS 2011n), the recovery plan (Oregon Department of Fish and Wildlife and NMFS 2011), "Historical population structure of Pacific salmonids in the Willamette River and Lower Columbia River Basins" (Myers *et al.* 2006) and listing documents (64 FR 14308, 70 FR 37160) to summarize the status of the species.

Distribution

The Upper Willamette River Chinook salmon ESU includes all naturally spawned populations of spring-run Chinook salmon in the Clackamas River and in the Willamette River, and its tributaries, above Willamette Falls, Oregon. Seven artificial propagation programs are included in the ESU, however on April 14, 2014, NMFS changed the number of artificial propagation programs included in the ESU to six (79 FR 20802).

Status

The ESU was listed due to habitat loss and degradation from the combined effects of damming; agricultural practices; urbanization; overharvest; and artificial propagation. The McKenzie River population is the only remaining self-sustaining naturally reproducing independent population. The other natural-origin populations in this ESU have very low current abundances, and long- and short-term population trends are negative. The spatial distribution of the species has been reduced by the loss of 30 to 40 percent of the total historic habitat. This loss has restricted spawning to a few areas below dams. Access of fall-run Chinook salmon to the upper Willamette River and the mixing of hatchery stocks within the ESU have threatened the genetic integrity and diversity of the species. Much of the genetic diversity that existed between populations has been homogenized. Based on these factors, this ESU would likely have a low resilience to additional perturbations.

Critical Habitat

NMFS designated critical habitat for Upper Willamette River Chinook salmon on September 2, 2005 (70 FR 52630). Critical habitat for upper Willamette River Chinook salmon includes defined areas within subbasins of the middle fork Willamette River, upper Willamette River, McKenzie River, Santiam River, Crabtree Creek, Molalla River and Clackamas River. This designation includes the stream channels within the designated stream reaches and includes a lateral extent as defined by the ordinary high water line. In areas where the ordinary high-water line is not defined, the lateral extent is defined as the bankfull elevation. The critical habitat designation for this species identifies primary constituent elements that include sites necessary to support one or more Chinook salmon life stages. Specific sites include freshwater spawning and rearing sites, freshwater migration corridors. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions and floodplain connectivity. Of 65 subbasins reviewed in NMFS' assessment of critical habitat for the Upper Willamette River Chinook salmon species, 19 subbasins were rated as having a medium conservation value, 19 were rated as low, and the 27 remaining subbasins were rated as having a high conservation value to Upper Willamette River Chinook salmon. Federal lands were generally rated as having high conservation value to the species' spawning and rearing. Factors contributing to the downward trends in this species include reduced access to spawning/rearing habitat in tributaries, hatchery impacts, altered water quality and temperature in tributaries, altered stream flow in tributaries and lost or degraded floodplain connectivity and lowland stream habitat.

3.2.31 Salmon, Chum

We discuss the distribution, life history, population dynamics, status, and critical habitats of the two species (here we use the word "species" to apply to DPSs and ESUs) separately; however, because listed chum salmon species are virtually indistinguishable in the wild and comprise the same biological species, we begin this section describing characteristics common across ESUs. We used information available in status reviews (Johnson *et al.* 1997, Good *et al.* 2005, Ford 2011) and various listing documents to summarize the status of the species.

Because their range extends farther along the shores of the Arctic Ocean than other Pacific salmonid, chum salmon have the widest natural geographic and spawning distribution of the Pacific salmonids. Chum salmon have been documented to spawn from Korea and the Japanese island of Honshu, east around the rim of the North Pacific Ocean to Monterey Bay, California.

Historically, chum salmon were distributed throughout the coastal regions of western Canada and the U.S. Presently, major spawning populations occur as far south as Tillamook Bay on the northern Oregon coast.

Chum salmon spend two to five years in feeding areas in the northeast Pacific Ocean, which is a greater proportion of their life history than other Pacific salmonids. Chum salmon distribute throughout the North Pacific Ocean and Bering Sea, although North American chum salmon (as opposed to chum salmon originating in Asia), rarely occur west of 175° E longitude (Johnson *et al.* 1997).

North American chum salmon migrate north along the coast in a narrow coastal band that broadens in southeastern Alaska, although some data suggest that Puget Sound chum, including Hood Canal summer run chum, may not make extended migrations into northern British

Columbian and Alaskan waters, but instead may travel directly offshore into the north Pacific Ocean (Johnson *et al.* 1997).

Chum salmon, like pink salmon, usually spawn in the lower reaches of rivers, with redds usually dug in the mainstem or in side channels of rivers from just above tidal influence to nearly 100 km from the sea. Juveniles out-migrate to seawater almost immediately after emerging from the gravel that covers their redds (Salo 1991). This ocean-type migratory behavior contrasts with the stream-type behavior of some other species in the genus *Oncorhynchus* (e.g., coastal cutthroat trout, steelhead, Coho salmon, and most types of Chinook and sockeye salmon), which usually migrate to sea at a larger size, after months or years of freshwater rearing. This means that survival and growth in juvenile chum salmon depend less on freshwater conditions (unlike stream-type salmonids which depend heavily on freshwater habitats) than on favorable estuarine conditions. Another behavioral difference between chum salmon and species that rear extensively in freshwater is that chum salmon form schools, presumably to reduce predation (Pitcher 1986), especially if their movements are synchronized to swamp predators (Miller and Brannon 1982).

Chum salmon have been threatened by overharvests in commercial and recreational fisheries, adult and juvenile mortalities associated with hydropower systems, habitat degradation from forestry and urban expansion, and shifts in climatic conditions that changed patterns and intensity of precipitation.

As fish (exempting the few species of fish that can survive for short periods of time out of water), chum salmon survive only in aquatic ecosystems and, therefore, depend on the quantity and quality of those aquatic systems. Chum salmon, like the other salmon NMFS has listed, have declined under the combined effects of overharvests in fisheries; competition from fish raised in hatcheries and native and non-native exotic species, dams that block their migrations and alter river hydrology; gravel mining that impedes their migration and alters the dynamics (hydrogeomorphology) of the rivers and streams that support juveniles, water diversions that deplete water levels in rivers and streams, destruction or degradation of riparian habitat that increase water temperatures in rivers and streams sufficient to reduce the survival of juvenile chum salmon, and land use practices (logging, agriculture, urbanization) that destroy wetland and riparian ecosystems while introducing sediment, nutrients, biocides, metals, and other pollutants into surface and ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest.

Salmon, Chum (Columbia River)

NMFS listed Columbia River chum salmon as threatened on March 25, 1999 (64 FR 14508) and reaffirmed their status on June 28, 2005 (71 FR 37160). We used information available in status reviews (Good *et al.* 2005, Ford 2011, NMFS 2011), the recovery plan (Oregon Department of Fish and Wildlife and NMFS 2011), "Historical population structure of Pacific salmonids in the Willamette River and Lower Columbia River Basins" (Myers *et al.* 2006) and listing documents (64 FR 14308, 70 FR 37160) to summarize the status of the species.

Distribution

Columbia River chum salmon includes all natural-origin chum salmon in the Columbia River and its tributaries in Washington and Oregon. The species consists of three populations: Grays River, Hardy and Hamilton Creek in Washington State

Status

The ESU was listed due to habitat loss and degradation from the combined effects of water withdrawal, conveyance, storage, and flood control; logging and agriculture; mining; urbanization; and overharvest. Much of the historical spatial structure has been lost on both the population and the ESU levels by extirpation (or near-extirpation) of many local stocks and the widespread loss of estuary habitats. Estimates of abundance and trends are available only for the Grays River and Lower Gorge populations, both of which have long- and short-term productivity trends at or below replacement. Limited distribution also increases risk to the ESU from local disturbances. Although hatchery production of chum salmon has been limited and hatchery effects on diversity are thought to have been relatively small, diversity has been greatly reduced at the ESU level because of presumed extirpations and the low abundance in the remaining populations (fewer than 100 spawners per year for most populations). Based on these factors, this ESU would likely have a low resilience to additional perturbations.

Critical Habitat

NMFS designated critical habitat for Columbia River chum salmon on September 2, 2005 (70 FR 52630). The designated includes defined areas in the following subbasins: Middle Columbia/Hood, Lower Columbia/Sandy, Lewis, Lower Columbia/Clatskanie, Lower Cowlitz, Lower Columbia subbasin and river corridor. This designation includes the stream channels within the designated stream reaches, and includes a lateral extent as defined by the ordinary high water line. In areas where the ordinary high-water line is not defined, the lateral extent is defined as the bankfull elevation.

The critical habitat designation for this species identifies primary constituent elements that include sites necessary to support one or more chum salmon life stages. These areas are important for the species' overall conservation by protecting quality growth, reproduction and feeding and are rated as having high conservation value to the species. Columbia River chum salmon have primary constituent elements of freshwater spawning, freshwater rearing, freshwater migration, estuarine areas free of obstruction, nearshore marine areas free of obstructions and offshore marine areas with good water quality. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity.

Of 21 subbasins reviewed in NMFS' assessment of critical habitat for the Columbia River chum salmon, three subbasins were rated as having a medium conservation value, no subbasins were rated as low and the majority of subbasins (18) were rated as having a high conservation value to Columbia River chum salmon. The major factors limiting recovery for Columbia River chum salmon are altered channel form and stability in tributaries, excessive sediment in tributary spawning gravels, altered stream flow in tributaries and the mainstem Columbia River, loss of some tributary habitat types, and harassment of spawners in the tributaries and mainstem.

Limited information exists on the quality of essential habitat characteristics for this ESU; however, the migration PCE has been significantly impacted by dams obstructing adult migration and access to historic spawning locations and water quality and cover for estuary and rearing PCEs have decreased in quality to the extent that the PCEs are not likely to maintain their intended function to conserve the species.

Salmon, Chum (Hood Canal Summer Run)

NMFS listed Hood Canal summer-run chum salmon as threatened on March 25, 1999 (64 FR 14508), and reaffirmed their status on June 28, 2005 (70 FR 37160). We used information available in status reviews (Good *et al.* 2005, Ford 2011, NMFS 2011) and listing documents (63 FR 11774, 64 FR 14508, 70 FR 37160) to summarize the status of the species

Distribution

Hood Canal summer-run chum salmon includes summer-run chum salmon populations in Hood Canal in Puget Sound and in Discovery and Sequim Bays on the Strait of Juan de Fuca. It may also include summer-run fish in the Dungeness River, but the existence of that run is uncertain. Of the sixteen populations of summer chum that are included in this species, seven are considered "functionally extinct" (Skokomish, Finch Creek, Anderson Creek, Dewatto, Tahuya, Big Beef Creek and Chimicum). The remaining nine populations are well distributed throughout the range of the species except for the eastern side of Hood Canal (Johnson *et al.* 1997).

Five hatchery populations are considered part of the species including those from the Quilcene National Fish Hatchery, Long Live the Kings Enhancement Project (Lilliwaup Creek), Hamma Hamma River Supplementation Project, Big Beef Creek reintroduction project and the Salmon Creek supplementation project in Discovery Bay. Although included as part of the species, none of the hatchery populations were listed.

Status

NMFS listed Hood Canal summer-run chum salmon as threatened on March 25, 1999 (64 FR 14508), and reaffirmed their status on June 28, 2005 (70 FR 37160). The ESU was listed due to habitat loss and degradation from the combined effects of water withdrawal, conveyance, storage, and flood control; logging and agriculture; mining; urbanization; overharvest; and artificial propagation. Much of the historical spatial structure and connectivity has been lost on both the population and the ESU levels by extirpation of many local stocks and the widespread loss of estuary and lower floodplain habitats. Long-term trends in productivity are above replacement only for the Quilcene and Union River stocks; however, most stocks remain depressed. The overall trend in spawning abundance is generally stable (meaning adults are replacing themselves) for the Hood Canal population (all natural spawners and natural-origin only spawners) and for the Strait of Juan de Fuca population (all natural spawners). Only the Strait of Juan de Fuca population's natural-origin only spawners shows a significant positive trend. Estimates of the fraction of naturally spawning hatchery fish exceed 60 percent for some stocks, which indicates that reintroduction programs are supplementing the numbers of total fish spawning naturally in streams. There is also concern that the Quilcene hatchery stock has high rates of straying, and may represent a risk to historical population structure and diversity. Based on these factors, this ESU would likely have a low resilience to additional perturbations.

Critical Habitat

NMFS designated critical habitat for Hood Canal summer-run chum salmon on September 2, 2005 (70 FR 52630). Designated critical habitat includes the Skokomish River, Hood Canal subbasin, which includes the Hamma Hamma and Dosewallips rivers and others, the Puget Sound subbasin, Dungeness/Elwha subbasin, and nearshore marine areas of Hood Canal and the Strait of Juan de Fuca. This includes a narrow nearshore zone within several Navy security/restricted zones and approximately eight miles of habitat that was unoccupied at the time of the designation (including Finch, Anderson and Chimacum creeks), but has been re-seeded. PCEs for this ESU and physical or biological features that characterize them are described in Section 3.0.4. The spawning PCE is degraded by excessive fine sediment in the gravel and the rearing PCE is degraded by loss of access to sloughs in the estuary and nearshore areas and excessive predation. Low flow in several rivers also adversely affects most PCEs. In estuarine areas, both migration and rearing PCEs of juveniles are impaired by loss of functional floodplain areas necessary for growth and development of juvenile chum salmon. These degraded conditions likely maintain low population abundances across the ESU.

3.2.32 Salmon, Coho

We discuss the distribution, life history, population dynamics, status, and critical habitats of the four species (here we use the word "species" to apply to DPSs and ESUs) separately; however, because listed coho salmon species are virtually indistinguishable in the wild and comprise the same biological species. We used information available in status reviews (Good *et al.* 2005, Ford 2011), and various listing documents to summarize the status of the species.

Coho salmon occur naturally in most major river basins around the North Pacific Ocean from central California to northern Japan (Laufle *et al.* 1986). After entering the ocean, immature Coho salmon initially remain in near-shore waters close to the parent stream. Most Coho salmon adults are 3-year-olds, having spent approximately 18 months in freshwater and 18 months in salt water. Wild female Coho return to spawn almost exclusively at age 3. Spawning escapements of Coho salmon are dominated by a single year class. The abundance of year classes can fluctuate dramatically with combinations of natural and human-caused environmental variation.

North American Coho salmon will migrate north along the coast in a narrow coastal band that broadens in southeastern Alaska. During this migration, juvenile Coho salmon tend to occur in both coastal and offshore waters. During spring and summer, Coho salmon will forage in waters between 46° N, the Gulf of Alaska, and along Alaska's Aleutian Islands.

As fish (exempting the few species of fish that can survive for short periods of time out of water), Coho salmon survive only in aquatic ecosystems and, therefore, depend on the quantity and quality of those aquatic systems. Coho salmon, like the other salmon NMFS has listed, have declined under the combined effects of overharvests in fisheries; competition from fish raised in hatcheries and native and non-native exotic species, dams that block their migrations and alter river hydrology; gravel mining that impedes their migration and alters the dynamics (hydrogeomorphology) of the rivers and streams that support juveniles, water diversions that deplete water levels in rivers and streams, destruction or degradation of riparian habitat that increase water temperatures in rivers and streams sufficient to reduce the survival of juvenile Coho salmon, and land use practices (logging, agriculture, urbanization) that destroy wetland and riparian ecosystems while introducing sediment, nutrients, biocides, metals, and other pollutants into surface and ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest.

When NMFS proposed Oregon coast, Southern Oregon Northern Coastal California, and Central California Coast Coho salmon as threatened, the proposal also identified the loss of wetland habitat, including the Corps' failure to consider the cumulative impact of its 404 permits, as one of several reasons for listing these salmon as threatened (60 FR 38011, 61 FR 56138).

Salmon, Coho (Central California Coast)

NMFS listed the central California coast coho salmon ESU as threatened on October 31, 1996 (61 FR 56138) and later reclassified their status as endangered on June 28, 2005 (70 FR 37160). We used information available in status reviews (Weitkamp *et al.* 1995, Good *et al.* 2005, NMFS 2011, Spence and Williams 2011), "An analysis of historical population structure for evolutionarily significant units of Chinook salmon, coho salmon, and steelhead in the North-Central California Coast Recovery Domain" (Bjorkstedt *et al.* 2005) and listing documents (60 FR 38011; 61 FR 56138; 70 FR 37160) to summarize the status of the species.

Distribution

The Central California Coast coho salmon ESU includes all naturally spawned populations of coho salmon from Punta Gorda in northern California south to and including the San Lorenzo River in central California, as well as populations in tributaries to San Francisco Bay, excluding the Sacramento-San Joaquin River system. The ESU also includes four artificial propagation programs.

Status

Historically, central California Coho salmon were known to have occurred in 186 streams along the central coast of California. Spawning populations of these Coho salmon have been extirpated from 71 (53 percent) of the 133 streams for which recent data are available. Based on this evidence, we assume that spawning populations of this species have been extirpated from at least half of the species' historic distribution.

Although some of the spawning populations that remain are estimated to number in the hundreds, most of these populations have some Cohorts that number in the tens of individuals; their loss would create gaps in the number of Cohorts that represent a spawning population that are equivalent to the loss of year-classes of age-structured populations. The largest Cohorts of several other spawning populations ─ for example at Olema, Noyo, and Scott Creeks ─ are estimated to number less than 200 individuals while the smaller Cohorts are estimated to number about 23 (Olema Creek), 59 (Noyo Creek), 9 (Scott Creek) individuals with declining trends. These sizes are small enough to leave these Cohorts with high risks of declining to zero in the short term. None of the remaining spawning populations of central California coastal Coho salmon are large enough to "rescue" the spawning populations that have been extirpated or that are on the brink of being extirpated.

The combination of the threats facing this species of Coho salmon (habitat loss and landscape alteration associated with the urban, suburban, and exurban centers of the San Francisco Bay region; water pollution, competition and predation by exotic species) and the species' status and trend, this species faces severe and imminent risks of extinction in the near future.

Critical Habitat

NMFS designated critical habitat for central California coast coho salmon on May 5, 1999 (64 FR 24049). Designated critical habitat includes accessible reaches of all rivers (including estuarine areas and tributaries) between Punta Gorda and the San Lorenzo River (inclusive) in California. Critical habitat for this species also includes two streams entering San Francisco Bay: Arroyo Corte Madera Del Presidio and Corte Madera Creek. Specific PCEs were not designated in the critical habitat final rule; instead five "essential habitat" categories were described: 1) juvenile summer and winter rearing areas; 2) juvenile migration corridors; 3) areas for growth and development to adulthood; 4) adult migration corridors; and 5) spawning areas. The "essential features" that characterize these sites include adequate 1) substrate; 2) water quality; 3) water quantity; 4) water temperature; 5) water velocity; 6) cover/shelter; 7) food; 8) riparian vegetation; 9) space; and 10) safe passage conditions. NMFS (2008) evaluated the condition of each habitat feature in terms of its current condition relative to its role and function in the conservation of the species. The assessment of habitat showed a distinct trend of increasing degradation in quality and quantity of all essential features as the habitat progresses south through the species range, with the area from the Lost Coast to the Navarro Point supporting the most favorable habitats and the Santa Cruz Mountains supporting the least. However, all populations are generally degraded regarding spawning and incubation substrate, and juvenile rearing habitat. Elevated water temperatures occur in many streams across the entire ESU.

Salmon, Coho (Lower Columbia River)

NMFS listed Lower Columbia River coho salmon as threatened on June 28, 2005 (70 FR 37160). We used information available in status reviews (Johnson *et al.* 1991, Good *et al.* 2005, Ford 2011, NMFS 2011), recovery plans (Lower Columbia Fish Recovery Board 2010, Oregon Department of Fish and Wildlife 2010, NMFS 2013a), "Viability status of Oregon salmon and steelhead populations in the Willamette and lower Columbia basins (McElhany *et al.* 2007) and listing documents (70 FR 37160; 78 FR 2725) to summarize the status of the species.

Distribution

The lower Columbia River coho salmon ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries in Oregon and Washington, from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers, Washington; and the Willamette River to Willamette Falls, Oregon. This ESU included 25 artificial propagation programs, however on April 14, 2014, NMFS changed the number of artificial propagation programs included in the ESU to 21 (79 FR 20802).

Status

Lower Columbia River coho salmon have been—and continue to be—affected by habitat degradation, hydropower impacts, harvest and hatchery production. Out of the 24 populations that make up this ESU, 21 are considered to have a very low probability of persisting for the next 100 years, and none is considered viable. The very low persistence probability for most Lower Columbia River coho salmon populations is related to low abundance and productivity, loss of spatial structure, and reduced diversity. Though data quality has been poor because of inadequate spawning surveys and, until recently, the presence of unmarked hatchery-origin spawners, most populations are believed to have very low abundance of natural-origin spawners (50 fish or fewer). The spatial structure of some populations is constrained by migration barriers (such as tributary dams) and development in lowland areas. Low abundance, past stock transfers, other legacy hatchery effects, and ongoing hatchery straying may have reduced genetic diversity within and among coho salmon populations. It is likely that hatchery effects have also decreased population productivity. The generally poor baseline population status of coho salmon reflects long-term trends: natural-origin coho salmon in the Columbia Basin have been in decline for the last 50 years. Based on these factors, this ESU would likely have very low resilience to additional perturbations.

Critical Habitat

The specific areas proposed for designation for lower Columbia River coho salmon include approximately 2,288 mi (3,681 km) of freshwater and estuarine habitat in Oregon and Washington. These areas contain sites essential to support one or more life stages of the DPS (sites for spawning, rearing, migration and foraging). These sites in turn contain physical or biological features essential to the conservation of the DPS (for example, spawning gravels, water quality and quantity, side channels, forage species). Specific types of sites and the features associated with them (both of which are referred to as PCEs) include the following:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
3. Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.
4. Estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.
5. Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large

rocks and boulders, and side channels. Show citation box

6. Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

Salmon, Coho (Oregon Coast)

NMFS listed the Oregon coast coho salmon as a threatened species on February 11, 2008 (73 FR 7816). We used information available in the status reviews (Good *et al.* 2005, Ford 2011), "Scientific conclusions of the status review for Oregon coast coho salmon (Oncorhynchus kisutch)" (Stout *et al.* 2012), "Identification of historical populations of coho salmon (Oncorhynchus kisutch) in the Oregon Coast Evolutionarily Significant Unit" (Lawson *et al.* 2007) and listing documents (63 FR 42587; 73 FR 7816) to summarize the status of the species.

Distribution

The Oregon Coast coho salmon ESU includes all naturally spawned populations of coho salmon in Oregon coastal streams south of the Columbia River and north of Cape Blanco (63 FR 42587). One hatchery population, the Cow Creek hatchery coho salmon, is considered part of the ESU.

Status

The ESU was listed because its biological status had not improved since NMFS's January 19, 2006 determination that the ESU's listing was not warranted (71 FR 3033) and current efforts being made to protect the species did not provide sufficient certainty of implementation or effectiveness to mitigate the assessed level of extinction risk. Current coho salmon coastal distribution has not changed markedly compared to historical distribution; however, river alterations and habitat destruction have significantly modified use and distribution within several river basins. Genetic diversity has been reduced by legacy effects of freshwater and tidal habitat loss, very low spawner returns within the past 20 years, and past high levels of hatchery releases; however, with recent reductions in hatchery releases, diversity should improve. Based on these factors, this ESU would likely have a moderate resilience to additional perturbations.

Critical Habitat

NMFS designated critical habitat for Oregon Coast Coho on February 11, 2008 (73 FR 7816). The designation includes 72 of 80 watersheds occupied by Oregon Coast Coho salmon, and totals about 6,600 stream miles including all or portions of the Nehalem, Nestucca/Trask, Yaguina, Alsea, Umpqua and Coquille basins. These areas are essential for feeding, migration, spawning and rearing. The specific primary constituent elements include: spawning sites with water and substrate quantity to support spawning, incubation and larval development; freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth, foraging, behavioral development (e.g., predator avoidance, competition) and mobility; freshwater migratory corridors free of obstruction with adequate water quantity and quality conditions; and estuarine, nearshore and offshore areas free of obstruction with adequate water quantity, quality and salinity conditions that support physiological transitions between fresh- and saltwater, predator avoidance, foraging and other life history behaviors.

PCEs vary widely throughout the critical habitat area designated the ESU; many watersheds have been heavily impacted and support low quality PCEs, while habitat in other watersheds have sufficient quality for supporting the conservation purpose of designated critical habitat. The spawning PCE has been impacted in many watersheds from the inclusion of fine sediment into spawning gravel from timber harvest and forestry related activities, agriculture and grazing. These activities have also diminished the channels' rearing and overwintering capacity by reducing the amount of large woody debris in stream channels, removing riparian vegetation, disconnecting floodplains from stream channels and changing the quantity and dynamics of stream flows. The rearing PCE has been degraded by elevated water temperatures in 29 of the watersheds within the Nehalem, North Umpqua and the inland watersheds of the Umpqua subbasins. Water quality is impacted by contaminants from agriculture and urban areas in low-lying areas in the Umpqua subbasin, and in coastal watersheds within the Siletz/Yaquina, Siltcoos, and Coos subbasins. Reductions in water quality have been observed in 12 watersheds due to contaminants and excessive nutrition. The migration PCE has been impacted throughout the ESU by culverts and road crossings that restrict passage.

Salmon, Coho (Southern Oregon Northern Coastal California)

NMFS listed the Southern Oregon/Northern California coast coho salmon as threatened on May 7, 1997 (62 FR 24588), and reaffirmed their status on June 28, 2005 (70 FR 37160). We used information available in status reviews (Good *et al.* 2005, NMFS 2011, Ford 2011), the draft recovery plan (78 FR 38011) and listing documents (62 FR 24588; 70 FR 37160) to summarize the status of the species

Distribution

The Southern Oregon/Northern California Coast coho salmon ESU consists of all naturally spawning populations of coho salmon that reside below long-term, naturally impassable barriers in streams between Punta Gorda, California and Cape Blanco, Oregon. This ESU also includes three artificial propagation programs.

Status

The ESU was listed due to habitat loss and degradation from the combined effects of logging, agricultural, and mining activities; road building; urbanization; stream channelization; damming; wetland loss; beaver trapping, water withdrawals; overharvest; drought; flooding; poor ocean conditions and El Niño; and artificial propagation. Though distribution has been reduced and fragmented within the ESU, extant populations can still be found in all major river basins within the ESU. Presence-absence data indicate a disproportionate loss of southern populations compared to the northern portion of the ESU. Though long-term data on salmon abundance are scarce, the available monitoring data indicate that spawner abundance has generally declined for populations in this ESU. Many populations have been extirpated, are near extirpation, or are severely depressed. Based on available data, this ESU is at high risk of extinction and is not viable. Based on these factors, this ESU would likely have a very low resilience to additional perturbations.

Critical Habitat

NMFS designated critical habitat for Southern Oregon/Northern California Coast coho salmon on May 5, 1999 (64 FR 24049). Designated critical habitat includes all accessible river reaches between Cape Blanco, Oregon, and Punta Gorda, California and consists of the water, substrate and river reaches (including off-channel habitats) in specified areas. Accessible reaches are those within the historical range of the ESU that can still be occupied by any life stage of coho salmon. Specific PCEs were not designated in the critical habitat final rule; instead, five "essential habitat" categories were described: 1) juvenile summer and winter rearing areas; 2) juvenile migration corridors; 3) areas for growth and development to adulthood; 4) adult migration corridors; and 5) spawning areas. The "essential features" that characterize these sites include adequate: 1) substrate; 2) water quality; 3) water quantity; 4) water temperature; 5) water velocity; 6) cover/shelter; 7) food; 8) riparian vegetation; 9) space; and 10) safe passage conditions. Critical habitat designated for this ESU is generally of good quality in northern coastal streams. Spawning essential habitats have been degraded throughout the ESU by logging activities that have increased fine particles in spawning gravel. Rearing essential habitats have been considerably degraded in many inland watersheds from the loss of riparian vegetation resulting in unsuitably high water temperatures. Rearing and juvenile migration essential habitat quality has been reduced from the disconnection of floodplains and off-channel habitat in low gradient reaches of streams, consequently reducing winter rearing capacity.

3.2.33 Salmon, Sockeye

We discuss the distribution, life history, population dynamics, status, and critical habitats of the two species (here we use the word "species" to apply to DPSs and ESUs) separately; however, because listed sockeye salmon species are virtually indistinguishable in the wild and comprise the same biological species, we begin this section describing characteristics common across ESUs. We used information available in the status review (Good *et al.* 2005), various listing documents and Biological Opinions to summarize the status of the species.

Sockeye salmon occur in the North Pacific and Arctic oceans and associated freshwater systems. In North America, the species ranges north from the Klamath River in California to Bathurst Inlet in the Canadian Arctic. In Asia, sockeye salmon range from northern Hokkaido in Japan north to the Anadyr River in Siberia. The largest populations occur north of the Columbia River.

Most sockeye salmon exhibit a lake-type life history (i.e., they spawn and rear in or near lakes), though some salmon exhibit a river-type life history. Spawning generally occurs in late summer and fall, but timing can vary greatly among populations. In lakes, salmon commonly spawn along "beaches" where underground seepage provides fresh oxygenated water. Incubation is a function of water temperature, but generally lasts between 100 to 200 days (Burgner 1991). Sockeye salmon fry primarily rear in lakes; river-emerged and stream-emerged fry migrate into lakes to rear. Juvenile sockeye salmon generally rear in lakes from one to three years after emergence, though some river-spawned salmon may migrate to sea in their first year. Juvenile sockeye salmon feeding behaviors change as they transition through life stages after emergence to the time of smoltification. In the early fry stage from spring to early summer, juveniles forage exclusively in the warmer littoral (i.e., shoreline) zone where they depend mostly on fly larvae and pupae, copepods, and water fleas. In summer, underyearling sockeye salmon move from the littoral habitat to a pelagic (i.e., open water) existence where they feed on larger zooplankton; however, flies may still make up a substantial portion of their diet. Older and larger fish may also prey on fish larvae. Distribution in lakes and prey preference is a dynamic process that changes daily and yearly depending on many factors, including: water temperature; prey abundance; presence of predators and competitors; and size of the juvenile. Peak emigration to the ocean occurs in mid-April to early May in southern sockeye populations (lower than 52ºN latitude) and as late as early July in northern populations (62ºN latitude) (Burgner 1991). Adult sockeye salmon return to their natal lakes to spawn after spending one to four years at sea. The diet of adult salmon consists of amphipods, copepods, squid and other fish.

Salmon, Sockeye (Ozette Lake)

NMFS listed the Ozette Lake sockeye salmon ESU as threatened on March 25, 1999 (64 FR 14528), and reaffirmed their threatened status on June 28, 2005 (70 FR 37160). We used information available in status reviews (Good *et al.* 2005, NMFS 2011), the recovery plan (NMFS 2009e), "Viability Criteria for the Lake Ozette Sockeye Salmon Evolutionarily Significant Unit" (Rawson *et al.* 2009) and listing documents (63 FR 11750, 64 FR 14528) to summarize the status of the species.

Distribution

The Ozette Lake sockeye salmon ESU includes all naturally spawned anadromous populations of sockeye salmon that migrate into and rear in in Ozette Lake, Ozette River, Coal Creek and other tributaries flowing into Ozette Lake, near the northwest tip of the Olympic Peninsula in Olympic National Park, Washington. Composed of only one population, the Ozette Lake sockeye salmon ESU consists of five spawning aggregations or subpopulations, grouped according to their spawning locations: Umbrella and Crooked creeks, Big Rive, and Olsen's and Allen's beaches. Two artificial populations are also considered part of this ESU. Sockeye salmon stock reared at the Makah Tribe's Umbrella Creek Hatchery were included in the ESU, but were not considered essential for recovery of the ESU. However, once the hatchery fish return and spawn in the wild, their progeny are considered to be listed under the ESA.

Status

The ESU was listed due to habitat loss and degradation from the combined effects of logging, road building, predation, invasive plant species and overharvest. Ozette Lake sockeye salmon have not been commercially harvested since 1982 and only minimally harvested by the Makah Tribe since 1982 (0 to 84 fish per year); there are also no known marine area harvest impacts to fish of this ESU. Overall, abundance is substantially below historical levels and it is not known if this decrease in abundance is a result of fewer spawning aggregations, lower abundances at each aggregation, or a combination of both factors. The proportion of beach spawners is assumed to be low; therefore, hatchery originated fish are not believed to have had a major effect on the genetics of the naturally spawned population. However, Ozette Lake sockeye have a relatively low genetic diversity compared to other O. *nerka* populations examined in Washington State (Crewson *et al.* 2001). Genetic differences do occur between age cohorts, but as different age groups do not spawn with each other, the population may be more vulnerable to significant reductions in population structure due to catastrophic events or unfavorable conditions affecting one year class. Based on these factors, this ESU would likely have a low resilience to additional perturbations.

Critical Habitat

NMFS designated critical habitat for Ozette Lake sockeye salmon on September 2, 2005 (70 FR 52630). It encompasses areas within the Hoh/Quillayute subbasin, Ozette Lake and the Ozette Lake watershed. The entire occupied habitat for this ESU is within the single watershed for Ozette Lake. PCEs identified for Lake Ozette sockeye salmon are areas for spawning, freshwater rearing and migration, estuarine areas free of obstruction, nearshore marine areas free of obstructions, and offshore marine areas with good water quality. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, and adequate passage conditions. Spawning habitat has been affected by loss of tributary spawning areas and exposure of much of the available beach-spawning habitat due to low water levels in summer. Further, native and non-native vegetation as well as sediment have reduced the quantity and suitability of beaches for spawning. The rearing PCE is degraded by excessive predation and competition with introduced non-native species, and by loss of tributary rearing habitat. Migration habitat may be adversely affected by high water temperatures and low water flows in summer which causes a thermal block to migration (La Riviere 1991).

Salmon, Sockeye (Snake River)

NMFS listed Snake River sockeye salmon as endangered on November 20, 1991 (56 FR 58619), and reaffirmed their status on June 28, 2005 (70 FR 37160). We used information available in status reviews (Gustafson *et al.* 1997, Good *et al.* 2005, NMFS 2011) and listing documents (58 FR 68543, 70 FR 37160) to summarize the status of the species.

Distribution

Snake River sockeye salmon includes populations of sockeye salmon from the Snake River Basin, Idaho, although the only remaining populations of this species occur in the Stanley River Basin of Idaho.

Status

Subsequent to the 1991 listing, the residual form of sockeye residing in Redfish Lake was identified and in 1993, NMFS determined that residual sockeye salmon in Redfish Lake was part of the ESU. The ESU was listed due to habitat loss and degradation from the combined effects of damming and hydropower development, overexploitation, fisheries management practices, and poor ocean conditions. Recent annual abundances of natural origin sockeye salmon in the Stanley Basin have been extremely low. This species is currently entirely supported by adults produced through the captive propagation program. No natural origin anadromous adults have returned since 1998 and the abundance of residual sockeye salmon in Redfish Lake is unknown. Current smolt-to-adult survival of sockeye originating from the Stanley Basin lakes is rarely greater than 0.3 percent (Hebdon *et al.* 2004). Based on these factors, this ESU would likely have a very low resilience to additional perturbations.

Critical Habitat

NMFS designated critical habitat for SR sockeye salmon on December 28, 1993 (58 FR 68543). It encompass the waters, waterway bottoms, and adjacent riparian zones of specified lakes and river reaches in the Columbia River that are or were accessible to salmon of this ESU (except reaches above impassable natural falls, and Dworshak and Hells Canyon Dams). Specific PCEs were not designated in the critical habitat final rule; instead four “essential habitat” categories were described: 1) spawning and juvenile rearing areas, 2) juvenile migration corridors, 3) areas for growth and development to adulthood and 4) adult migration corridors. The “essential features” that characterize these sites include substrate/spawning gravel; water quality, quantity, temperature, velocity; cover/shelter; food; riparian vegetation; space; and safe passage conditions. The quality and quantity of rearing and juvenile migration essential habitats have been reduced from activities such as tilling, water withdrawals, timber harvest, grazing, mining and alteration of floodplains and riparian vegetation. These activities disrupt access to foraging areas, increase the amount of fines in the steam substrate that support production of aquatic insects, and reduce instream cover. Adult and juvenile migration essential habitat is affected by four dams in the Snake River basin that obstructs migration and increases mortality of downstream migrating juveniles. Water quality impairments in designated critical habitat include inputs from fertilizers, insecticides, fungicides, herbicides, surfactants, heavy metals, acids, petroleum products, animal and human sewage, dust suppressants (e.g., magnesium chloride), radionuclides, sediment in the form of turbidity, and other anthropogenic pollutants. Pollutants enter the surface waters and riverine sediments from the headwaters of the Salmon River to the Columbia River estuary as contaminated stormwater runoff, aerial drift and deposition, and via point source discharges.

3.2.34 Smalltooth Sawfish (U.S. Portion of Range)

The United States DPS of smalltooth sawfish (Pristis pectinata) was listed as endangered on April 1, 2003 (68 FR 15674). We used information available in the 2009 Recovery Plan (74 FR 3566), the 5-year Review (NMFS 2010a) and the proposed listing of other sawfish (78 FR 33300) to summarize the status of the species, as follows.

Distribution

The smalltooth sawfish is a tropical marine and estuarine elasmobranch (e.g., sharks and rays) that uses its tooth-lined rostrum to forage on fish and benthic invertebrates. Smalltooth sawfish can be found in Florida waters, primarily in the southern tip of the state, centered around Charlotte Harbor, Everglades National Park and Florida Bay. On June 4, 2013, NMFS proposed a rule to list five species of sawfish (Pristis spp.) found outside U.S. waters (78 FR 33300), including the non-listed DPSs of smalltooth sawfish.

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 5% 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. The decline in the population of smalltooth sawfish is attributed to fishing (both commercial and recreational), habitat modification and sawfish life history. Large numbers of smalltooth sawfish were caught as bycatch in the early part of this century. Smalltooth sawfish were historically caught as bycatch in various fishing gears throughout their historic range, including gillnet, otter trawl, trammel net, seine, and to a lesser degree, hand line. Frequent accounts in earlier literature document smalltooth sawfish being entangled in fishing nets from areas where smalltooth sawfish were once common but are now rare or extirpated (Everman and Bean 1898). Loss and/or degradation of habitat contributed to the decline of many marine species and continue to impact the distribution and abundance of smalltooth sawfish.

Since actual abundance data are limited, researchers have begun to compile capture and sightings data (collectively referred to as encounter data) in the National Sawfish Encounter Database (NSED) that was developed in 2000. Since the conception of the NSED, over 3,000 smalltooth sawfish encounters have been reported and compiled in the encounter database (NSED 2012). 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. Seitz and Poulakis (2002) and Poulakis and Seitz (2004) document recent (1990 to 2002) occurrences of sawfish along the southwest coast of Florida, and in Florida Bay and the Florida Keys, respectively. This information is confirmed by Wiley and Simpfendorfer (2010) who show the core range has expanded.

The majority of smalltooth sawfish encounters today are from the southwest coast of Florida between the Caloosahatchee River and Florida Bay. Outside of this core area, the smalltooth sawfish appears more common on the west coast of Florida and in the Florida Keys than on the east coast, and occurrences decrease the greater the distance from the core area (Simpfendorfer and Wiley 2004). The capture of a smalltooth sawfish off Georgia in 2002 is the first record north of Florida since 1963. New reports during 2004 extend the current range of the species to Panama City, offshore Louisiana (south of Timbalier Island in 100 ft. of water), southern Texas and the northern coast of Cuba. The Texas sighting was not confirmed to be a smalltooth sawfish and may have been a largetooth sawfish.

Status

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 an increase of between 2 and 5% per year in abundance within the park over the past decade (Carlson and Osborne 2012; Carlson *et al.* 2007). In addition, the declining numbers of individuals with increasing size is consistent with the historic size composition data (Simpfendorfer and Wiley 2004).

The effective population size, the number of animals in the population that produce offspring was recently estimated to be between 250 and 350 individuals (Chapman *et al.* 2011). Given the small effective population size and the increasing number of neonates produced, inbreeding depression was suspected to be a concern for smalltooth sawfish. Given the degree of decline and range contraction that smalltooth sawfish have experienced over the last few generations, it was originally hypothesized that the remnant smalltooth sawfish population has experienced a genetic bottleneck. However, an analysis of tissue samples (fin clips) collected under the previous permit (number 13330) indicates inbreeding is rare (Chapman *et al.* 2011). Results of this study also suggest that the remnant smalltooth sawfish population will probably retain 90% of its current genetic diversity and there is no evidence of a genetic bottleneck accompanying last century's demographic bottleneck.

The status and trends and recent encounters in new areas beyond the core abundance area suggest that the population may be increasing. However, smalltooth sawfish encounters are still rare along much of their historical range and they are thought to be extirpated from areas of historical abundance such as the Indian River Lagoon and John's Pass (Snelson and Williams 1981, Simpfendorfer and Wiley 2004).

Critical Habitat

Two units of critical habitat were designated for smalltooth sawfish in 2009 (74 FR 45353): the Charlotte Harbor Estuary and the Ten Thousand Islands/Everglades. Primary constituent elements were not identified, although the final rule identified the red mangroves and shallow euryhaline habitats as essential to the conservation of smalltooth sawfish because both serve nursery area functions. Activities that may affect smalltooth sawfish critical habitat include dredging, filling, in-water construction, installation of water control structures, and hard clam aquaculture activities.

3.2.35 Steelhead

We discuss the distribution, life history, population dynamics, status, and critical habitats of the eleven species (here we use the word "species" to apply to DPSs and ESUs) separately; however, because listed steelhead trout species are virtually indistinguishable in the wild and comprise the same biological species, we begin this section describing characteristics common across DPSs. We used information available in the status reviews (Good *et al.* 2005, Ford 2011) and various salmon ESU listing documents to summarize the status of the species.

Steelhead is the common name of the anadromous form of *O. mykiss*. They are a Pacific salmonid with freshwater habitats that include streams extending from northwestern Mexico to Alaska in North America to the Kamchatka peninsula in Russia. Non-anadromous *O. mykiss* do not migrate to the ocean and remain in freshwater all their lives. These fish are commonly called rainbow trout.

Steelhead are distributed from Alaska south to southern California. They can be divided into two basic run-types: the stream-maturing type, or summer steelhead, enters fresh water in a sexually immature condition and requires several months in freshwater to mature and spawn and the ocean-maturing type, or winter steelhead, enters fresh water with well-developed gonads and spawns shortly after river entry (61 FR 41542).

Summer steelhead enter freshwater between May and October in the Pacific Northwest (Busby *et al.* 1996). Winter steelhead enter freshwater between November and April in the Pacific Northwest (Busby *et al.* 1996). Steelhead spawn in cool, clear streams featuring suitable gravel size, depth and current velocity. Intermittent streams may also be used for spawning (Barnhart 1986, Everest 1973). Depending on water temperature, steelhead eggs may incubate for 1.5 to 4 months (61 FR 41542) before hatching. Juveniles rear in fresh water from one to four years, and then migrate to the ocean as smolts (61 FR 41542). Winter steelhead populations generally smolt after two years in fresh water (Busby *et al.* 1996).

Steelhead, like the other salmon discussed previously, survive only in aquatic ecosystems and, therefore, depend on the quantity and quality of those aquatic systems. Steelhead, like the other salmon NMFS has listed, have declined under the combined effects of overharvests in fisheries; competition from fish raised in hatcheries and native and non-native exotic species, dams that block their migrations and alter river hydrology; gravel mining that impedes their migration and alters the dynamics (hydrogeomorphology) of the rivers and streams that support juveniles, water diversions that deplete water levels in rivers and streams, destruction or degradation of riparian habitat that increase water temperatures in rivers and streams sufficient to reduce the survival of juveniles, and land use practices (logging, agriculture, urbanization) that destroy wetland and riparian ecosystems while introducing sediment, nutrients, biocides, metals, and other pollutants into surface and ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest and California.

On June 28, 2005, as part of the final listing determinations for 16 ESUs of West Coast salmon, NMFS amended and streamlined the 4(d) protective regulations for threatened salmon and steelhead (70 FR 37160). Under this change, the section 4(d) protections apply to natural and hatchery fish with an intact adipose fin, but not to listed hatchery fish that have had their adipose fin removed prior to release into the wild.

Steelhead (California Central Valley)

NMFS listed the California Central Valley steelhead DPS as threatened on March 19, 1998, and reaffirmed their status on January 5, 2006 (71 FR 834). We used information available in status reviews (Good *et al.* 2005, NMFS 2011c), the draft recovery plan (NMFS 2009c) and listing documents (69 FR 33102; 71 FR 834) to summarize the status of the species.

Distribution

The California Central Valley steelhead DPS includes all naturally spawned steelhead populations below natural and manmade impassable barriers in the Sacramento and San Joaquin Rivers and their tributaries, excluding steelhead from San Francisco and San Pablo Bays and their tributaries. The DPS also includes two artificial propagation programs: the Coleman National Fish Hatchery and Feather River Hatchery.

Status

Factors contributing to the listing of this DPS include the loss of historical spawning and rearing habitat above impassable dams, restriction of natural production areas, the apparent continuing decline in abundance, and lack of monitoring efforts to assess the DPS's abundance and trends. The DPS's present distribution has been greatly reduced: about 80 percent of historic habitat has been lost behind dams and about 38 percent of habitat patches that supported independent populations are no longer accessible to steelhead (Lindley *et al.* 2006). Though previously thought to be extirpated from these areas, populations may exist in Big Chico and Butte Creeks and steelhead have also been observed in Clear Creek and Stanislaus River (Demko and Cramer 2000). A few wild steelhead are produced in the American and Feather Rivers. Though annual monitoring data for calculating trends are lacking, available data indicate the DPS has had a significant long-term downward trend in abundance. The losses of populations and reductions in abundance have reduced genetic diversity in the DPS. Hatchery-origin fish have also compromised the genetic diversity of the majority of the spawning runs. Based on these factors, this DPS would likely have a low resilience to additional perturbations.

Critical Habitat

Designated critical habitat for the California Central Valley steelhead DPS encompasses about 2,300 miles of stream habitat and about 250 square miles of estuarine habitat in the San Francisco-San Pablo-Suisan Bay estuarine complex and includes stream reaches such as those of the Sacramento, Feather, and Yuba Rivers, and Deer, Mill, Battle, and Antelope creeks in the Sacramento River basin; the lower San Joaquin River to the confluence with the Merced River, including its tributaries, and the waterways of the Delta. The critical habitat is degraded, and does not provide the conservation value necessary for species recovery. In addition, the Sacramento-San Joaquin River Delta provides very little function necessary for juvenile steelhead rearing and smoltification. The spawning PCE is subject to variations in flows and temperatures, particularly over the summer months. The rearing PCE is degraded by channelized, leveed and riprapped river reaches, and sloughs common in the Sacramento-San Joaquin system. These areas typically have low habitat complexity, low abundance of food organisms, offer little protection from fish or avian predators and commonly have elevated temperatures. The current conditions of migration corridors are substantially degraded. Both migration and rearing PCEs have reduced water quality from several contaminants introduced by dense urbanization and agriculture along the mainstems and in the Delta. In the Sacramento River, the migration corridor for both juveniles and adults is obstructed by the Red Bluff Diversion Dam gates from May 15 through September 15. The migration PCE is also obstructed by complex channel configuration making it difficult for fish to migrate successfully to the western Delta and the ocean. State and Federal pumps and associated fish facilities alter flows in the Delta and impede and obstruct a functioning migration corridor. The estuarine PCE in the Delta is affected by contaminants from agricultural and urban runoff and release of wastewater treatment plants effluent. However, some complex, productive habitats with floodplains remain in the system and flood bypasses (i.e., Yolo and Sutter bypasses).

Steelhead (Central California Coast)

NMFS listed the Central California Coast steelhead as threatened on August 18, 1997 (62 FR 43937), and reaffirmed their status on January 5, 2006 (71 FR 834). We used information available in status reviews (Good *et al.* 2005, Ford 2011, NMFS 2011), the recovery outline (NMFS 2007b), "An analysis of historical population structure for evolutionarily significant units of Chinook salmon, coho salmon, and steelhead in the North-Central California Coast Recovery Domain" (Bjorkstedt *et al.* 2005) and listing documents (61 FR 41541, 62 FR 43937; 71 FR 834) to summarize the status of the species.

Distribution

The Central California Coast steelhead DPS includes all naturally spawned populations of steelhead in coastal streams from the Russian River to Aptos Creek; the drainages of San Francisco, San Pablo, and Suisun Bays eastward to Chipps Island at the confluence of the

Sacramento and San Joaquin Rivers; and tributary streams to Suisun Marsh including Suisun Creek, Green Valley Creek, and an unnamed tributary to Cordelia Slough (commonly referred to as Red Top Creek). The DPS does not include the Sacramento-San Joaquin River Basin of the California Central Valley. Two artificial propagation programs are considered part of the DPS: the Don Clausen Fish Hatchery, and Kingfisher Flat Hatchery/Scott Creek (Monterey Bay Salmon and Trout Project).

Status

Factors contributing to the listing of this DPS include the generalized listing factors for West Coast salmon (i.e., destruction and modification of habitat, overutilization for recreational purposes, and natural and human-made factors), as well as the more specific issue of sedimentation and channel restructuring due to floods. Spatial structure has been reduced throughout the DPS. Impassible dams have cut off substantial portions of habitat in some basins and it is estimated that 22 percent of the DPS's historical habitat has been lost behind (primarily man-made) barriers, including significant portions of the upper Russian River. Long-term population sustainability is extremely low for the southern populations in the Santa Cruz Mountains and in the San Francisco Bay, and declines in juvenile southern populations are consistent with the more general estimates of declining abundance in the region. The interior Russian River population may be able to be sustained over the long-term, but hatchery management has eroded the population's genetic diversity. Though the information for individual populations is limited, available information strongly suggests that no population is viable. Based on these factors, this DPS would likely have a low resilience to additional perturbations.

Critical Habitat

Designated critical habitat for the Central California coast steelhead DPS includes the Russian River watershed, coastal watersheds in Marin County, streams within the San Francisco Bay, and coastal watersheds in the Santa Cruz Mountains, southeast to Aptos Creek. The spawning PCE have reduced quality throughout the critical habitat; sediment fines in spawning gravel have reduced the ability of the substrate attribute to provide well-oxygenated and clean water to eggs and alevins. The forage PCE has been degraded in some areas where high proportions of fines in bottom substrate limit the production of aquatic stream insects adapted to high velocity water. Elevated water temperatures and impaired water quality have further reduced the quality, quantity and function of the rearing PCE within most streams. These impacts have diminished the ability of designated critical habitat to conserve the Central California Coast steelhead.

Steelhead (Lower Columbia River)

NMFS listed Lower Columbia River steelhead as threatened on March 19, 1998 (63 FR 13347), and reaffirmed their status on January 5, 2006 (71 FR 834). We used information available in status reviews (Busby *et al.* 1996, Good *et al.* 2005, Ford 2011, NMFS 2011d), recovery plans (Lower Columbia Fish Recovery Board 2010, Oregon Department of Fish and Wildlife 2010, NMFS 2013d) and listing documents (61 FR 41541, 63 FR 13347, 71 FR 834) to summarize the status of the species.

Distribution

The Lower Columbia River steelhead DPS includes all naturally spawned steelhead populations below natural and manmade impassable barriers in streams and tributaries to the Columbia River between the Cowlitz and Wind Rivers, Washington, and the Willamette and Hood Rivers, Oregon. The DPS also includes seven hatchery populations.

Status

Factors contributing to the listing of this DPS include the generalized listing factors for West Coast salmon (i.e., destruction and modification of habitat, overutilization for recreational purposes, and natural and human-made factors), as well as the more specific issue of genetic introgression from hatchery stocks. Spatial structure remains relatively high for most populations (Lower Columbia Fish Recovery Board 2010, Oregon Department of Fish and Wildlife 2010). Except in the North Fork Lewis subbasin, where dams have impeded access to historical spawning habitat, most summer-run steelhead populations continue to have access to historical production areas in forested, mid- to-high-elevation subbasins that remain largely intact.

Out of the 23 populations in this DPS, 16 are considered to have a low or very low probability of persisting over the next 100 years, and six populations have a moderate probability of persistence (Lower Columbia Fish Recovery Board 2010, Oregon Department of Fish and Wildlife 2010). Only the summer-run Wind population is considered viable. The low to very low baseline persistence probabilities of most Lower Columbia River steelhead populations reflects low abundance and productivity. In addition, it is likely that genetic and life history diversity has been reduced because of pervasive hatchery effects and population bottlenecks. Although current Lower Columbia River steelhead populations are depressed compared to historical levels and long-term trends show declines, many populations are substantially healthier than their salmon counterparts, typically because of better habitat conditions in core steelhead production areas (Lower Columbia Fish Recovery Board 2010). Based on these factors, this DPS would likely have a moderate resilience to additional perturbations

Critical Habitat

Designated critical habitat for the Central California coast steelhead DPS includes the Russian River watershed, coastal watersheds in Marin County, streams within the San Francisco Bay, and coastal watersheds in the Santa Cruz Mountains, southeast to Aptos Creek. The spawning PCE have reduced quality throughout the critical habitat; sediment fines in spawning gravel have reduced the ability of the substrate attribute to provide well-oxygenated and clean water to eggs and alevins. The forage PCE has been degraded in some areas where high proportions of fines in bottom substrate limit the production of aquatic stream insects adapted to high velocity water. Elevated water temperatures and impaired water quality have further reduced the quality, quantity and function of the rearing PCE within most streams. These impacts have diminished the ability of designated critical habitat to conserve the Central California Coast steelhead.

Steelhead (Middle Columbia River)

NMFS listed Middle Columbia River steelhead as threatened on March 25, 1999 (64 FR 14517), and reaffirmed their threatened status on January 5, 2006 (71 FR 834). We used information available in status reviews (Busby *et al.* 1996, Good *et al.* 2005, Ford 2011, NMFS 2011), the recovery plan (NMFS 2009b) and listing documents (63 FR 11798, 64 FR 14517, 71 FR 834) to summarize the status of the species.

Distribution

The Middle Columbia River steelhead DPS includes all naturally spawned steelhead populations below natural and manmade impassable barriers in streams from above the Wind River, Washington, and the Hood Rivers, Oregon and upstream to, and including, the Yakima River, Washington, excluding *O. mykiss* from the Snake River Basin. The DPS also includes seven artificial propagation programs. Steelhead from the Snake River basin are not included in this DPS.

Status

Factors contributing to the listing of this DPS include the generalized listing factors for West Coast salmon (i.e., destruction and modification of habitat, overutilization for recreational purposes, and natural and human-made factors), as well as impacts from artificial propagation. NMFS considers spatial structure and diversity of the DPS to be at moderate risk. Relative to the brood cycle just prior to listing (1992 to 1996 spawning year), current brood cycle (five-year geometric mean) natural abundance is substantially higher (more than twice) for seven of the populations, lower for three, and at similar levels for four populations. Three populations have insufficient data to calculate long-term trends. Short-term trends are positive for all but three populations. Viability ratings for the 17 populations are: four viable, seven maintained, one highly variable and five high risk. Impacts from Tribal fisheries targeting Chinook salmon continue to harvest approximately five percent of summer-run steelhead in the Middle Columbia, Upper Columbia and Snake River Basins per year. Based on these factors, this DPS would likely have a moderate resilience to additional perturbations.

Critical Habitat

Designated critical habitat for the Middle Columbia River steelhead DPS includes the following subbasins: Upper Yakima, Naches, Lower Yakima, Middle Columbia/Lake Wallula, Walla Walla, Umatilla, Middle Columbia/Hood, Klickitat, Upper John Day, North Fork John Day, Middle Fork John Day, Lower John Day, Lower Deschutes, Trout, the Upper Columbia/Priest Rapids subbasins, and the Columbia River corridor. The current condition of Middle Columbia River critical habitat is moderately degraded. Quality of juvenile rearing and migration PCEs has been reduced in several watersheds and in the mainstem Columbia River by contaminants from agriculture that affect both water quality and food production. Loss of riparian vegetation from grazing has resulted in high water temperatures in the John Day basin. Reduced quality of the rearing PCEs has diminished its contribution to the conservation value necessary for the recovery of the species. Several dams affect adult migration PCE by obstructing the migration corridor.

Steelhead (Northern California)

NMFS listed Northern California steelhead as threatened on June 7, 2000 (65 FR 36074), and reaffirmed their status on January 5, 2006 (71 FR 834). We used information available in status reviews (Busby *et al.* 1996, Good *et al.* 2005, NMFS 2011b), the recovery outline (NMFS 2007c), “An analysis of historical population structure for evolutionarily significant units of Chinook salmon, coho salmon, and steelhead in the North-Central California Coast Recovery Domain” (Bjorkstedt *et al.* 2005), “A framework for assessing the viability of Threatened and Endangered Salmon and Steelhead in the North-central California Coast Recovery Domain” (Spence *et al.* 2008) and listing documents (61 FR 41541, 62 FR 43937; 71 FR 834) to summarize the status of the species.

Distribution

The Northern California steelhead DPS includes all naturally spawned steelhead populations below natural and manmade impassable barriers in California coastal river basins from Redwood Creek southward to, but not including, the Russian River. The DPS also includes two artificial propagation programs: the Yeager Creek Hatchery and the North Fork Gualala River Hatchery (Gualala River Steelhead Project).

Status

Factors contributing to the listing of this DPS include the generalized listing factors for West Coast salmon (i.e., destruction and modification of habitat, overutilization for recreational purposes, and natural and human-made factors), as well as the more specific issue of the introduction of a salmonid predator, the Sacramento pikeminnow (formerly known as Sacramento squawfish (*Ptychocheilus grandis*), and concern about the influence of hatchery stocks on native fish (i.e., genetic introgression and ecological interactions). Overall, spatial structure of the DPS is relatively intact and all diversity strata appear to be represented by extant populations. However, spatial structure and distribution within most watersheds has been adversely affected by barriers and high water temperatures.

The scarcity of time series of abundance at the population level spanning more than a few years hinders assessment of the DPS’s status; population level estimates of abundance are available for four of the 42 winter-run populations and for one of the 10 summer-run populations. Trend information from the available datasets suggests a mixture of patterns, with slightly more populations showing declines than increases, though few of these trends are statistically significant. Where population level estimates of abundance are available, only the Middle Fork Eel River summer-run populations are considered to have a low-risk of extinction. The remaining populations for which adult abundance has been estimated appear to be at either moderate- or high-risk of extinction. Although surveys within the summer-run steelhead watersheds do not encompass all available summer habitats, the chronically low numbers observed during surveys suggest that those populations are likely at high risk of extinction. The high number of hatchery fish in the Mad River basin, coupled with uncertainty regarding relative abundances of hatchery and wild spawners is also of concern. Based on these factors, this DPS would likely have a low resilience to additional perturbations.

Critical Habitat

Designated critical habitat for the Northern California steelhead DPS includes the following CALWATER hydrological units: Redwood Creek, Trinidad, Mad River, Eureka Plain, Eel River, Cape Mendocino, and the Mendocino Coast. The total area of critical habitat includes about

3,000 miles of stream habitat and about 25 square miles of estuarine habitat, mostly within Humboldt Bay. The current condition of designated critical habitat is moderately degraded. Portions of the rearing PCE, especially the interior Eel River, are affected by elevated temperatures from riparian vegetation removal. Spawning PCE attributes (i.e., the quality of substrate that supports spawning, incubation and larval development) have been generally degraded throughout designated critical habitat by silt and sediment fines. The adult migration PCE function has been reduced by bridges and culverts that restrict access to tributaries in many watersheds, especially in watersheds with forest road construction.

Steelhead (Puget Sound)

NMFS listed Puget Sound steelhead as threatened on May 11, 2007 (72 FR 26722). We used information available in status reviews (NMFS 2005, 2007, Ford 2011, NMFS 2011), the recovery outline (NMFS 2013b), and previously issued Biological Opinions to summarize the status of the species.

Distribution

This Puget Sound DPS includes all naturally spawned anadromous winter-run and summer-run steelhead in the river basins of Strait of Juan de Fuca, Puget Sound and Hood Canal, Washington. The DPS is bounded to the west by the Elwha River (inclusive) and to the north by the Nooksack River and Dakota Creek (inclusive). Hatchery production of steelhead is widespread throughout the DPS, but only two artificial propagation programs are included in the DPS. On April 14, 2014NMFS changed the number of artificial propagation programs included in the DPS to six (79 FR 20802).

Status

Factors contributing to the listing of this DPS include habitat loss and degradation from damming, agricultural practices, and urbanization; historic overexploitation; predation; poor oceanic and climatic conditions; and impacts from artificial propagation. Spatial structure, complexity and connectivity have been reduced throughout the DPS. Most populations of steelhead in Puget Sound have declining estimates of mean population growth rates (typically three to 10 percent annually) and extinction risk within 100 years for most populations is estimated to be moderate to high. Effects of hatchery fish on the natural populations remain unknown. Based on these factors, this DPS would likely have a low resilience to additional perturbations.

Critical Habitat

The specific areas proposed for designation for Puget Sound steelhead include approximately1,880 mi (3,026 km) of freshwater and estuarine habitat in Puget Sound, Washington.

These sites in turn contain physical or biological features essential to the conservation of the DPS (for example, spawning gravels, water quality and quantity, side channels, forage species). Specific types of sites and the features associated with them (both of which are referred to as PCEs) include the following:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
3. Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.
4. Estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.
5. Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.
6. Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

Though the physical or biological features of critical habitat proposed for Puget Sound steelhead are the same as those designated for Puget Sound Chinook and Hood Canal summer-run chum, watershed conservation values for steelhead may be different because of differences in population structure and habitat use.

Steelhead (Snake River Basin)

NMFS listed Snake River Basin steelhead as threatened on August 18, 1997 (62 FR 43937), and reaffirmed their status on January 5, 2006 (71 FR 834). We used information available in status reviews (Good *et al.* 2005, Ford 2011, NMFS 2011) and listing documents (62 FR 43937, 71 FR 834) to summarize the status of the species.

Distribution

The Snake River basin steelhead DPS includes all naturally spawned steelhead populations below natural and man-made impassable barriers in streams in the Columbia River Basin upstream from the Yakima River, Washington, to the U.S./Canada border. Six artificial propagation programs are also included in the DPS.

Status

Factors contributing to the listing of this DPS include the generalized listing factors for West Coast salmon (i.e., destruction and modification of habitat, overutilization for recreational purposes, and natural and human-made factors), and, more specifically, widespread habitat blockage from hydrosystem management and potentially deleterious genetic effects from straying and introgression from hatchery fish. The level of natural production in the two populations with full data series and one of the index areas is encouraging, but the status of most populations in the DPS remains highly uncertain. The DPS is not currently considered to be viable due to high-risk population ratings, uncertainty about the viability status of many populations, and overall lack of population data. A great deal of uncertainty remains regarding the relative proportion of hatchery fish in natural spawning areas near major hatchery release sites. Based on these factors, this DPS would likely have a low resilience to additional perturbations.

Critical Habitat

Designated critical habitat for the Snake River Basin steelhead DPS includes the following subbasins: Hells Canyon, Imnaha River, Lower Snake/Asotin, Upper Grand Ronde River, Wallowa River, Lower Grand Ronde, Lower Snake/Tucannon, Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, Upper Middle Fork Salmon, Lower Middle Fork Salmon, Middle Salmon, South Fork Salmon, Lower Salmon, Little Salmon, Upper and Lower Selway, Lochsa, Middle and South Fork Clearwater, and the Clearwater subbasins, and the Lower Snake/Columbia River corridor. The current condition of critical habitat designated for Snake River basin steelhead is moderately degraded. Critical habitat is affected by reduced quality of juvenile rearing and migration PCEs within many watersheds. Contaminants from agriculture affect both water quality and food production in several watersheds and in the mainstem Columbia River. Loss of riparian vegetation to grazing has resulted in high water temperatures in the John Day basin. These factors have substantially reduced the rearing PCEs' contribution to the conservation value necessary for species recovery. Several dams affect adult migration PCE by obstructing the migration corridor.

Steelhead (South Central California coast)

NMFS listed South-Central California Coast steelhead as threatened August 18, 1997 (62 FR 43937), and reaffirmed their status on January 5, 2006 (71 FR 834). We used information available in status reviews (Busby *et al.* 1996, Good *et al.* 2005, NMFS 2011, Williams *et al.* 2011), the recovery plan (NMFS 2013d), "Steelhead of the South-central/Southern California coast: population characterization for recovery planning" (Boughton *et al.* 2006), "Viability criteria for steelhead of the South-central and Southern California Coast" (Boughton *et al.* 2007), listing documents (61 FR 41541, 62 FR 43937; 71 FR 834), and previously issued Biological Opinions to summarize the status of the species.

Distribution

The South-central California coast steelhead DPS includes all naturally spawned steelhead populations in streams from the Pajaro River watershed (inclusive) to, but not including, the Santa Maria River, (71 FR 5248) in northern Santa Barbara County, California. There are no artificially propagated steelhead stocks within the range of the DPS.

Status

Factors contributing to the listing of this DPS include the generalized listing factors for West Coast salmon (i.e., destruction and modification of habitat, overutilization for recreational purposes, and natural and human-made factors), as well as the more specific concerns about genetic effects from widespread stocking of rainbow trout. The DPS consists of 12 discrete sub-populations that represent localized groups of interbreeding individuals. None of these sub-populations are considered viable. Most of the sub-populations are characterized by low population abundance, variable or negative population growth rates, and reduced spatial structure and diversity. Though steelhead are present in most streams in the DPS, their populations are small, fragmented, and unstable, or more vulnerable to stochastic events. In addition, severe habitat degradation and the compromised genetic integrity of some populations pose a serious risk to the survival and recovery of the DPS. The DPS is in danger of extinction. Based on these factors, this DPS would likely have a low resilience to additional perturbations.

Critical Habitat

NMFS designated critical habitat for South-Central California Coast steelhead on September 2, 2005 (70 FR 52488). Specific geographic areas designated include the following CALWATER hydrological units: Pajaro River, Carmel River, Santa Lucia, Salinas River and Estero Bay. These areas are important for the species' overall conservation by protecting quality growth, reproduction and feeding. The critical habitat designation for this species identifies primary constituent elements that include sites necessary to support one or more steelhead life stages. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, nearshore marine habitat and estuarine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions and floodplain connectivity. The critical habitat designation (70 FR 52488) contains additional details on the sub-areas that are included as part of this designation and the areas that were excluded from designation.

In total, South-Central California Coast steelhead occupy 30 watersheds (fresh water and estuarine). The total area of habitat designated as critical includes about 1,250 miles of stream habitat and about 3 square miles of estuarine habitat (e.g., Morro Bay). This designation includes the stream channels within the designated stream reaches and includes a lateral extent as defined by the ordinary high water line. In areas where the ordinary high-water line is not defined, the lateral extent is defined as the bankfull elevation. In estuarine areas the lateral extent is defined by the extreme high water because extreme high tide areas encompass those areas typically inundated by water and regularly occupied by juvenile salmon during the spring and summer, when they are migrating in the nearshore zone and relying on cover and refuge qualities provided by these habitats and while they are foraging. Of the 30 watersheds reviewed in NMFS' assessment of critical habitat for South-Central California Coast steelhead, six watersheds received a low rating of conservation value, 11 received a medium rating and 13 received a high rating of conservation value for the species.

Migration and rearing PCEs are degraded throughout designated critical habitat by elevated stream temperatures and contaminants from urban and agricultural areas. The estuarine PCE is impacted due to breaching of estuarine areas, removal of structures, and contaminants.

Steelhead (Southern California)

NMFS listed the Southern California steelhead as endangered on August 18, 1997 (62 FR 43937), and reaffirmed their status on January 5, 2006 (71 FR 834). We used information available in status reviews (Busby *et al.* 1996, Good *et al.* 2005, NMFS 2011, Williams *et al.* 2011), the recovery plan (NMFS 2012c), "Contraction of the southern range limit for anadromous Oncorhynchus mykiss" (Boughton *et al.* 2005) and listing documents (62 FR 43937; 71 FR 834) to summarize the status of the species.

Distribution

The Southern California Steelhead DPS includes all naturally spawned populations of steelhead in streams from the Santa Maria River, San Luis Obispo County, California (inclusive) to the U.S.-Mexico Border (62 FR 43937; 67 FR 21586). No artificially propagated steelhead stocks are currently recognized within the range of the DPS.

Status

Factors contributing to the listing of this DPS include the generalized listing factors for West Coast salmon (i.e., destruction and modification of habitat, overutilization for recreational purposes, and natural and human-made factors), as well as the more specific concern about the widespread, dramatic declines in abundance relative to historical levels. Construction of dams and a corresponding increase in water temperatures have excluded steelhead distribution in many watersheds throughout southern California. Streams in southern California containing steelhead have declined over the last decade, with a southward proportional increase in loss of populations. Consequently, the DPS has experienced a contraction of its southern range. This range contraction affects the DPS's ability to maintain genetic and life history diversity for adaptation to environmental change. The 2005 status review concluded the chief causes for the DPS's decline include urbanization, water withdrawals, channelization of creeks, human-made barriers to migration, and the introduction of exotic fishes and riparian plants. The most recent status review indicates these threats are essentially unchanged and the species remains in danger of extinction. Based on these factors, this DPS would likely have a very low resilience to additional perturbations.

Critical Habitat

NMFS designated critical habitat for Southern California steelhead on September 2, 2005 (70 FR 52488). Specific geographic areas designated include the following CALWATER hydrological units: Santa Maria River, Santa Ynez, South Coast, Ventura River, Santa Clara Calleguas, Santa Monica Bay, Callequas and San Juan hydrological units. These areas are important for the species' overall conservation by protecting quality growth, reproduction and feeding. The critical habitat designation for this species identifies primary constituent elements that include sites necessary to support one or more steelhead life stages. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, nearshore marine habitat and estuarine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions and floodplain connectivity. The critical habitat designation (70 FR 52488) contains additional details on the sub-areas that are included as part of this designation and the areas that were excluded from designation.

In total, Southern California steelhead occupy 32 watersheds (fresh water and estuarine). The total area of habitat designated as critical includes about 700 miles of stream habitat and about 22 square miles of estuarine habitat, mostly within Humboldt Bay. This designation includes the stream channels within the designated stream reaches and includes a lateral extent as defined by the ordinary high water line. In areas where the ordinary high-water line is not defined, the lateral extent is defined as the bankfull elevation. In estuarine areas the lateral extent is defined by the extreme high water because extreme high tide areas encompass those areas typically inundated by water and regularly occupied by juvenile salmon during the spring and summer, when they are migrating in the nearshore zone and relying on cover and refuge qualities provided by these habitats and while they are foraging. Of the 32 watersheds reviewed in NMFS' assessment of critical habitat for Southern California steelhead, five watersheds received a low rating of conservation value, six received a medium rating and 21 received a high rating of conservation value for the species.

All PCEs have been affected by degraded water quality by pollutants from densely populated areas and agriculture within the DPS. Elevated water temperatures impact rearing and juvenile migration PCEs in all river basins and estuaries. Rearing and spawning PCEs have been affected throughout the DPS by water management or reduction in water quantity. The spawning PCE has been affected by the combination of erosive geology features and land management activities that have resulted in excessive fines in spawning gravel of most rivers.

Steelhead (Upper Columbia River)

NMFS originally listed Upper Columbia River steelhead as endangered on August 18, 1997 (62 FR 43937). NMFS changed the listing to threatened on January 5, 2006 (71 FR 834). We used information available in status reviews (Good et al. 2005, Ford 2011, NMFS 2011), the recovery plan (Upper Columbia Salmon Recovery Board 2007) and listing documents (62 FR 43937; 71 FR 834; 74 FR 42605to summarize the status of the species.

Distribution

The Upper Columbia River steelhead DPS includes all naturally spawned steelhead populations below natural and man-made impassable barriers in streams in the Columbia River basin upstream from the Yakima River, Washington, to the U.S.-Canada border. The DPS also includes six artificial propagation programs.

Status

After litigation resulting in a change in the DPS' status to endangered and then again to threatened. On August 24, 2009, NMFS reaffirmed the species' status as threatened (74 FR 42605). Factors contributing to the listing of this DPS include the generalized listing factors for West Coast salmon (i.e., destruction and modification of habitat, overutilization for recreational purposes, and natural and human-made factors), as well as the more specific issues of extremely low estimates of adult replacement ratios, habitat degradation, juvenile and adult mortality in the hydrosystem, unfavorable marine and freshwater environmental conditions, overharvest, and genetic homogenization from composite broodstock collections. Though steelhead in the DPS must pass over several dams to access spawning areas, three of the four populations are rated as low risk for spatial structure. The proportions of hatchery-origin returns in natural spawning areas remain extremely high across the DPS and continue to be a major concern. Though there has been an increase in abundance and productivity for all populations, the improvements have been minor, and none of the populations meet recovery criteria. All populations remain at high risk of extinction and the DPS, as a whole, is not viable. Based on these factors, this DPS would likely have a low resilience to additional perturbations.

Critical Habitat

NMFS designated critical habitat for Upper Columbia River steelhead on September 2, 2005 (70 FR 52630). Designated critical habitat includes the following subbasins: Chief Joseph, Okanogan, Similkameen, Methow, Upper Columbia/Entiat, Wenatchee, Lower Crab, and the Upper Columbia/Priest Rapids subbasins and the Columbia River corridor. These areas are important for the species' overall conservation by protecting quality growth, reproduction and feeding. The critical habitat designation for this species identifies primary constituent elements that include sites necessary to support one or more steelhead life stages. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, nearshore marine habitat and estuarine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions and floodplain connectivity. The final rule (70 FR 52630) lists the watersheds that comprise the designated subbasins and any areas that are specifically excluded from the designation.

There are 42 watersheds within the range of Upper Columbia River steelhead. The total area of habitat designated as critical includes about 1,250 miles of stream habitat. This designation includes the stream channels within the designated stream reaches and includes a lateral extent as defined by the ordinary high water line. In areas where the ordinary high-water line is not defined, the lateral extent is defined as the bankfull elevation. Of the 42 watersheds reviewed in NMFS' assessment of critical habitat for Upper Columbia River steelhead, three watersheds received a low rating of conservation value, eight received a medium rating and 31 received a high rating of conservation value for the species. In addition, the Columbia River rearing/migration corridor downstream of the spawning range was rated as a high conservation value. Limiting factors identified for the Upper Columbia River steelhead include: mainstem Columbia River hydropower system mortality, reduced tributary stream flow, tributary riparian degradation and loss of in-river wood, altered tributary floodplain and channel morphology and excessive fine sediment and degraded tributary water quality.

Currently, designated critical habitat is moderately degraded. Habitat quality in tributary streams varies from excellent in wilderness and roadless areas, to poor in areas subject to heavy agricultural and urban development. The water quality and food production features of juvenile rearing and migration PCEs in several watersheds and the mainstem Columbia River have been degraded by contaminants from agriculture. Several dams affect the adult migration PCE by obstructing the migration corridor.

Steelhead (Upper Willamette River)

NMFS originally listed Upper Willamette steelhead as threatened on March 25, 1999 (64 FR 14517), and reaffirmed their status on January 5, 2006 (71 FR 834). We used information available in status reviews (Busby *et al.* 1996, Good *et al.* 2005, Ford 2011, NMFS 2011), the recovery plan (Oregon Department of Fish and Wildlife and NMFS 2011) and listing documents (64 FR 14517; 71 FR 834) to summarize the status of the species.

Distribution

The Upper Willamette River steelhead DPS includes all naturally spawned winter-run steelhead populations below natural and manmade impassable barriers in the Willamette River, Oregon, and its tributaries upstream from Willamette Falls to the Calapooia River (inclusive). No artificially propagated populations are included in the DPS. Hatchery summer-run steelhead occur in the Willamette Basin, but they are an out-of-basin population and not included in the DPS.

Status

Factors contributing to the listing of this DPS include the generalized listing factors for West Coast salmon (i.e., destruction and modification of habitat, overutilization for recreational purposes, and natural and human-made factors), as well as the more specific issues of damming, water diversions, poor ocean conditions and overharvest. Though access to historical spawning grounds has been lost behind dams, the DPS remains spatially well distributed. Three populations are considered to be in the moderate to high-risk category for spatial structure and one is in the low risk category. The DPS continues to demonstrate an overall low abundance pattern. The elimination of winter-run hatchery releases reduces threats from artificial propagation, but non-native summer steelhead hatchery releases are still a concern. Human population growth within the Willamette Basin continues to be a significant risk factor for the populations. This DPS remains at a moderate risk of extinction. Based on these factors, this DPS would likely have a moderate resilience to additional perturbations.

A major threat to Willamette River steelhead results from artificial production practices. Fish ways built at Willamette Falls in 1885 have allowed Skamania-stock summer steelhead and early-migrating winter steelhead of Big Creek stock to enter the range of Upper Willamette River steelhead. The population of summer steelhead is almost entirely maintained by hatchery salmon, although natural-origin, Big Creek-stock winter steelhead occur in the basin (Howell *et al.* 1985). In recent years, releases of winter steelhead are primarily of native stock from the Santiam River system.

Critical Habitat

NMFS designated critical habitat for Upper Willamette River steelhead on September 2, 2005 (70 FR 52488). Designated critical habitat includes the following subbasins: Upper Willamette, North Santiam, South Santiam, Middle Willamette, Molalla/Pudding, Yamhill, Tualatin, and the Lower Willamette subbasins and the lower Willamette/Columbia River corridor. These areas are important for the species' overall conservation by protecting quality growth, reproduction and feeding. The critical habitat designation for this species identifies primary constituent elements that include sites necessary to support one or more steelhead life stages. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, nearshore marine habitat and estuarine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions and floodplain connectivity. The final rule (70 FR 52630) lists the watersheds that comprise the designated subbasins and any areas that are specifically excluded from the designation.

There are 38 watersheds within the range of Upper Willamette River steelhead. The total area of habitat designated as critical includes about 1,250 miles of stream habitat. This designation includes the stream channels within the designated stream reaches and includes a lateral extent as defined by the ordinary high water line. In areas where the ordinary high-water line is not defined, the lateral extent is defined as the bankfull elevation. Of the 38 watersheds reviewed in NMFS' assessment of critical habitat for Upper Willamette River steelhead, 17 watersheds received a low rating of conservation value, six received a medium rating and 15 received a high rating of conservation value for the species. In addition, the lower Willamette/Columbia River rearing/migration corridor downstream of the spawning range was rated as a high conservation value.

Designated critical habitat is currently degraded. The water quality and food production features of juvenile rearing and migration PCEs in several watersheds and the mainstem Columbia River have been degraded by contaminants from agriculture. Several dams affect the adult migration PCE by obstructing the migration corridor.

3.2.36 Sturgeon, Atlantic

We discuss the distribution, life history, population dynamics, status, and critical habitats of the five species (here we use the word "species" to apply to DPSs) separately; however, because listed Atlantic sturgeon species are virtually indistinguishable in the wild and comprise the same biological species, we begin this section describing characteristics common across DPSs. We used information available in the 2007 Atlantic Sturgeon Status Review (NMFS 2007d) and the listing documents (77 FR 5880, 77 FR 5914) to summarize the status of the species.

Distribution

The range of Atlantic sturgeon includes the St. John River in Canada, to St. Johns River in Florida. Five DPSs of Atlantic sturgeon were designated and listed under the ESA on February 6, 2012 (Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic) (77 FR 5880, 77 FR 5914).

Historically, Atlantic sturgeon were present in approximately 38 rivers in the United States from St. Croix, Maine to the Saint Johns River, Florida, of which 35 rivers have been confirmed to have had a historical spawning population. Atlantic sturgeon are currently present in approximately 32 of these rivers, and spawning occurs in at least 20 of them.

There are only two Atlantic sturgeon populations for which size estimates are available - the Hudson River and the Altamaha River populations. In 1995, sampling crews on the Hudson River estimated that there were 9,500 juvenile Atlantic sturgeon in the estuary. Since 4,900 of these were stocked hatchery-raised fish, about 4,600 fish were thought to be of wild origin. The mean annual spawning stock size (spawning adults) was estimated at 870 (600 males and 270 females). The Altamaha River supports one of the healthiest Atlantic sturgeon populations in the Southeast, with over 2,000 subadults captured in research surveys in the past few years, 800 of which were 1 to 2 years of age. The population appears to be stable.

Overharvest of Atlantic sturgeon historically led to widespread declines in abundance. Other current threats to Atlantic sturgeon populations include bycatch in fisheries; habitat degradation and loss from various human activities such as dredging, dams, water withdrawals and other development; habitat impediments including locks and dams (e.g., Cape Fear and Santee-Cooper Rivers); and ship strikes (e.g., Delaware and James Rivers).

As fish (exempting the few species of fish that can survive for short periods of time out of water), Atlantic sturgeon survive only in aquatic ecosystems and, therefore, depend on the quantity and quality of those aquatic systems. Adults spawn in freshwater in the spring and early summer and migrate into "estuarine" and marine waters where they spend most of their lives. In some southern rivers a fall spawning migration may also occur. They spawn in moderately flowing water (46-76 cm/s) in deep parts of large rivers. Sturgeon eggs are highly adhesive and are deposited on bottom substrate, usually on hard surfaces (e.g., cobble). It is likely that cold, clean water is important for proper larval development. Once larvae begin migrating downstream, they use benthic structure (especially gravel matrices) as refuges. Juveniles usually reside in estuarine waters for months to years.

Subadults and adults live in coastal waters and estuaries when not spawning, generally in shallow (10-50 m depth) nearshore areas dominated by gravel and sand substrates. Long distance migrations away from spawning rivers are common.

Sturgeon, Atlantic (Carolina)

The Carolina DPS is listed as endangered (77 FR 5914).

Distribution

The Carolina DPS includes the following: all Atlantic sturgeon that spawn or are spawned in the watersheds (including all rivers and tributaries) from Albemarle Sound southward along the southern Virginia, North Carolina and South Carolina coastal areas to Charleston Harbor. The marine range of Atlantic sturgeon from the Carolina DPS extends from the Hamilton Inlet, Labrador, Canada, to Cape Canaveral, Florida. The Carolina DPS also includes Atlantic sturgeon held in captivity (e.g., aquaria, hatcheries, and scientific institutions) and which are identified as fish belonging to the Carolina DPS based on genetics analyses, previously applied tags, previously applied marks, or documentation to verify that the fish originated from (hatched in) a river within the range of the Carolina DPS, or is the progeny of any fish that originated from a river within the range of the Carolina DPS.

Status

The Carolina DPS has been reduced to a fraction of its historical levels by past commercial harvest. Although there is no longer a commercial fishery, the species still faces threats throughout its range. Threats to the Carolina DPS include habitat loss due to dams, dredging, degraded water quality and incidental capture in fisheries. Climate change is also expected to exacerbate water quantity and quality problems like elevated water temperatures and lower levels of dissolved oxygen (77 FR 5914). Many of these threats are expected to continue into the future (e.g., dredging, dams, fisheries bycatch), or even grow worse (e.g., climate change). Low population numbers of every river population in the Carolina DPS put them in danger of extinction; none of the populations are large or stable enough to provide with any level of certainty for continued existence of Atlantic sturgeon in this part of its range. The loss of any one riverine spawning population within the DPS will result in a decrease in genetic diversity, reduction in the number of reproducing individuals, a gap in the range of the DPS that is unlikely to be recolonized and lower recruitment. NMFS concludes that the resiliency of the Carolina DPS to further perturbations is low.

Sturgeon, Atlantic (Chesapeake Bay)

The Chesapeake Bay DPS is listed as endangered (77 FR 5880).

Distribution

The Chesapeake Bay DPS includes the following: all anadromous Atlantic sturgeon that are spawned in the watersheds that drain into the Chesapeake Bay and into coastal waters from the Delaware-Maryland border on Fenwick Island to Cape Henry, VA, as well as wherever these fish occur in coastal bays and estuaries and the marine environment. Within this range, Atlantic sturgeon have been documented from the James, York, Potomac, Rappahannock, Pocomoke, Choptank, Little Choptank, Patapsco, Nanticoke, Honga, and South rivers as well as the Susquehanna Flats. The marine range of Atlantic sturgeon from the Chesapeake Bay DPS extends from Labrador Inlet, Labrador, Canada to Cape Canaveral, FL. The Chesapeake Bay DPS also includes Atlantic sturgeon held in captivity (e.g., hatcheries, scientific institutions) and which are identified as fish belonging to the Chesapeake Bay DPS based on genetics analyses, previously applied tags, previously applied marks, or documentation to verify that the fish originated from (hatched in) a river within the range of the Chesapeake Bay DPS, or is the progeny of any fish that originated from a river within the range of the Chesapeake Bay DPS.

Status

The Chesapeake Bay DPS has been reduced to a fraction of its historical levels by overfishing. Although there is no longer a commercial fishery, the species still faces the threats described above throughout its range. Threats to the Chesapeake Bay DPS are the same as those facing the NYB DPS (see section 6.4.3, above); Atlantic sturgeon mortality from vessel strikes has been documented on the James River (NMFS 2007d). Many of these threats are expected to continue into the future (e.g., ship strikes, dredging, dams, fisheries bycatch). Low population numbers of every river population in the Chesapeake Bay DPS put them in danger of extinction; none of the populations are large or stable enough to provide with any level of certainty for continued existence of Atlantic sturgeon in this part of its range. The loss of any one riverine spawning population within the DPS will result in a decrease in genetic diversity, reduction in the number of reproducing individuals, a gap in the range of the DPS that is unlikely to be recolonized and lower recruitment. NMFS concludes that the resiliency of the Chesapeake Bay DPS to further perturbations is low

Sturgeon, Atlantic (Gulf of Maine)

The Gulf of Maine (GOM) DPS was listed as threatened (77 FR 5880).

Distribution

The Gulf of Maine DPS includes all Atlantic sturgeon that are spawned in the Gulf of Maine watersheds from the Maine/Canada border to Chatham, MA. A 4(d) Rule to apply take prohibitions to the Gulf of Maine DPS was proposed separately (76 FR 34023; June 10, 2011). The proposed rulemaking identified several activities that may take Gulf of Maine DPS Atlantic sturgeon, including incidental bycatch in fisheries, habitat alteration, and "entrainment and impingement of all life stages of GOM DPS Atlantic sturgeon during the operation of water diversions, dredging projects, and power plants…" (76 FR 34023).

The Gulf of Maine DPS also includes Atlantic sturgeon held in captivity (e.g., hatcheries, scientific institutions) and which are identified as fish belonging to the Gulf of Maine DPS based on genetics analyses, previously applied tags, previously applied marks, or documentation to verify that the fish originated from (hatched in) a river within the range of the Gulf of Maine DPS, or is the progeny of any fish that originated from a river within the range of the Gulf of Maine DPS.

Status

Threats to the Gulf of Maine DPS Atlantic sturgeon include dredging, which can displace sturgeon, alter habitat, and allow saltwater to intrude further upstream, reducing freshwater spawning habitat, water quality degradation from run-off, and bycatch in commercial and recreational fisheries. Dams are also a threat to the GOM DPS, but recent dam removals in the region have begun to restore access to spawning habitat. The Edwards Dam on the Kennebec River was removed in 1999 (Natural Resources Council of Maine website). Construction has been underway to remove the Veazie and Great Works dams by the Penobscot River Restoration Trust since 2012 (PRRT website).

The removal of dams on the Kennebec and Penobscot rivers is seen as a positive step towards restoring habitat, for this and other anadromous species in the area. Recent research has detected the presence of adults, age-1 fish and eggs in rivers where sturgeon were unknown to occur or had not been observed for many years. These observations suggest that abundance of the Gulf of Maine DPS of Atlantic sturgeon is sufficient such that recolonization to rivers historically suitable for spawning may be occurring. However, despite some positive signs, there is not enough information to establish a trend for this DPS. Still, in order to recover, this DPS of Atlantic sturgeon can only withstand low levels of anthropogenic mortality because as a threatened species, they are at risk of becoming endangered in the near future.

Sturgeon, Atlantic (New York Bight)

The New York Bight DPS for Atlantic sturgeon was listed as an endangered species under the

ESA on February 6, 2012 (77 FR 5880).

Distribution

The New York Bight (NYB) DPS is comprised of all Atlantic sturgeon that are spawned in watersheds that drain into the coastal waters from Chatham, MA, to the Delaware-Maryland border on Fenwick Island. The NYB DPS is listed as endangered (77 FR 5880).

Within this range, Atlantic sturgeon have been documented from the Hudson and Delaware rivers as well as at the mouth of the Connecticut and Taunton rivers, and throughout Long Island Sound. The marine range of Atlantic sturgeon from the NYB DPS extends from Hamilton Inlet, Labrador, Canada to Cape Canaveral, FL. The New York Bight DPS also includes Atlantic sturgeon held in captivity (e.g., hatcheries, scientific institutions) and which are identified as fish belonging to the NYB DPS based on genetics analyses, previously applied tags, previously applied marks, or documentation to verify that the fish originated from (hatched in) a river within the range of the New York Bight DPS, or is the progeny of any fish that originated from a river within the range of the New York Bight DPS.

Status

Threats to the New York Bight DPS include habitat loss and water quality degradation through dredging and run-off, and incidental capture in fisheries. In addition, vessel strikes are of particular concern for Atlantic sturgeon in the Delaware River. No critical habitat has been designated for this species.

Although the Hudson River is believed to support one of the more robust populations, the status of Atlantic sturgeon in other rivers of the New York Bight DPS is either unknown or severely depleted from historic levels. The threats facing the New York Bight DPS are expected to continue into the future. A loss of any one of the riverine populations within this DPS would represent a loss in the number of reproducing individuals, a gap in the range of the DPS, and fragmentation of the species' habitat.

Sturgeon, Atlantic (South Atlantic)

The South Atlantic DPS for Atlantic sturgeon was listed as an endangered species under the ESA on February 6, 2012 (77 FR 5914).

Distribution

The South Atlantic DPS includes the following: all Atlantic sturgeon that spawn or are spawned in the watersheds (including all rivers and tributaries) of the ACE (Ashepoo, Combahee, and Edisto) Basin southward along the South Carolina, Georgia, and Florida coastal areas to the St. Johns River, Florida. The marine range of Atlantic sturgeon from the South Atlantic DPS extends from the Hamilton Inlet, Labrador, Canada, to Cape Canaveral, Florida. The South Atlantic DPS also includes Atlantic sturgeon held in captivity (e.g., aquaria, hatcheries, and scientific institutions) and which are identified as fish belonging to the South Atlantic DPS based on genetics analyses, previously applied tags, previously applied marks, or documentation to verify that the fish originated from (hatched in) a river within the range of the South Atlantic DPS, or is the progeny of any fish that originated from a river within the range of the South Atlantic DPS.

Status

Threats to the South Atlantic DPS are similar to those faced by the Carolina DPS; see Section 6.6.3, above. These threats will likely continue into the future. Like the other Atlantic sturgeon DPSs, the South Atlantic DPS was severely depleted by overfishing, and what little is known about the current population in several rivers indicates that the populations are at low levels or have been extirpated. The loss of any one riverine spawning population within the DPS will result in a decrease in genetic diversity, reduction in the number of reproducing individuals, a gap in the range of the DPS that is unlikely to be recolonized and lower recruitment. NMFS concludes that the resiliency of the South Atlantic DPS to further perturbations is low. No critical habitat has been designated for this species.

3.2.37 Sturgeon, Green (Southern Population)

The southern population of Green sturgeon was listed as threatened on April 7, 2006 (75 FR 30714). We used information available in the Initiation of the 5-year Review (77 FR 64959), status reviews and the listing documents (56 FR 49653) to summarize the status of the species.

Distribution

Green sturgeon occur in coastal Pacific waters from San Francisco Bay to Canada. The Southern DPS of green sturgeon includes populations south of (and exclusive of) the Eel River (75 FR 30714).

Status

The southern population of Green sturgeon was listed as threatened primarily because of population declines caused by dams the prevented them from reaching spawning areas located above the dams (FWS 1995). A substantial amount of habitat in the Feather River above Oroville Dam also was lost, and threats to green sturgeon on the Feather River are similar to those faced in the Sacramento River (NMFS 2004).

The status reviews, proposed and final regulations to list green sturgeon as threatened did not identify water quality as a problem. Further, the published literature on green sturgeon provides limited information on the ecological relationship between green sturgeon and water quality. However, studies from other sturgeon demonstrates that sturgeon populations are limited by low levels of dissolved oxygen levels and high temperatures in the rivers, streams, and estuaries they occupy; juvenile anadromous sturgeon also depend on the freshwater-brackish interface in the tidal portion of rivers for nursery areas. Siberian sturgeon (*Acipenser baeri*), for example, appear to have a preferred temperature range between 17.2 and 21.5° C and preferred dissolved oxygen levels between 5.9 and 13.2 mg/l (Khakimullin 1987). White sturgeon in the Bliss Reach of the Snake River (upstream of Brownlee Reservoir) were caught in water with temperatures between 10 and 22°C and dissolved oxygen levels between 8 and 16 mg/l (Lepla and Chandler 1995). Temperatures of 26°C and dissolved oxygen levels of 3 mg/l killed all juvenile Atlantic sturgeon (*Acipenser oxyrinchus*) in five out of six replicates (Secor and Gunderson 1997) and dissolved oxygen levels of 2.5 mg/l killed all 25-day old shortnose sturgeon (*Acipenser brevirostrum*), 96% of 32-day old shortnose sturgeon, 86% of all 64-day old sturgeon, and 12% of 104- to 310-day old shortnose sturgeon (Jenkins *et al.* 1993).

Critical Habitat

On October 9, 2009, NMFS designated critical habitat for southern green sturgeon (74 FR 52300). The area identified as critical habitat is the entire range of the biological species, green sturgeon, from the Bering Sea, Alaska, to Ensenada, Mexico. Specific freshwater areas include the Sacramento River, Feather River, Yuba River and the Sacramento-San Joaquin Delta.

Specific coastal bays and estuaries include estuaries from Elkhorn Slough, California, to Puget Sound, Washington. Coastal marine areas include waters along the entire biological species range within a depth of 60 fathoms. The principle biological or physical constituent elements essential for the conservation of southern green sturgeon in freshwater include: food resources; substrate of sufficient type and size to support viable egg and larval development; water flow, water quality such that the chemical characteristics support normal behavior, growth and viability; migratory corridors; water depth; and sediment quality. Primary constituent elements of estuarine habitat include food resources, water flow, water quality, migratory corridors, water depth and sediment quality. The specific primary constituent elements of marine habitat include food resources, water quality and migratory corridors.

Critical habitat of southern green sturgeon is threatened by several anthropogenic factors. Four dams and several other structures currently are impassible for green sturgeon to pass on the Sacramento, Feather and San Joaquin rivers, preventing movement into spawning habitat. Threats to these riverine habitats also include increasing temperature, insufficient flow that may impair recruitment, the introduction of striped bass that may eat young sturgeon and compete for prey, and the presence of heavy metals and contaminants in the river.

3.2.38 Sturgeon, Gulf

Gulf sturgeon were listed as threatened on September 30, 1991 (56 FR 49653). We used information available in the Initiation of the 5-year Review (NMFS 2009a), status reviews and the listing documents (56 FR 49653) to summarize the status of the species.

Distribution

Gulf sturgeon historically occurred in coastal river systems from the Mississippi River to the Suwannee River, Florida, and in the Gulf of Mexico to the Florida Bay (Gulf Sturgeon RP). Currently, Gulf sturgeon are distributed from the Suwannee River to Lake Pontchartrain and the Pearl River system, Louisiana.

Status

Gulf sturgeon were listed as threatened because of population declines caused by nearly a century of fishing pressure for meat and caviar, and habitat modifications caused by the disposal of dredged material, de-snagging (removal of trees and their roots), and other navigation maintenance activities; incidental take by commercial fishermen; poor water quality associated with contamination by pesticides, heavy metals, and industrial contaminants; aquaculture and incidental or accidental introductions; and the Gulf sturgeon’s slow growth and late maturation (56 FR 49653).

Gulf sturgeon are anadromous and spend the major part of a year in freshwater, migrating to saltwater in the fall. The best river habitat for gulf sturgeon are long, spring-fed free-flowing rivers. Steep banks and a hard bottom with an average water temperature of 60 to 72°F are also characteristic of rivers where sturgeon inhabit. Sturgeon occupy the river bottom downstream of springs where they seek thermal refuge during hot summer days.

Empirical studies of relationships between sturgeon and water quality have demonstrated that sturgeon populations are limited by low levels of dissolved oxygen levels and high temperatures in the rivers, streams, and estuaries they occupy; juvenile anadromous sturgeon also depend on the freshwater-brackish interface in the tidal portion of rivers for nursery areas. Siberian sturgeon (*Acipenser baeri*), for example, appear to have a preferred temperature range between 17.2 and 21.5° C and preferred dissolved oxygen levels between 5.9 and 13.2 mg/l (Khakimullin 1987). White sturgeon in the Bliss Reach of the Snake River (upstream of Brownlee Reservoir) were caught in water with temperatures between 10 and 22°C and dissolved oxygen levels between 8 and 16 mg/l (Lepla and Chandler 1995). Temperatures of 26°C and dissolved oxygen levels of 3 mg/l killed all juvenile Atlantic sturgeon (*Acipenser oxyrinchus*) in five out of six replicates (Secor and Gunderson 1997) and dissolved oxygen levels of 2.5 mg/l killed all 25-day old shortnose sturgeon (*Acipenser brevirostrum*), 96% of 32-day old shortnose sturgeon, 86% of all 64-day old sturgeon, and 12% of 104- to 310-day old shortnose sturgeon (Jenkins *et al.* 1993).

Critical Habitat

Critical habitat was designed for Gulf sturgeon in 2003 (68 FR 13370). The designation encompasses 14 sites in Louisiana, Mississippi, Alabama and Florida. The primary constituent elements essential for the conservation of Gulf sturgeon are those habitat components that support feeding, resting and sheltering, reproduction, migration, and physical features necessary for maintaining the natural processes that support these habitat components. The primary constituent elements include:

1. Abundant prey items within riverine habitats for larval and juvenile life stages, and within estuarine and marine habitats and substrates for juvenile, subadult and adult life stages;
2. Riverine spawning sites with substrates suitable for egg deposition and development, such as limestone outcrops and cut limestone banks, bedrock, large gravel or cobble beds, marl, soapstone or hard clay;
3. Riverine aggregation areas, also referred to as resting, holding, and staging areas, used by adult, subadult, and/or juveniles, generally, but not always, located in holes below normal riverbed depths, believed necessary for minimizing energy expenditures during fresh water residency and possibly for osmoregulatory;
4. A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of fresh water discharge over time) necessary for normal behavior, growth, and survival of all life stages in the riverine environment, including migration, breeding site selection, courtship, egg fertilization, resting, and staging; and necessary for maintaining spawning sites in suitable condition for egg attachment, egg sheltering, resting, and larvae staging;
5. Water quality, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth and viability of all life stages;

6. Sediment quality, including texture and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages; and

7. Safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine and marine habitats (e.g., a river unobstructed by any permanent structure, or a dammed river that still allows for passage).

Direct impacts to the Gulf sturgeon and its habitat continue to affect its continued existence through: 1) present or threatened destruction, modification or curtailment of its habitat or range; 2) inadequacy of existing regulatory mechanisms; and 3) other natural or manmade factors. These factors include impacts to habitats by dams, dredging, point and nonpoint discharges, climate change, bycatch, red tide and collisions with boats.

All of the dams noted in the listing rule continue to block passage of Gulf sturgeon to historical spawning habitats and thus reduce the amount of available spawning habitat or entirely impede access to it. Dredging and disposal to maintain navigation channels, and removal of sediments for beach re-nourishment occurs frequently and throughout the range of the Gulf sturgeon and within designated Gulf sturgeon habitat annually. This activity has, and continues to threaten the species and affect its designated critical habitat. Evaluations of water and sediment quality in Gulf Sturgeon habitat on the northern Gulf of Mexico coast have consistently shown elevated pollutant loading.

3.2.39 Sturgeon, Shortnose

Shortnose sturgeon were listed as endangered on March 11, 1967 (32 FR 4001) and remained on the endangered species list with enactment of the ESA in 1973. We used information available in the biological assessment (SSSRT 2010), recovery plan (63 FR 69613) and the listing documents (32 FR 4001) to summarize the status of the species.

Distribution

Shortnose sturgeon occur along the Atlantic Coast of North America, from the St. John River in Canada to the St. John's River in Florida. Nineteen, geographically-distinct populations of shortnose sturgeon in the wild are distributed from New Brunswick, Canada; Maine; Massachusetts; Connecticut; New York; New Jersey and Delaware; Chesapeake Bay and Potomac River; North Carolina; South Carolina; Georgia; and Florida. Two additional, geographically distinct populations represent shortnose sturgeon that were isolated by dams occur in the Connecticut River (above the Holyoke Dam) and in Lake Marion on the Santee-Cooper River system in South Carolina (above the Wilson and Pinopolis Dams).

Status

These sturgeon were listed as endangered because of population declines resulting from the construction of dams in the large river systems of the northeastern United States during the late-1800s and early-1900s, dredging, the effects of water pollution, bridge construction and incidental capture in commercial fisheries. More recently, alteration of freshwater flows into the estuaries of rivers had reduced the nursery habitat of juvenile shortnose sturgeon and larval and juvenile shortnose sturgeon have been killed after being impinged on the intake screens or entrained in the intake structures of power plants on the Delaware, Hudson, Connecticut, Savannah and Santee rivers. Critical habitat has not been designated for shortnose sturgeon.

Shortnose sturgeon are anadromous fish that live primarily in slower-moving rivers or nearshore waters; they prefer nearshore marine, estuarine and riverine habitats near large river systems. They are benthic omnivores that feed on crustaceans, insect larvae, worms and mollusks (NMFS 1998) but they have been observed feeding off plant surfaces and on fish bait (Dadswell *et al.* 1984).

During the summer and winter, adult shortnose sturgeon occur in freshwater reaches of rivers or river reaches that are influenced by tides; as a result, they often occupy only a few short reaches of a river's entire length (Buckley and Kynard 1985). During the summer, at the southern end of their range, shortnose sturgeon congregate in cool, deep, areas of rivers where adult and juvenile sturgeon can take refuge from high temperatures (Flournoy *et al.* 1992; Rogers and Weber 1994; Rogers and Weber 1995; Weber 1996). Juvenile shortnose sturgeon generally move upstream for the spring and summer seasons and downstream for fall and winter; however, these movements usually occur above the salt- and freshwater interface of the rivers they inhabit (Dadswell *et al.* 1984; Hall *et al.* 1991). Adult shortnose sturgeon prefer deep, downstream areas with soft substrate and vegetated bottoms, if present. While shortnose sturgeon are occasionally collected near the mouths of coastal rivers, they are not known to engage in coastal migrations (Dadswell *et al.* 1984).

3.2.40 Abalone, Black

The species was listed as endangered under the ESA on January 14, 2009 (74 FR 1937). We used information available in the status review report (NMFS 2009d) to summarize the status of the species, as follows.

Distribution

Historically, black abalone occurred from about Point Arena in northern California to Bahia Tortugas and Isla Guadalupe, Mexico. Black abalone are rare north of San Francisco and south of Punta Eugenia, and unconfirmed sightings have been reported as far north as Coos Bay, Oregon. The northernmost documented record of black abalone (based on museum specimens) is from Crescent City (Del Norte County, California, USA; Geiger 2004). Most experts agree that the current range of black abalone extends from Point Arena (Mendocino County, California, USA) south to Northern Baja California, Mexico. Black abalone may exist, but are considered extremely rare, north of San Francisco (Morris *et al.* 1980) to Crescent City, California, USA and south of Punta Eugenia to Cabo San Lucas, Baja California, Mexico (P. Raimondi, personal communication). Within this broad geographic range, black abalone generally inhabit coastal and offshore island intertidal habitats on exposed rocky shores where bedrock provides deep, protective crevice shelter (Leighton 2005).

Status

Long-term monitoring sites from most of the geographical range of black abalone in the United States indicate that black abalone have become locally extinct at 11 of the 32 study locations (34%), have declined between 90–99% in abundance at an additional 10 (31%) study locations, and have declined between 80–89% at 2 sites (Neuman *et al.* 2010). At 8 northern sites (25%), there have been no instances of declines, and average abundance has increased by 56% (Neuman *et al.* 2010). Thus, significant declines (>80%) have occurred at the majority (72%) of study sites, including all sites in southern

California (Neuman et al. 2010). There is evidence of recent recruitment in northern Baja California. Black abalone are endangered as a result of overharvest and disease. The Californian commercial fishery peaked at 1,860 metric tons in 1879, reached 868 metric tons in 1973, and fell to <20 metric tons in 1993, when the commercial and recreational fisheries were closed. Between 1972 and 1981, over 3.5 million individuals were harvested. The Mexican commercial fishery peaked in 1990 with 28 metric tons and declined to < 0.5 metric tons by 2003. The severe declines were caused primarily by withering syndrome. Withering syndrome is a disease caused by bacteria that prevents assimilation of nutrients in the digestive system. The first appearance along mainland California occurred in 1988, when approximately 85% of the resident black abalone in Diablo Cove died because of the disease and warm-water effluent from a nuclear power facility. Previous overharvest, continued poaching and withering syndrome have resulted in extremely low population densities, which further reduce the potential for fertilization and recruitment and limit the recovery potential of the species. Its resilience to future perturbations is extremely low.

Critical Habitat

Critical habitat for black abalone includes about 360 square kilometers of rocky intertidal and subtidal habitat within five segments of the California coast between the Del Mar Landing Ecological Reserve to the Palos Verdes Peninsula, as well as on the Farallon Islands, Aňo Nuevo Island, San Miguel Island, Santa Rosa Island, Santa Cruz Island, Anacapa Island, Santa Barbara Island, and Santa Catalina Island. This designation also includes rocky intertidal and subtidal habitats from the mean higher high water line to a depth of 6 meters (relative to the mean lower low water line), as well as the coastal marine waters encompassed by these areas (76 FR 66806).

3.2.41 Abalone, White

The species was listed as endangered under the ESA on May 29, 2001 (66 FR 29046). We used information available in the status review reports and the recovery plan (73 FR 62257) to summarize the status of the species, as follows.

Distribution

Historically, white abalone occurred from Point Conception, California to Punta Abreojos, Baja California, Mexico. They are the deepest-living of the west coast abalone species (Hobday and Tegner 2000): they had been caught at depths of 20-60 m (66-197 ft.) but had been reported as having had the highest abundance at depths of 25-30 m (80-100 ft.; Cox 1960, Tutschulte 1976). At these depths, white abalone are found in open low relief rock or boulder habitat surrounded by sand (Tutschulte 1976, Davis *et al.* 1996).

Status

White abalone were listed as an endangered species on May 29, 2001 (66 FR 29046). Over the past 30 years, the white abalone populations have declined precipitously in abundance primarily because of exploitation. Surveys conducted at Tanner and Cortez Banks have yielded numbers of white abalone in the low hundreds (Butler *et al.* 2006). Surveys conducted off the western side of San Clemente Island in August 2004 yielded only 6 animals at 37-50 m depth (Navy 2005 *in* Navy 2006a).

Surveys conducted between 1972 and 1997 indicate that the density of white abalone declined by four orders of magnitude (99 percent). Furthermore, juvenile shells are rarely observed, indicating a lack of recruitment. The species is endangered because of overharvest by commercial and recreational fisheries. The Californian commercial fishery began in 1968 and peaked at 144,000 lbs. (86,000 individuals) in 1972. By 1978, white abalone catch had declined dramatically, such that individuals were rarely landed (< 1000 lbs. annually). The Californian recreational fishery peaked in 1975, at ~35,000 individuals. The commercial and recreational fisheries were closed in 1996. White abalone were also harvested in Baja California, Mexico, although catch numbers are not available. Its continued existence is threatened by illegal poaching and low recruitment (the current density of white abalone limits the success rate of fertilization and recruitment). Therefore, species' resilience to future perturbations is low.

Critical habitat has not been designated because it was determined to be "not prudent," due to concern that disclosure of white abalone whereabouts would increase the threat of poaching (66 FR 29048).

3.2.42 Coral, Boulder Star

NMFS published the final rule that listed boulder star coral as threatened under the ESA in September 2014 (79 FR 53852).

Distribution

Boulder star coral are known to occur in the Caribbean, Gulf of Mexico, Florida, the Bahamas and Bermuda.

Status

In the last 20 years, there has been a severe decline in the overall cover and abundance of *M. annularis* in several parts of the Caribbean. Off the northern coast of Belize, declines upwards of 90% were recorded specifically for boulder star coral (Burke *et al.* 2004).

In Florida, the percent cover data from four fixed sites have shown the *Montastraea annularis* complex to have declined in absolute cover from 5% to 2% in the Lower Keys between 1998 and 2003 and was accompanied by 5–40% colony shrinkage and virtually no recruitment (Smith *et al.* 2008). Earlier studies from the Florida Keys indicated a 31% decline of Montastraea annularis complex absolute cover between 1975 and 1982 (Dustan and Halas, 1987) at Carysfort Reef and > 75% decline (from over 6% cover to less than 1%) across several sites in Biscayne National Park between the late 1970s and 1998–2000 (Dupont *et al.* 2008). Taken together, these data imply extreme declines in the Florida Keys (80%–95%) between the late 1970s and 2003, and it is clear that further dramatic losses occurred in this region during the cold weather event in January 2010.

3.2.43 Coral, Elkhorn

Elkhorn coral was listed as threatened under the ESA on May 9, 2006 (71 FR 26852); it was proposed as endangered on December 7, 2012 (77 FR 73219), but was listed as threatened in the final rule (79 FR 53852) on September 10, 2014. NMFS issued a draft recovery plan on September 5, 2014 (79 172 53019). We used information available in the status review report, the draft recovery plan and the listing rules to summarize the status of the species, as follows.

Distribution

Elkhorn coral is found on coral reefs in southern Florida, the Bahamas, and throughout the Caribbean. Its northern limit is Flower Garden Banks National Marine Sanctuary in Texas, United States (Zimmer *et al.* 2006), and extends south to Venezuela. Once found in continuous stands that extended along the front side of most coral reefs, the characteristic "*Acropora palmata* zone" supported a diverse assemblage of other invertebrates and fish. These zones have been largely transformed into rubble fields with few, isolated living colonies.

Status

Elkhorn coral has declined by 90-95% within large areas of its range since 1980. Reductions of between 75 and 90% have been reported in areas such as the Florida Keys in 1998 due to bleaching and hurricane damage.

Elkhorn coral populations face high extinction risks because of the individual and cumulative effects of disease (particularly white-band disease and white pox; which has killed 85% of elkhorn coral colonies in the Florida Keys over an 8-year period); high seasonal temperatures that result in coral bleaching; overharvest by collectors; natural abrasion and breakage; anthropogenic abrasion and breakage (caused by recreational divers, vessel groundings, the impacts of anchors and anchor chains, fishing debris and damaging fishing practices); competition from macroalgae; predation (by the fireworm, *Hermodice corunculata*, and the murcid snail, *Coralliophilia abbreviata*, among others), sedimentation and increases in water turbidity; increased carbon dioxide levels and ocean acidification; sea level rise; and competition from bioeroding sponges of the genus *Cliona*.

These stressors not only increase the mortality rates, they have reduced the reproductive success, which reduces their ability to recover from mortalities. Elkhorn coral reproduce through fragmentation (asexual) and broadcast spawning (sexual reproduction). Although fragmentation probably allowed staghorn coral to recover from physical disturbance in the past, the decline of the large, extant colonies that were the source of such fragments and the decline of suitable substrate on which those fragment could attach impairs this reproductive strategy for elkhorn coral. At the same time, there is substantial evidence that sexual reproduction in elkhorn coral is also compromised (reductions in successful fertilization and larval numbers and density). The combination of high mortality rates in a large number of colonies, extirpation of colonies, the continued action of multiple stressors, and reductions in the ability of colonies to recover from population reductions or withstand the effect of multiple stressors would suggest a species at substantial risk of extinction in the foreseeable future.

Critical Habitat

On November 26, 2008, NMFS designated critical habitat for elkhorn coral. They designated marine habitat in four specific areas: Florida (1,329 square miles), Puerto Rico (1,383 square miles), St. John/St. Thomas (121 square miles) and St. Croix (126 square miles). These areas support the following physical or biological features that are essential to the conservation of the species: substrate of suitable quality and availability to support successful larval settlement and recruitment and reattachment and recruitment of fragments.

3.2.44 Coral, Lobed Star

NMFS published the final rule that listed lobed star coral as threatened under the ESA in September 2014 (79 FR 53852).

Distribution

Star coral is found throughout the Caribbean Sea, including in the Bahamas, Bermuda and Flower Garden Banks. The range is restricted to the West Atlantic and there is no range fragmentation. Within Federally protected waters, this species has been recorded from the following areas: Flower Garden Banks National Marine Sanctuary, Dry Tortugas National Park, Virgin Island National Park/Monument, Florida Keys National Marine Sanctuary, Navassa Island National Wildlife Refuge, Biscayne National Park and Buck Island Reef National Monument.

Status

This species is particularly susceptible to bleaching, disease and other threats and therefore population decline is based on both the percentage of destroyed reefs and critical reefs that are likely to be destroyed within 20 years (Wilkinson 2004).

Until recently, this species was included in *Montastraea (Orbicella) annularis* (Weil and Knowlton 1994) along with *Montastraea (Orbicella) faveolata*. Consequently, most studies prior to 1994 do not distinguish between the three species, and information on population is difficult to disaggregate for the three taxa.

3.2.45 Coral, Mountainous Star

NMFS published the final rule that listed mountainous star coral as threatened under the ESA in September 2014 (79 FR 53852).

Distribution

Mountainous star coral occurs in the Caribbean, the Gulf of Mexico, Florida and the Bahamas. Within Federally protected waters, the species has been recorded from the following areas: Flower Garden Banks National Marine Sanctuary, Florida Keys National Marine Sanctuary, Biscayne National Park, Dry Tortugas National Park, Virgin Islands National Park/Monument, Navassa Island National Wildlife Refuge and Buck Island National Monument.

Status

In the last 20 years, there has been a severe decline in the overall cover and abundance of this species in several parts of the Caribbean. For example, 90% of the species was lost in the coastal waters off Jamaica from 1980 through 1994 (Hughes, 1994). Until recently, this species was included in *Montastraea (Orbicella) annularis* (Weil and Knowlton 1994) along with *Montastraea (Orbicella) franksi*. Consequently, most studies prior to 1994 do not distinguish between the three species, and information on population is difficult to disaggregate for the three taxa.

3.2.46 Coral, Pillar

NMFS published the final rule that listed pillar star coral as threatened under the ESA in September 2014 (79 FR 53852).

Distribution

Pillar coral is restricted to the western Atlantic where it is present throughout the greater Caribbean but is one of the Caribbean genera absent from the southwest Gulf of Mexico (Tunnell, 1988). The species has been reported in the waters of south Florida and the U.S. Caribbean but appears to be absent from the Flower Garden Banks. Within Federally protected U.S. waters, the species has been recorded from the following areas: Florida Keys National Marine Sanctuary, Navassa National Wildlife Refuge, Dry Tortugas National Park, Virgin Islands National Park/Monument, Biscayne National Park and Buck Island National Monument.

Status

Pillar coral is reported to be uncommon but conspicuous (Veron 2000) with isolated colonies scattered across a range of habitat types. Overall, colony density throughout south Florida was estimated to be an estimated 0.6 colonies per 10 m^2 (Wagner *et al.* 2010). Recent monitoring data (e.g., since 2000) from La Parguera, Puerto Rico, and St. Croix, USVI (NOAA Center for Coastal Monitoring and Assessment, randomized monitoring stations) have shown that Dendrogyra cylindrus cover was consistently less than 1% with individual observations up to 4% but with no apparent temporal trend, although trends would be difficult to detect with such low cover values (available online at http://www8.nos.noaa.gov/biogeo_public/query_habitat.aspx).

3.2.47 Coral, Rough Cactus

NMFS published the final rule that listed rough cactus star coral as threatened under the ESA in September 2014 (79 FR 53852).

Distribution

The range of rough cactus coral is restricted to the West Atlantic. There it has been reported to occur throughout most of the Caribbean, including the Bahamas, but it is not present in the Flower Garden Banks or around the waters of Bermuda. Within Federally protected waters, this species has been recorded from the following areas: Dry Tortugas National Park, Virgin Island National Park/Monument, Florida Keys National Marine Sanctuary, Navassa Island National Wildlife Refuge, Biscayne National Park and Buck Island Reef National Monument.

Status

Rough cactus coral is usually uncommon (Veron, 2000) or rare according to published and unpublished records indicating that it constitutes < 0.1% species contribution (percent of all colonies censuses) and occurs at densities < 0.8 colonies per 10 m^2 in Florida (Wagner *et al.* 2010) and at 0.8 colonies per 100 m transect in Puerto Rico sites sampled by the Atlantic and Gulf Rapid Reef Assessment (AGRRA database online at http://www.agrra.org).

Recent monitoring data (e.g., since 2000) from Florida (National Park Service permanent monitoring stations), La Parguera Puerto Rico and St. Croix (USVI/NOAA Center for Coastal Monitoring and Assessment randomized monitoring stations) show cover to be consistently less than 1%, with occasional observations up to 2% and no apparent temporal trend (available online at http://www8.nos.noaa.gov/biogeo_public/query_habitat.aspx).

3.2.48 Coral, Staghorn

Staghorn coral were listed as threatened throughout their range on May 9, 2006 (71 FR 24359). On December 7, 2012, staghorn coral were proposed to be reclassified as endangered under the ESA (77 FR 73219), but was listed as threatened in the final rule (79 FR 53852) on September 10, 2014. NMFS issued a draft recovery plan on September 5, 2014 (79 172 53019). We used information available in the status review report, the draft recovery plan and the listing rules to summarize the status of the species, as follows.

Distribution

Staghorn coral colonies are known to occur in Anguilla; Antigua and Barbuda; Bahamas; Barbados; Belize; Cayman Islands; Colombia; Costa Rica; Cuba; Dominica; Dominican Republic; Grenada; Guadeloupe; Haiti; Honduras; Jamaica; Mexico; Montserrat; Netherlands Antilles; Nicaragua; Panama; Saint Barthélemy; Saint Kitts and Nevis; Saint Lucia; Saint Martin (French part); Saint Vincent and the Grenadines; Trinidad and Tobago; Turks and Caicos Islands; United States (Florida, Puerto Rico, U.S. Virgin Islands); Venezuela; and British Virgin Islands. The northern limit of staghorn coral is around Boca Raton, along the Atlantic Coast of Florida.

Status

Since 1980, the size and distribution of staghorn coral populations have collapsed because of disease outbreaks, such as white band disease; hurricanes; predation, bleaching, algal overgrowth, sedimentation, temperature and salinity variation, and low genetic diversity. Since the early 1970s, populations of this coral have declined by between 80 and 98% throughout their range and some populations have become locally extinct, which led the International Union for the Conservation of Nature and Natural Resources to classify staghorn coral as critically endangered.

Staghorn coral populations face high extinction risks because of the individual and cumulative effects of disease (particularly white-band disease, which was reported to have affected 72% of tagged staghorn coral colonies in the Florida Keys in 2003, killing about 28% of those colonies and leaving others as fragments); high seasonal temperatures that result in coral bleaching; overharvest by collectors; natural abrasion and breakage; anthropogenic abrasion and breakage (caused by recreational divers, vessel groundings, the impacts of anchors and anchor chains, fishing debris and damaging fishing practices); competition from macroalgae; predation (by the fireworm, *Hermodice corunculata*, and the murcid snail, *Coralliophilia abbreviata*, among others), sedimentation and increases in water turbidity; increased carbon dioxide levels and ocean acidification; sea level rise; and competition from bioeroding sponges of the genus *Cliona*.

These stressors increase the mortality rates and the reproductive success of staghorn coral, which reduces their ability to recover from mortalities. Like elkhorn coral, staghorn coral reproduce through fragmentation (asexual) and broadcast spawning (sexual reproduction). Although fragmentation probably allowed staghorn coral to recover from physical disturbance in the past, the decline of the large, extant colonies that were the source of such fragments and the decline of suitable substrate on which those fragment could attach impairs this reproductive strategy for staghorn coral. At the same time, there is substantial evidence that sexual reproduction in staghorn coral is also compromised (reductions in successful fertilization and larval numbers and density). The combination of high mortality rates in a large number of colonies, extirpation of colonies, the continued action of multiple stressors, and reductions in the ability of colonies to recover from population reductions or withstand the effect of multiple stressors would suggest a species at substantial risk of extinction in the foreseeable future.

Critical Habitat

On November 26, 2008, NMFS designated critical habitat for staghorn coral. They designated marine habitat in four specific areas: Florida (1,329 square miles), Puerto Rico (1,383 square miles), St. John/St. Thomas (121 square miles) and St. Croix (126 square miles). These areas support the following physical or biological features that are essential to the conservation of the species: substrate of suitable quality and availability to support successful larval settlement and recruitment and reattachment and recruitment of fragments

3.2.49 Coral, Pacific species[29]

NMFS published the final rule to list the following coral species as threatened under the ESA in September 2014 (79 FR 53852):

- *Acropora globiceps*
- *Acropora jacquelineae*
- *Acropora retusa*
- *Acropora rudis*
- *Anacropora speciosa*
- *Euphyllia paradivisa*
- *Isopora crateriformis*
- *Pavona diffluens*
- *Seriatopora aculeata*

Distribution

Listed Pacific coral species are generally distributed in the Central Indo-Pacific, Western Pacific regions including American Samoa, Guam, the Northern Mariana Islands and other U.S. Pacific islands.

Status

In general, the major threat to corals is global climate change, in particular, temperature extremes leading to bleaching and increased susceptibility to disease, increased severity of ENSO events

[29] For more information, see NMFS' Status Review Report of 82 Candidate Coral Species Petitioned Under the U.S. Endangered Species Act at: http://www.nmfs.noaa.gov/stories/2012/05/docs/010_corals_status_review_indo_pac1.pdf

and storms, and ocean acidification.

Populations of the crown-of-thorns starfish have greatly increased since the 1970s and have been known to wipe out large areas of coral reef habitat. Increased breakouts of this species have become a major threat to some species, and have contributed to the overall decline and reef destruction in the Indo-Pacific region. The effects of such an outbreak include the reduction of abundance and surface cover of living coral, reduction of species diversity and composition, and overall reduction in habitat area.

Escalating anthropogenic stressors combined with the threats associated with global climate change of increases in coral disease, frequency and duration of coral bleaching, and ocean acidification place coral reefs in the Indo-Pacific at high risk of collapse. Other localized threats to corals include fisheries, human development (industry, settlement, tourism and transportation), changes in native species dynamics (competitors, predators, pathogens and parasites) invasive species (competitors, predators, pathogens and parasites), dynamite fishing, chemical fishing, pollution from agriculture and industry, domestic pollution, sedimentation and human recreation and tourism activities.

3.2.50 Johnson's seagrass

Johnson's seagrass was listed as threatened under the ESA on September 14, 1998 (63 FR 49035). We used information available in the final rule and the 5-year review (72 FR 68129), recovery plan (67 FR 62230), listing documents (63 FR 49035) and listing documents to summarize the status of the species, as follows.

Distribution

Johnson's seagrass is distributed along the east coast of Florida from central Biscayne Bay to Sebastian Inlet in Indian River lagoon. The largest patches have been identified inside Lake Worth Inlet. The southernmost distribution is reported to be near Virginia Key in Biscayne Bay.

Status

Johnson's seagrass was listed as threatened under the ESA on September 14, 1998 (63 FR 49035), because of habitat destruction and modification resulting from propeller scarring (alteration and subsequent destruction of the benthic community from boating activities, propeller scarring of the substrate, anchoring, and mooring has been observed in Johnson's seagrass sites), dredging to provide boat access, erosion caused by storm action, increased suspended solids caused by human land uses, scour associated with storms, and nutrient enrichment of coastal lagoons in Florida caused by urban and agricultural land run-off that stimulates algal growth and smothers Johnson's seagrass (by shading rooted vegetation and diminishing the oxygen content of the water).

Critical Habitat

Critical habitat for Johnson's seagrass was designated on April 5, 2000 (65 FR 17786). Ten areas were designated: a portion of the Indian River Lagoon, north of the Sebastian Inlet Channel; a portion of the Indian River Lagoon, south of the Sebastian Inlet Channel; a portion of the Indian River Lagoon near the Fort Pierce Inlet; a portion of the Indian River Lagoon, north of the St. Lucie Inlet; a portion of Hobe Sound; a site on the south side of Jupiter Inlet; a site in central Lake Worth Lagoon; a site in Lake Worth Lagoon, Boynton Beach; a site in Lake Wyman, Boca Raton; and a portion of Biscayne Bay. These areas are characterized by one or more of the following criteria: (1) locations with populations that have persisted for 10 years; (2) locations with persistent flowering populations; (3) locations at the northern and southern range limits of the species; (4) locations with unique genetic diversity; and (5) locations with a documented high abundance of Johnson's seagrass compared to other areas in the species' range. Important physical and biological features of the critical habitat areas include adequate water quality, salinity levels, water transparency and stable, unconsolidated sediments that are free from physical disturbance.

3.3 Climate Change

Global climate patterns have a natural year-to-year variability; however, a global warming trend has become apparent based on observations of average air and sea surface temperatures, losses of ice and snow and rising average sea levels (IPCC 2001, 2007, U.S. Global Change Research Program 2009). There is now widespread consensus within the scientific community that atmospheric temperatures on earth are increasing (warming) (IPCC 2001, 2007, Oreskes 2004). Observational evidence from all continents and most oceans shows that many regional ecosystems are also being affected due to factors driving global climate change, particularly temperature increases (EPA 2010, IPCC 2007, U.S. Global Change Research Program 2009, Walther 2010). The severity of climate change depends not only on the magnitude of the change but also on the potential for irreversibility (Solomon *et al.* 2009). Modeling on the longevity of climate-driven changes (atmospheric warming) suggest that atmospheric temperatures would not drop significantly for at least 1,000 years (even if factors driving the warming climate ceased (Solomon *et al.* 2009.)

The Intergovernmental Panel on Climate Change (IPCC) estimated that average global land and sea surface temperature has increased by 0.85°C (± 0.2) since the late-1800s, with most of the change occurring since the mid-1900s (IPCC 2013). Annual average atmospheric temperatures in the Northeastern U.S. have been increasing by 2^0F since 1970 with winter temperatures rising by as much as 4^0F (Global Change Research Program 2009). These trends are expected to continue. Environmental changes in response to warming atmospheric temperatures already taking place include increased frequencies of extreme events (i.e., air temperatures above 90^oF and heavy precipitation), reduced snow and ice leading to smaller snowpacks, earlier breakup of winter ice on lakes and rivers, earlier spring freshets and peak river flows as well as rising sea levels and oceanic temperatures.

In the Southeastern U.S. annual average temperatures since 1970 have risen 2^oF with winter temperatures experiencing the greatest increases. Hurricanes with greater intensity (greater wind speeds, rainfall and storm surge height and strength) are more likely as projections show more northern trajectories towards the mid-Atlantic. With warming temperatures water and oxygen availability in lakes, rivers and shallow habitats decrease, particularly in the already warm, humid climate of the southeast.

Atmospheric warming has direct consequences for the oceans as well. Approximately 80 percent of the rise in atmospheric temperatures is likely to be absorbed by the oceans (IPCC 2007). A recent study by Polyakov *et al.* (2010), suggests that the North Atlantic Ocean has been experiencing a general warming trend over the last 80 years of 0.031 ± 0.006^{0}C per decade in the upper 2,000 m of the ocean. The Intergovernmental Panel on Climate Change (IPCC) estimated that average global land and sea surface temperature has increased by 0.85°C (± 0.2) since the late-1800s, with most of the change occurring since the mid-1900s (IPCC 2013).

Sea surface temperatures, in the North Atlantic Ocean are closely related to the North Atlantic Oscillation. The North Atlantic Oscillation, which results from variability in pressure differences between a low pressure system that lies over Iceland and a high pressure system that lies over the Azore Islands, has been directly linked to climate changes in the North Atlantic Oceans as well as all other oceans. As these pressure systems shift from east to west, they control the strength of westerly winds and storm tracks across the North Atlantic Ocean.

The North Atlantic Oscillation Index, which is positive when both systems are strong (producing increased differences in pressure that produce more and stronger winter storms) and negative when both systems are weak (producing decreased differences in pressure resulting in fewer and weaker winter storms), varies from year to year, but also exhibits a tendency to remain in one phase for intervals lasting several years. This variability results in favorable and unfavorable ecological conditions for marine species.

Changes in the oscillation and sea surface temperatures in the North Atlantic Ocean influences the abundance of marine mammal prey such as zooplankton and fish. In the 1970s and 1980s, the North Atlantic Oscillation Index has been positive and sea surface temperature increased. These increases are believed to have produced conditions that were favorable for the copepod (*Calanus finmarchicus*), which is the principal prey of North Atlantic right whales (Conversi *et al.* 2001) and may have increased calving rates of these whales (we cannot verify this association because systematic data on North Atlantic right whale was not collected until 1982) (Greene *et al.* 2003). In the late 1980s and 1990s, the North Atlantic Oscillation Index was mainly positive but exhibited two substantial, multi-year reversals to negative values. This was followed by two major, multi-year declines in copepod prey abundance (Drinkwater *et al.* 2003; Pershing, Head, Greene *et al.* 2010). Calving rates for North Atlantic right whales followed the declining trend in copepod abundance, although there was a time lag between the two (Greene *et al.* 2003). Copepod abundance then declined again in 1998 with a possible recovery in 1999 and 2000 followed by increased calving rates between 2001 and 2005 (Hamilton *et al.* 2010).

Although the North Atlantic Oscillation Index has been positive for the past 25 years, atmospheric models suggest that increases in ocean temperature associated with climate change forecasts may produce more severe fluctuations in the North Atlantic Oscillation. Such fluctuations would be expected to cause dramatic shifts in the reproductive rate of critically endangered North Atlantic right whales (Drinkwater, *et al.* 2003; Greene, *et al.* 2003) and possibly a northward shift in the location of right whale calving areas (Kenney, 2007).

Changes in global climatic patterns are also projected to have profound effect on the coastlines of every continent by increasing sea levels and increasing the intensity, if not the frequency, of hurricanes and tropical storms. Based on computer models, these phenomena would inundate nesting beaches of sea turtles, change patterns of coastal erosion and sand accretion that are necessary to maintain those beaches, and would increase the number of turtle nests that are destroyed by tropical storms and hurricanes. The combination of increasing sea levels, changes in patterns of coastal erosion and accretion and changes in rainfall patterns are likely to affect coastal estuaries, submerged aquatic vegetation and reef ecosystems that provide foraging and rearing habitat for several species of sea turtles. Changes in ocean currents associated with climate change projections would affect the migratory patterns of sea turtles. The loss of nesting beaches, by itself, would have catastrophic effect on sea turtles populations globally if they are unable to colonize any new beaches that form of if the beaches that form do not provide the sand depths, grain patterns, elevations above high tides, or temperature regimes necessary to allow turtle eggs to survive. When combined with changes in coastal habitats and ocean currents, the future climates that are forecast place sea turtles at substantially greater risk of extinction than they already face.

Increasing sea levels, changes in patterns of coastal erosion and accretion, and changes in rainfall patterns are likely to affect coastal estuaries and submerged aquatic vegetation, that provide foraging and rearing habitat for anadromous fish. Decline in dissolved oxygen in river, stream and shallow aquatic habitats may also lead to fish kills and loss of aquatic species diversity. Decreased water availability due to increased temperatures and longer periods of time between rainfall events will ultimately affect eggs and juvenile survival resulting in changes in recruitment, abundance, distribution and growth (Drinkwater *et al.* 2003) as well as changes in the ecosystem functions relating to the timing and availability of prey species (Walther 2010). These climate-driven hydrological changes will combine with other pressures on water resources, such as population growth and land-use change especially in coastal areas (Kundzewicz *et al*. 2008), and may place Atlantic sturgeon at a greater risk of extinction.

In the Pacific Northwest, annual average temperatures have increased by about 1.5°F over the past century with some areas experiencing increases of up to 4°F (Elsner and Hamlet 2010, Karl *et al.* 2009, Littell *et al.* 2009). Higher temperatures during the cool season (October through March) have caused more precipitation to fall as rain rather than snow and contribute to earlier snowmelt. The amount of snowpack remaining on April 1, which is a key indicator of natural water storage available for the warm season, has declined substantially throughout the Northwest region. In the Cascade Mountains, for example, the snowpack remaining on April 1 declined by an average of 25% over the past 40 to 70 years; most of this decline is attributed to the 2.5°F increase in temperatures during the winter season over the time interval (Christensen *et al.* 2007, Payne *et al.*2004).

Over the next century, average temperatures in the Northwest Region are projected to increase by another 3 to 10°F, with higher emissions scenarios resulting in warming in the upper end of this range (Christensen *et al.* 2007, Karl *et al.* 2009). Increases in winter precipitation and decreases in summer precipitation are projected by many climate models, though these projections are less certain than those for temperature.

There is consensus within the scientific community that warming trends will continue to alter current weather pattern and patterns of natural phenomena that are influenced by climate, including the timing and intensity of extreme events such as heat-waves, floods, storms, and wet-dry cycles. As ice melts in the Earth's Polar Regions in response to increases in temperature, increases in the distribution and abundance of cold water are projected to influence oceanic currents, which would further alter weather patterns. In addition to influencing atmospheric temperatures and weather patterns, increases in greenhouse gases in the Earth's atmosphere have begun to increase rates of carbon capture and storage in the oceans: as carbon dioxide levels in the oceans increase, the waters will become more acidic, which would affect the physiology of large marine animals and cause structures made of calcium carbonate (for example, corals) to dissolve (IPCC 2001, Royal Society 2005).

Climate change is projected to have substantial direct and indirect effects on individuals, populations, species, and the structure and function of marine, coastal, and terrestrial ecosystems in the foreseeable future (Houghton *et al.* 2001, McCarthy *et al.* 2001, Parry *et al.* 2007; see Table 3.2). Increasing atmospheric temperatures have already contributed to changes in the quality of the freshwater, coastal and marine ecosystems that are essential to the survival and recovery of salmon populations and have contributed to the decline of populations of endangered and threatened species (Karl *et al.* 2009, Littell *et al.* 2009). Since the late 1970s, sea surface temperatures have increased and coastal upwelling — which is recognized as an important mechanism governing the production of both phytoplankton and zooplankton — has decreased resulting in reduced prey availability and poorer marine survival of Pacific salmon. Changes in the number of Chinook salmon escaping into the Klamath River between 1978 and 2005 corresponded with changes in coastal upwelling and marine productivity and the survival of Snake River spring/summer Chinook salmon and Oregon Coho salmon has been predicted using indices of coastal ocean upwelling (Elsner and Hamlet 2010, Karl *et al.* 2009, Littell *et al.* 2009). The majority (90%) of year-to-year variability in marine survival of hatchery reared Coho salmon between 1985 and 1996 can be explained by coastal oceanographic conditions.

The States of Idaho, Oregon, and Washington, are likely to experience increased forest growth over the next few decades followed by decreased forest growth as temperature increases overwhelm the ability of trees to make use of higher winter precipitation and higher carbon dioxide. In coastal areas, climate change is forecast to increase coastal erosion and beach loss (caused by rising sea levels), increase the number of landslides caused by higher winter rainfall, inundate areas in southern Puget Sound around the city of Olympia, Washington (Littell *et al.* 2009). Climate change is also expected to impact the timing and intensity of stream seasonal flows (Staudinger et al 2012).

Rising stream temperatures will likely reduce the quality and extent of freshwater salmon habitat. The duration of periods that cause thermal stress and migration barriers to salmon is projected to at least double by the 2080s for most analyzed streams and lakes (Littell *et al.* 2009). The greatest increases in thermal stress (including diseases and parasites which thrive in warmer waters) would occur in the Interior Columbia River Basin and the Lake Washington Ship Canal. The combined effects of warming stream temperatures and altered stream flows will very likely reduce the reproductive success of many salmon populations in Washington watersheds, but impacts will vary according to different life-history types and watershed-types. As more winter precipitation falls as rain rather than snow, higher winter stream flows scour streambeds, damaging spawning nests and washing away incubating eggs for Pacific Northwest salmon. Earlier peak stream flows flush young salmon from rivers to estuaries before they are physically mature enough for transition, increasing a variety of stressors including the risk of being eaten by predators.

Table 3.2 Phenomena associated with projections of global climate change including levels of confidence associated with projections (adapted from IPCC 2001 and Campbell-Lendrum Woodruff 2007).

Phenomenon	Confidence in Observed Changes (observed in the latter 20th Century)	Confidence in Projected Changes (during the 21st Century)
Higher maximum temperatures and a greater number of hot days over almost all land areas	Likely	Very likely
Higher minimum temperatures with fewer cold days and frost days over almost all land areas	Very likely	Very likely
Reduced diurnal temperature range over most land areas	Very likely	Very likely
Increased heat index over most land areas	Likely over many areas	Very likely over most areas
More intense precipitation events	Likely over many mid- to high-latitude areas in Northern Hemisphere	Very likely over many areas
Increased summer continental drying and associated probability of drought	Likely in a few areas	Likely over most mid-latitude continental interiors (projections are inconsistent for other areas)
Increase in peak wind intensities in tropical cyclones	Not observed	Likely over some areas
Increase in mean and peak precipitation intensities in tropical cyclones	Insufficient data	Likely over some areas

As a result of these changes, about one third of the current habitat for either the endangered or threatened Northwest salmon species will no longer be suitable for them by the end of this century as key temperature thresholds are exceeded (Littell *et al.* 2009). As summer temperatures increase, juvenile salmon are expected to experience reduced growth rates, impaired smoltification and greater vulnerability to predators.

Ocean acidification caused by increasing amounts of carbon dioxide (CO_2) in the Earth's atmosphere poses a more wide-spread threat because virtually every major biological function has been shown to respond to acidification changes in seawater, including photosynthesis, respiration rate, growth rates, calcification rates, reproduction, and recruitment (The Royal Society 2005).

At the same time as these changes in regional weather patterns and ocean productivity are expected to occur, the oceans are expected to become increasingly acidic. Over the past 200 years, the oceans have absorbed about half of the CO_2 produced by fossil fuel burning and other human activities. This increase in carbon dioxide has led to a reduction of the pH of surface seawater of 0.1 units, equivalent to a 30% increase in the concentration of hydrogen ions in the ocean. If global emissions of carbon dioxide from human activities continue to increase, the average pH of the oceans is projected to fall by 0.5 units by the year 2100 (The Royal Society

2005).

Although the scale of these changes are likely to vary regionally, pHs would be lower than the oceans have experienced about 420,000 years and the rate of change is probably 100 times greater than the oceans have experienced at any time over that time interval. More importantly, it would take tens of thousands of years for ocean chemistry to return to a condition similar to that occurring at pre-industrial times (The Royal Society 2005).

Marine species such as fish, larger invertebrates and some zooplankton take up oxygen and lose respired carbon dioxide through their gills. Increased carbon dioxide levels and decreased pH would have a major effect on this respiratory gas exchange system because oxygen is much harder to obtain from surface seawater than it is from air (primarily because concentrations of oxygen are lower in water). The processes involved in supplying oxygen to the gills means that more carbon dioxide is removed from these aquatic animals than is removed from air breathing animals of a similar size. This more ready removal of carbon dioxide from body fluids means that the level and range of CO_2 concentrations in the bodies of water-breathing animals are much lower than is the case for air-breathing animals. As a result, large water breathing marine animals are more sensitive to changes in the carbon dioxide concentration in the surrounding seawater than are large air-breathing animals.

This has important implications because higher ambient levels of carbon dioxide would acidify the body tissues and fluids of these species and affect the ability of their blood to carry oxygen. Experimental studies have demonstrated that acidosis of tissues decrease cellular energy use, lower respiratory activity, and lower rates of protein synthesis (Pörtner *et al.* 2000, 2004). These changes would reduce the performance of almost every physiological process of larger animals including their growth and reproduction (Langenbuch and Pörtner 2002, 2003). By itself, this effect of climate change poses severe risks for endangered and threatened anadromous and marine species. In combination with changes in seasonal temperatures, formation of snow pack in terrestrial ecosystems, upwelling phenomena, and ocean productivity, ocean acidification would lead us to expect the status of endangered and threatened anadromous, coastal, and marine species to trend toward increasing decline over the next three or four decades.

4.0 Environmental Baseline

The "Environmental Baseline" is defined as: "the past and present impacts of all Federal, State, or private actions and other human activities in an action area, the anticipated impacts of all proposed Federal projects in an action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process" (50 CFR 402.02).

Since this consultation is national in scope, it is not practical to describe the environmental conditions for specific sites where the Nationwide Permits may be used to authorize eligible activities. As discussed, the action area for this consultation consists of the land and waters encompassed by 44 of the 50 States that constitute the United States, as well as the territories and possessions of the United States, and is focused on the waters inhabited by the species under NMFS' jurisdiction.

To describe the baseline environmental conditions in the action area, the most recent national studies on the quantity and quality of aquatic ecosystems in the United States were relied upon. The results of those studies are summarized below. Most of the studies focused on the quantity of aquatic resources in the United States, and little information was available on the quality of those aquatic resources and their ability to support populations of various species. Not all aquatic ecosystems are subject to the regulatory jurisdiction of the Corps under CWA section 404 or section 10 of the Rivers and Harbors Act of 1899. Activities in uplands, including non-wetland riparian areas, are not regulated by the Corps under either of its two statutory authorities for the Nationwide Permits, even though activities in uplands and non-wetland riparian areas can have substantial adverse effects on the quality of aquatic ecosystems because of the indirect effects of those unregulated activities.

In accordance with the Services' definition, the environmental baseline consists of terrestrial and aquatic ecosystems within the action area, as they have been affected by past and present activities, including activities authorized by the various Nationwide Permits issued since 1977, activities authorized by other types of Department of the Army permits and activities that are not regulated by the Corps. For most of these ecosystems, activities permitted by the Corps make up only a small subset of the activities causing impacts within the environmental baseline. The environmental baseline also includes past and present activities in uplands, which may have indirect effects on aquatic ecosystems and the species that inhabit those aquatic ecosystems. Due to the large geographic and temporal scales involved in the environmental baseline, it is not practical to describe those various activities, except in general terms.

Land use distribution in 48 states of the contiguous United States as of 2007 is provided in Table 4.1 (Nickerson *et al.* 2011). In the contiguous United States, approximately 67% of the land is privately owned, 31% is held by the United States government, and 2% is owned by state or local governments (Dale *et al.* 2000). Developed non-Federal lands comprise 4.4% of the total land area of the contiguous United States (Dale *et al.* 2000).

Table 4.1 Major land uses in the United States (Nickerson *et al.* 2011).

Land Use	Acres	Percent of Total
Agriculture	1,161,000,000	51.3
Forest land	544,000,000	24.0
Transportation use	27,000,000	1.2
Recreation and wildlife areas	252,000,000	11.1
National defense areas	23,000,000	1.0
Urban land	61,000,000	2.7
Miscellaneous (other) land use	197,000,000	8.7
Total land area	2,265,000,000	100.0

4.1 Quantity of Aquatic Ecosystems in the United States

Wetlands occupy less than 9% of the global land area (Zedler and Kercher 2005). According to Dahl (2011), wetlands and deepwater habitats cover approximately 8% of the land area in the contiguous United States. Rivers and streams comprise approximately 0.52% of the total land area of the contiguous United States (Butman and Raymond 2011). Therefore, the wetlands, streams and rivers that are potentially waters of the United States and subject to regulation by the Corps under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act of 1899 Rivers and Harbors Act comprise a minor proportion of the land area of the United States. The remaining land area of the United States (approximately 90 percent) is outside the Corps regulatory authority. As discussed in the Corps' biological evaluation, the indirect effects of changes in upland land use (which are highly likely not to be subject to Federal control and responsibility, at least in terms of the Corps Regulatory Program), including the construction and expansion of upland developments, have substantial adverse effects on the quality (i.e., the ability to perform hydrologic, biogeochemical, and habitat functions) of jurisdictional waters and wetlands because those upland activities alter watershed-scale processes. Those watershed-scale processes include water movement and storage, erosion and sediment transport, and the transport of nutrients and other pollutants.

Dahl (1990) estimated that approximately 53% of the wetlands in the contiguous United States were lost in the 200-year period from the 1780s to 1980s, while Alaska lost less than 1% of its wetlands and Hawaii lost approximately 12% of its original wetland acreage. In the 1780s, there were approximately 221 million acres of wetlands in the contiguous United States (Dahl 1990). California lost the largest percentage of its wetlands (91 percent), whereas Florida lost the largest acreage (9.3 million acres) (Dahl 1990). During that 200-year period, 22 states lost more than

50% of their wetland acreage and 10 states have lost more than 70% of their original wetland acreage (Dahl 1990).

Frayer *et al.* (1983) evaluated wetland status and trends in the United States during the period of the mid-1950s to the mid-1970s. During that 20-year period, approximately 7.9 million acres of wetlands (4.2 percent) were lost in the contiguous United States. Much of the loss of estuarine emergent wetlands was due to changes to estuarine subtidal deepwater habitat, and some loss of estuarine emergent wetlands was due to urban development. For palustrine vegetated wetlands, nearly all of the losses of those wetlands were due to agricultural activities (e.g., conversion to agricultural production).

The U.S. Fish and Wildlife Service also examined the status and trends of wetlands in the United States during the period of the mid-1970s to the 1980s, and found that there was a net loss of more than 2.6 million acres of wetlands (2.5 percent) during that time period (Dahl and Johnson 1991). Freshwater wetlands comprised 98% of those wetland losses (Dahl and Johnson 1991). During that time period, losses of estuarine wetlands were estimated to be 71,000 acres, with most of that loss due to changes of emergent estuarine wetlands to open waters caused by shifting sediments (Dahl and Johnson 1991). Conversions of wetlands to agricultural use were responsible for 54% of the wetland losses, and conversion to other land uses resulted in the loss of 41% of wetlands (Dahl and Johnson 1991). Urban development was responsible for 5% of the wetland loss (Dahl and Johnson 1991).

Most of the wetland loss cited by NMFS as a factor responsible for the decline of various species of west coast salmonids (e.g., West Coast steelhead (71 FR 856); chinook salmon (63 FR 11498); chum salmon and steelhead trout (69 FR 33142)) occurred prior to the enactment of CWA section 404. The annual rate of wetland loss has decreased substantially since the 1970s (Dahl 2011, 2013), when wetland regulation became more prevalent (Brinson and Malvárez 2002).

Between 2004 and 2009, there was no statistically significant difference in wetland acreage in the contiguous United States (Dahl 2011, 2013) (Table 4.2). According to the 2011 wetland status and trends report, during the period of 2004 to 2009 urban development accounted for 11% of wetland losses (61,630 acres), rural development resulted in 12% of wetland losses (66,940 acres), silviculture accounted for 56% of wetland losses (307,340 acres), and wetland conversion to deepwater habitats caused 21% of the loss in wetland area (115,960 acres) (Dahl 2011, 2013). Some of the losses occurred to wetlands that are not subject to CWA jurisdiction and some losses are due to activities not regulated under CWA section 404, such as unregulated drainage activities, exempt forestry activities or water withdrawals. From 2004 to 2009, approximately 100,020 acres of wetlands were gained as a result of wetland restoration and conservation programs on agricultural land (Dahl 2011, 2013). Another source of wetland gain is conversion of other uplands to wetlands, resulting in a gain of 389,600 acres during the period of 2004 to 2009 (Dahl 2011, 2013). Inventories of wetlands, streams, and other aquatic resources are incomplete because the techniques used for those studies cannot identify some of those resources (e.g., Dahl 2011) for wetlands; Meyer and Wallace (2001) for streams).

Losses of vegetated estuarine wetlands due to the direct effects of human activities have decreased significantly due to the requirements of CWA section 404 and other laws and regulations (Dahl 2011, 2013). During the period of 2004 to 2009, less than 1% of estuarine emergent wetlands were lost as a direct result of human activities, while other factors such as sea level rise, land subsidence, storm events, erosion, and other ocean processes caused substantial losses of estuarine wetlands (Dahl 2011, 2013). The indirect effects of other human activities, such as oil and gas development, water extraction, development of the upper portions of watersheds, and levees, have also resulted in coastal wetland losses (Dahl 2011, 2013). Eutrophication of coastal waters can also cause losses of emergent estuarine wetlands, through changes in growth patterns of marsh plants and decreases in the stability of the wetland substrate, which changes those marshes to mud flats (Deegan *et al.* 2012).

Table 4.2 Estimated Aquatic Resource Acreages in the Contiguous United States in 2009 (Dahl 2011, 2013).

Aquatic Habitat Category	Estimated Area in 2009 (acres)
Marine intertidal	227,800
Estuarine intertidal non-vegetated	1,017,700
Estuarine intertidal vegetated	4,539,700
All intertidal waters and wetlands	5,785,200
Freshwater ponds	6,709,300
Freshwater vegetated	97,565,300
• Freshwater emergent wetlands	27,430,500
• Freshwater shrub wetlands	18,511,500
• Freshwater forested wetlands	51,623,300
All freshwater wetlands	104,274,600
Lacustrine deepwater habitats	16,859,600
Riverine deepwater habitats	7,510,500
Estuarine subtidal habitats	18,776,500
All wetlands and deepwater habitats	153,206,400

The Emergency Wetlands Resources Act of 1986 (Public Law 99-645) requires the USFWS to submit wetland status and trends reports to Congress (Dahl 2011, 2013). The acreage of lacustrine deepwater habitats does not include the open waters of Great Lakes (Dahl 2011, 2013).

The Federal Geographic Data Committee has established the Cowardin system developed by the U.S. Fish and Wildlife Service (Cowardin *et al.* 1979) as the national standard for wetland mapping, monitoring, and data reporting (Dahl 2011, 2013) (see also http://www.fgdc.gov/standards/projects/FGDC-standards-projects/wetlands/fgdc-announce, accessed January 31, 2012). The Cowardin system is a hierarchical system that describes various wetland and deepwater habitats, using structural characteristics such as vegetation, substrate and water regime as defining characteristics. Plant communities, soils, or inundation or flooding frequency defines wetlands. Deepwater habitats are permanently flooded areas located below the wetland boundary. In rivers and lakes, deepwater habitats are usually more than two meters deep.

There are five major systems in the Cowardin classification scheme: marine, estuarine, riverine, lacustrine, and palustrine (Cowardin *et al.* 1979). The marine system consists of Open Ocean on the continental shelf and its high-energy coastline. The estuarine system consists of tidal deepwater habitats and adjacent tidal wetlands that are usually partially enclosed by land, but may have open connections to open ocean waters. The riverine system generally consists of all wetland and deepwater habitats located within a river channel. The lacustrine system generally consists of wetland and deepwater habitats located within a topographic depression or dammed river channel, with a total area greater than 20 acres. The palustrine system generally includes all non-tidal wetlands and wetlands located in tidal areas with salinities less than 0.5 parts per thousand; it also includes ponds less than 20 acres in size. Approximately 95% of wetlands in the contiguous United States are freshwater wetlands, and the remaining 5% are estuarine or marine wetlands (Dahl 2011, 2013).

According to Hall *et al.* (1994), there are more than 204 million acres of wetlands and deepwater habitats in the State of Alaska, including approximately 174.7 million acres of wetlands. Wetlands and deepwater habitats comprise approximately 50.7% of the surface area in Alaska (Hall *et al.* 1994).

The National Resources Inventory is a statistical survey conducted by the Natural Resources Conservation Service (USDA 2009) of natural resources on non-Federal land in the United States. The Natural Resources Conservation Service defines non-Federal land as privately owned lands, tribal and trust lands, and lands under the control of local and state governments. The land use determined by 2007 National Resources Inventory is summarized in Table 4.3. The 2007 National Resources Inventory estimates that there are 110,671,500 acres of palustrine and estuarine wetlands on non-Federal land and water areas in the United States (USDA 2009). The 2007 National Resources Inventory estimates that there are 48,471,100 acres of open waters on non-Federal land in the United States, including lacustrine, riverine and marine habitats, as well as estuarine deepwater habitats.

The land cover/use categories used by the 2007 National Resources Inventory are defined below (USDA 2009). Croplands are areas used to produce crops grown for harvest. Pastureland is land managed for livestock grazing, through the production of introduced forage plants. Conservation Reserve Program land is under a Conservation Reserve Program contract. Forestland is comprised of at least 10% single stem woody plant species that will be at least 13 feet tall at maturity. Rangeland is land on which plant cover consists mostly of native grasses, herbaceous plants or shrubs suitable for grazing or browsing, and introduced forage plant species. Other rural land consists of farmsteads and other farm structures, field windbreaks, marshland, and barren land. Developed land is comprised of large urban and built-up areas (i.e., urban and built-up areas 10 acres or more in size), small built-up areas (i.e., developed lands 0.25 to 10 acres in size), and rural transportation land (e.g., roads, railroads, and associated rights-of-way outside urban and built-up areas). Water areas are comprised of waterbodies and streams that are permanent open waters.

The wetlands data from U.S. Fish and Wildlife Service's Status and Trends study and the Natural Resources Conservation Service's National Resources Inventory should not be compared, because they use different methods and analyses to produce their results (Dahl 2011, 2013).

Table 4.3 The 2007 National Resources Inventory Acreages for Palustrine and Estuarine Wetlands on non-Federal Land, by Land Cover/Use Category (USDA 2009).

National Resources Inventory Land Cover/Use Category	Area of Palustrine and Estuarine Wetlands (acres)
Cropland, pastureland, and Conservation Reserve Program land	16,790,300
Forest land	66,043,100
Rangeland	7,940,300
Other rural land	14,744,800
Developed land	1,571,900
Water area	3,581,100
Total	110,671,500

Leopold *et al.* (1964) estimated that there are approximately 3,250,000 miles of river and stream channels in the United States. This estimate is based on an analysis of 1:24,000 scale topographic maps. Their estimate does not include many small streams. Many small streams are not mapped on 1:24,000 scale U.S. Geological Survey topographic maps (Leopold 1994) or included in other analyses (Meyer and Wallace 2001). In a study of stream mapping in the southeastern United States, only 20% of the stream network was mapped on 1:24,000 scale topographic maps, and nearly none of the observed intermittent or ephemeral streams were indicated on those maps (Hansen 2001). Another study in Massachusetts showed that those types of topographic maps exclude over 27% of stream miles in a watershed (Brooks and Colburn 2011). For a 1:24,000 scale topographic map, the smallest tributary found by using 10-foot contour interval has drainage area of 0.7 square mile and length of 1,500 feet, and smaller stream channels are common throughout the United States (Leopold 1994). Due to the difficulty in mapping small streams, there are no accurate estimates of the total number of river or stream miles in the contiguous United States that may be considered as "waters of the United States."

The Nation's aquatic resource baseline is underestimated by studies that estimate the length or number of stream channels within watersheds (see above), the U.S. Fish and Wildlife Service status and trends study, and the National Wetland Inventory (NWI). The U.S. Fish and Wildlife Service status and trends study does not include Alaska, Hawaii or the territories. The underestimate of wetland acreage by the U.S. Fish and Wildlife Service status and trends study and the NWI results from the minimum size of wetlands detected through remote sensing techniques and the difficulty of identifying certain wetland types through those remote sensing techniques. The NWI maps do not show small or linear wetlands (Tiner 1997) that may be directly impacted by activities authorized by Nationwide Permits. For the latest FWS U.S. Fish and Wildlife Service status and trends study, most of the wetlands identified are larger than 1 acre, but the minimum size of detectable wetlands varies by wetland type (Dahl 2011, 2013). Some wetland types less than one acre in size can be identified; the smallest wetland detected for the most recent status and trends report was 0.1 acre (Dahl 2011, 2013). Because of the limitations of remote sensing techniques, certain wetland types are not included in the U.S. Fish and Wildlife Service status and trends study: seagrass beds, submerged aquatic vegetation, submerged reefs and certain types of forested wetlands (Dahl 2011, 2013).

The quantity of waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur, has been affected by many past federal, tribal, state, local, and private actions, many of which occurred prior to the enactment of section 404 of the Federal Water Pollution Control Act of 1972 (renamed the Clean Water Act with the 1977 amendments). The conversion of wetlands to other uses, such as agriculture, was encouraged by Federal government policies and occurred at a high rate from the time of European settlement to 1954 (an average of approximately 800,000 acres per year) (Heimlich *et al.* 1998).

4.2 Quality of Aquatic Ecosystems in the United States

The U.S. Fish and Wildlife Service status and trends study does not assess the condition or quality of wetlands and deepwater habitats (Dahl 2011, 2013). The EPA has undertaken the National Wetland Condition Assessment, which is a statistical survey of the wetland quality in the United States (Scozzafava 2009). The National Wetland Condition Assessment will assess wetland quality, by examining the ambient conditions of wetlands at national and regional scales. That effort is expected to be completed with the issuance of the final report in 2014, so that information is not currently available[30].

Information on water quality in waters and wetlands, as well as the causes of water quality impairment, is collected by the EPA under CWA sections 305(b) and 303(d). Table 4.4 provides EPA's most recent national summary of water quality in the Nation's waters and wetlands. According to the 2010 national summary (U.S. EPA 2012), 53% of assessed rivers and streams, 66% of assessed bays and estuaries, 81% of assessed coastal shoreline, 24% of assessed ocean and near coastal waters and 84% of assessed wetlands are impaired.

For rivers and streams, 34 causes of impairment were identified, and the top 10 causes were pathogens, sediment, nutrients, organic enrichment/oxygen depletion, polychlorinated biphenyls, habitat alterations, metals (excluding mercury), mercury, flow alterations and temperature. The primary sources of impairment for the assessed rivers and streams were agriculture, atmospheric deposition, unknown sources, hydrology modification, urban-related runoff/stormwater, wildlife,

[30] See http://water.epa.gov/type/wetlands/assessment/survey/

municipal discharges/sewage, unspecified non-point sources, habitat alterations and resource extraction.

For wetlands, 27 causes of impairment were identified, and the top 10 causes were organic enrichment/oxygen depletion, pathogens, mercury, metals (excluding mercury), habitat alterations, nutrients, flow alterations, toxic inorganics, total toxics and sediment. The primary sources for wetland impairment were “unknown,” wildlife, municipal discharges/sewage, agriculture, atmospheric deposition, industrial, hydrology modifications, resource extraction, other, and unspecified non-point sources.

Table 4.4 The 2010 National Summary of Water Quality Data (U.S. EPA 2012).

Category of water	Total waters	Total waters assessed	Percent of waters assessed	Good waters	Threatened waters	Impaired waters
Rivers and streams	3,533,205 miles	965,693 miles	27.3	445,079 miles	6,369 miles	514,246 miles
Lakes, reservoirs and ponds	41,666,049 acres	18,796,765 acres	45.1	5,833,964 acres	38,681 acres	12,924,120 acres
Bays and estuaries	87,791 square miles	32,830 square miles	37.4	11,045 square miles	17 square miles	21,768 square miles
Coastal shoreline	58,618 miles	9,143 miles	15.6	1,746 miles	0 miles	7,396 miles
Ocean and near coastal waters	54,120 square miles	1,275 square miles	2.4	968 square miles	0 square miles	307 square miles
Wetlands	107,700,000 acres	1,311,645 acres	1.2	208,944 acres	805 acres	1,101,895 acres
Great Lakes shoreline	5,202 miles	4,431 miles	85.2	78 miles	0 miles	4,353 miles
Great Lakes open waters	60,546 square miles	53,332 square miles	88.1	62 square miles	0 square miles	53,270 square miles

Water quality standards are established by states, with review and approval by the EPA (see CWA section 303(c) and the implementing regulations at 40 CFR part 131). Under CWA section 401, States review proposed discharges. Most causes and sources of impairment are not due to activities regulated under section 404 of the CWA or section 10 of the Rivers and Harbors Act. Inputs of sediments into aquatic ecosystems can result from erosion occurring within a watershed (Beechie *et al.* 2013, Gosselink and Lee 1989). As water moves through a watershed it carries sediments and pollutants to streams (e.g., Allan 2004, Dudgeon *et al.* 2005, Paul and

Meyer 2001) and wetlands (e.g., Zedler and Kercher 2005, Wright *et al.* 2006). Non-point sources of pollution (i.e., pollutants carried in runoff from farms, roads, and urban areas) are largely uncontrolled (Brown and Froemke 2012) because the CWA only requires permits for point sources discharges of pollutants (i.e., discharges of dredged or fill material regulated under section 404 of the CWA and point source discharges of other pollutants regulated under section 402).

Habitat alterations as a cause or source of impairment may be the result of activities regulated under section 404 of the CWA and section 10 of the Rivers and Harbors Act because they involve discharges of dredged or fill material into jurisdictional waters or structures or work in navigable waters, but habitat alterations may also occur as a result of activities not regulated under those two statutes, such as the removal of vegetation from upland riparian areas. Hydrologic modifications may or may not be regulated under section 404 of the CWA or section 10 of the Rivers and Harbors Act, depending on whether those hydrologic modifications are the result of discharges of dredged or fill material into waters of the United States regulated under section 404 of the CWA or structures or work in navigable waters of the United States regulated under section 10 of the Rivers and Harbors Act. When states, tribes, or the EPA establish total daily maximum loads (TMDLs) for pollutants and other impairments for specific waters, there may be variations in how these TMDLs are defined (see 40 CFR part 130).

The quality of jurisdictional waters and wetlands can be expressed as the ability to perform ecological functions. Two common ways of characterizing the ability of aquatic ecosystems to perform ecological functions are "functional capacity" or "condition." The Corps regulations at 33 CFR 332.2 define "functional capacity" as "the degree to which an area of aquatic resource performs a specific function." The term "condition" is defined in 33 CFR 332.2 as "the relative ability of an aquatic resource to support and maintain a community of organisms having a species composition, diversity, and functional organization comparable to reference aquatic resources in the region."

As discussed below, many anthropogenic activities and natural processes affect the ability of jurisdictional waters and wetlands to perform ecological functions. Stream and river functions are affected by activities occurring in their watersheds, including the indirect effects of land uses changes (Beechie *et al.* 2013, Allan 2004, Paul and Meyer 2001). Booth at al. (2004) found riparian land use in residential areas also strongly affects stream condition because many landowners clear vegetation up to the edge of the stream bank. The removal of vegetation from upland riparian areas and other activities in those non-jurisdictional areas do not require Corps authorization. Wetland functions are also affected by indirect effects of land use activities in the land area that drains to the wetland (Zedler and Kercher 2005, Wright *et al.* 2006). Human activities within a watershed or catchment that have direct or indirect adverse effects on rivers, streams, wetlands, and other aquatic ecosystems are not limited to discharges of dredged or fill material into waters of the United States or structures or work in a navigable waters. Human activities in uplands have substantial indirect effects on the structure and function of aquatic ecosystems, including streams and wetlands, and their ability to sustain populations of listed species. It is extremely difficult to distinguish between degradation of water quality caused by upland activities and degradation of water quality caused by the filling or alteration of wetlands (Gosselink and Lee 1989).

4.3 National Efforts to Conserve Aquatic Ecosystems

4.3.1 Clean Water Act

Originally the Federal Water Pollution Control Act, the Clean Water Act as it is now known is the principal law concerned with polluting activity in streams, lakes and estuaries in the United States. This 1948 statute was re-written in 1972 (P. L. 92-500) to produce its current purpose: "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (Federal Water Pollution Control Act, Public Law 92 –500). Congress made substantial amendment to the CWA in the Water Quality Act of 1987 (P. L. 100-4) in response to the significant and persistent water quality problems.

The CWA uses two primary approaches to achieve its goal. The first approach uses regulations to achieve a goal of zero discharge of pollutants into waters of the United States. The second approach provides federal technical assistance for municipal wastewater treatment construction. Both approaches are supported by research activities, permits and provisions for enforcement. To achieve its objectives, the CWA prohibits all discharges into the nation's waters, unless they are specifically authorized by a permit. For example, the National Pollutant Discharge Elimination System (NPDES) program regulates discharges of pollutants like bacteria, oxygen-consuming materials, and toxic pollutants like heavy metals, pesticides, and other organic chemicals. On the other hand, CWA section 404 prohibits discharges of dredged or fill material into waters of the United States without a permit.

Most of these federal programs are administered by the EPA, while state and local governments have the principal day-to-day responsibility for implementing the law. However, as discussed in the Description of the Proposed Action section of this Opinion, Section 404 of the CWA (33 U.S.C section 1344) authorizes the Corps, or a state with a program approved by the EPA, to regulate placement of dredged or fill material in waters of the United States and other activities in navigable waters of the United States. We discuss the impacts of the Corps' program and its effects on endangered and threatened species in the Effects of the Action chapter, which follows this Environmental Baseline.

Nonpoint sources of water pollution, which are believed to be responsible for the majority of modern water quality problems in the United States, are generally not subject to CWA permits or the regulatory requirements. Instead, non-point sources of pollution are primarily regulated by States programs.

4.3.2 Wetland Protection Programs

Since the 1970s, numerous federal, state, local and private programs have developed to protect and restore wetlands for their hydrological, ecological and aesthetic value. In 1977, the Office of the President issued Executive Order No. 11990 which directed all federal agencies to minimize the destruction of wetlands and to preserve and enhance wetlands' benefits when carrying out responsibilities such as managing federal lands and facilities or funding construction activities. In 1989, the Executive Office of the President committed the executive branch of the United States to achieve a national goal of no net loss of wetlands.

About 13 percent of the wetland acreage in the United States is managed by Federal agencies. This are includes 1.1 million acres of the U.S. Fish and Wildlife Service's National Wildlife

Refuge System that were established to protect wetland ecosystems. Other Federal agencies managing wetlands include the National Park Service, U.S. Department of Agriculture Forest Service, Bureau of Land Management, NOAA, Bureau of Reclamation, Bureau of Indian Affairs and Department of Defense. Under Federal-Aid-Highway legislation, state transportation agencies may use National Highway System and Surface Transportation Program funds to finance wetland and natural habitat conservation planning and implementation, as well as compensatory mitigation and restoration projects that offset unavoidable losses from transportation projects. Under the Federal Aid Highway Program, the U.S. Department of Transportation has created, restored or enhanced almost 42,000 acres of wetlands since 1996, which exceeds the acres adversely affected by transportation projects by almost 26,000 acres.

In addition, numerous programs implemented by Federal, state, and local governments, non-governmental organizations, and private institutions are designed to protect, restore, or enhance wetland ecosystems on the 74 percent of the land in the United States that is privately owned.

Conservation Reserve Program

Originally authorized in 1985 and re-authorized through 2007, the Conservation Reserve Program establishes permanent cover on eligible acreage of environmentally sensitive lands (including cropped and wetlands that had been previously converted for agriculture) through long-term rental agreements. Currently, about 2.3 million wetland acres, including upland buffers, have been restored and are maintained under 10- and 15-year contracts with annual rental payments.

<u>Wetlands Reserve Program</u>: Another voluntary program that helps restore and protect wetlands on private lands using conservation easements and cost-share agreements. Since 1992, more than 1 million acres of wetland and associated upland have been enrolled in this program. The 2002 Farm Bill authorizes up to an additional 250,000 acres to be enrolled in the program each year, for a total program enrollment of 2,275,000 acres by the end of 2007. By the end of fiscal year 2005, the acreage of wetlands that were enrolled in this program exceeded 1.8 million acres of wetlands and associated uplands.

<u>Aquatic Ecosystem Restoration</u>: The Corps has numerous authorities that allow them to undertake projects to restore aquatic ecosystems on the 12 million acres of water and land the Corps' manages for purposes, such as flood damage reduction, navigation and recreation. For example, the Corps is primarily responsible for the Comprehensive Everglades Restoration Plan (which was developed to restore the South Florida ecosystem, from Lake Okeechobee to the Florida Everglades and, once complete, will represent the largest ecosystem restoration undertaken), the Louisiana Coastal Area, LA Ecosystem Restoration, which was developed to restore and protect Louisiana's valuable coastal wetlands, and the Upper Mississippi River Restoration, which entails a suite of habitat projects to revitalize the side channels and to restore island, aquatic, and riparian habitat in the Upper Mississippi River.

<u>FWS Coastal Program</u>: The Coastal Program works in 18 specific coastal communities to improve the health of watersheds for fish, wildlife, and people by building partnerships; identifying, evaluating, and mapping important habitats; restoring habitats; and providing technical assistance and financial support to help protect important coastal habitats. Since 1994, the program has restored 112,000 acres of coastal wetlands, 26,000 acres of coastal uplands, and

over 1,100 miles of coastal streamside habitat. It has also helped protect 1.33 million acres of coastal habitat.

North American Wetlands Conservation Act Program: This U.S. Fish and Wildlife Service participates in a tri-national strategic plan that works to build partnerships between state and Federal governments, tribes, corporations, private organizations, and individuals that are designed to cooperatively plan, fund, and implement projects to conserve and enhance wetland habitat in high-priority "joint venture" regions. The plan calls for 16.1 million acres of wetlands and associated uplands to be protected and 12.1 million acres to be restored or enhanced.

FWS Partners for Fish and Wildlife Program: This program works with landowners to restore wetlands on private lands using cooperative agreements. Since the program began in 1987, the U.S. Fish and Wildlife Service has entered into over 37,000 agreements to restore more than 750,000 acres of wetlands, over 1.57 million acres of uplands, and over 5,900 miles of riparian and in-stream habitat.

Environmental Quality Incentives Program (EQIP): Through EQIP, farmers and ranchers receive financial and technical assistance on conservation practices that enhance soil, water and related natural resources, including wetlands. Since the program was established in 1996, it has restored about 29,369 acres of wetlands and an additional 146,769 acres have been enhanced or improved.

Other federal programs that are protect, restore, or enhance wetlands in the United States include the Grassland Reserve Program and Wildlife Habitat Incentives Program. By fiscal year 2007, the latter of these two programs is expected to have protected, restored or enhanced about 11,100 acres of wetlands. The Federal Highway Administration uses its various authorities to achieve a net increase in wetland acreage associated with its projects. For example, Federal-aid highway projects provided 3.3 acres of compensatory wetland mitigation for each acre of impact and the FHWA estimates that Federal-aid highway programs have resulted in a net increase of 25,888 acres of wetlands between 1996 and 2005.

4.4 Corps Contributions to the Environmental Baseline

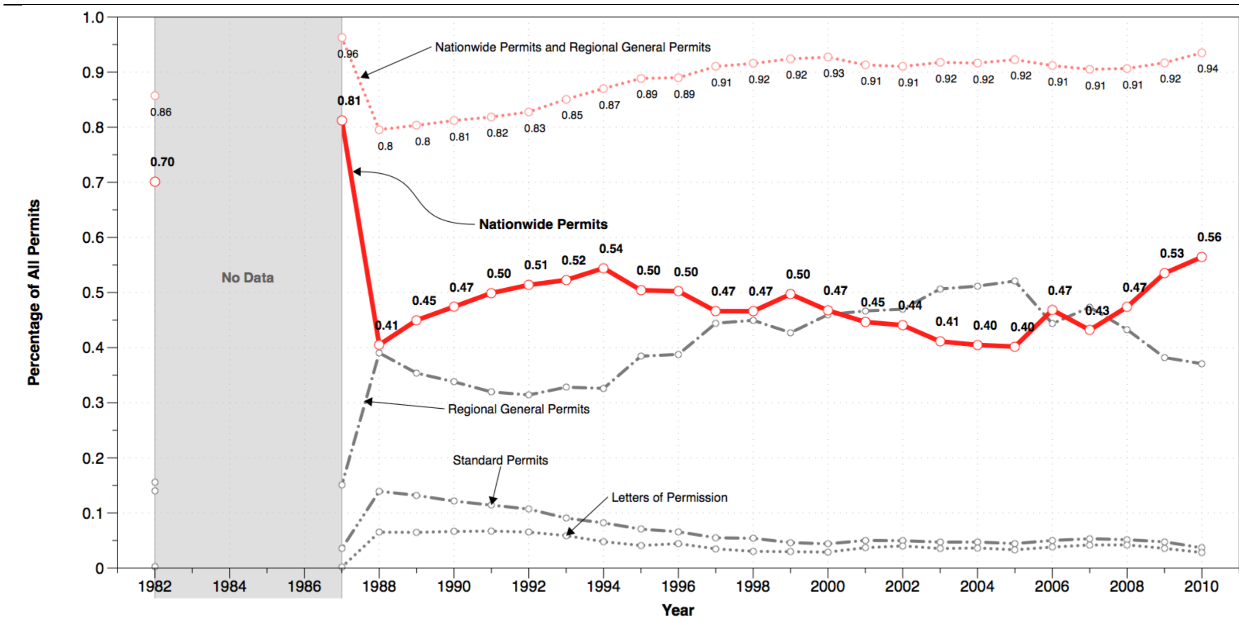
The Corps has authorized many different types of activities that directly or indirectly produce stressors which affect threatened or endangered species under NMFS' jurisdiction. Contributing factors are identified in Endangered Species Act listing rules, NMFS web pages, status reports and recovery plans. In some cases, the factors are identified in terms of the activities or sources of multiple stressors (e.g., gas and oil exploration, urbanization, agriculture), in other cases specific stressors are identified (e.g., entrainment mortality, temperature changes). The Nationwide Permit Program is not the sole or primary source of these contributing factors, but describing the Corps' contribution to the environmental baseline enhances our understanding of the larger context in which we consider the effects of the Corps' current proposed program.

4.4.1 Number of Activities Authorized by Nationwide Permits

The available data indicate that, since Nationwide Permits were established, they have been responsible for authorizing between 40% and slightly more than 80% of all of the activities the Corps has authorized (Figure 4.1). The combination of Nationwide and General Permits accounted for more than 90% of the Corps' authorizations since the early 1980s, although the proportion of activities authorized has fluctuated. Until the late 1990s, Nationwide Permits accounted for the greatest proportion of authorizations, from the late 1990s until about 2007, General Permits accounted for the greatest proportion of authorization; since then, the proportion of authorizations accounted for by Nationwide Permits has continually increased.

The number of activities authorized under the Nationwide Permits in 1987 was an order of magnitude greater than any other of the years since (see Figure 4.2). If we treat the estimate for 1987 as an aberration, the average number of discharges and other activities authorized by the Nationwide Permits drops to 33,109 (95% confidence interval = 30,250 – 35,968). The number of discharges of dredged or fill material into waters of the United States and other activities that have been authorized between the time period 2003 and 2010 have averaged 31,090 (95% confidence interval = 31,085 – 31,097), which is only slightly below the average for the longer time interval.

Figure 4.1 Percentage of the total number of activities the Corps authorized using Nationwide Permits, Regional General Permits, Standard Permits and Letters of Permissions between 1982 and 2010.

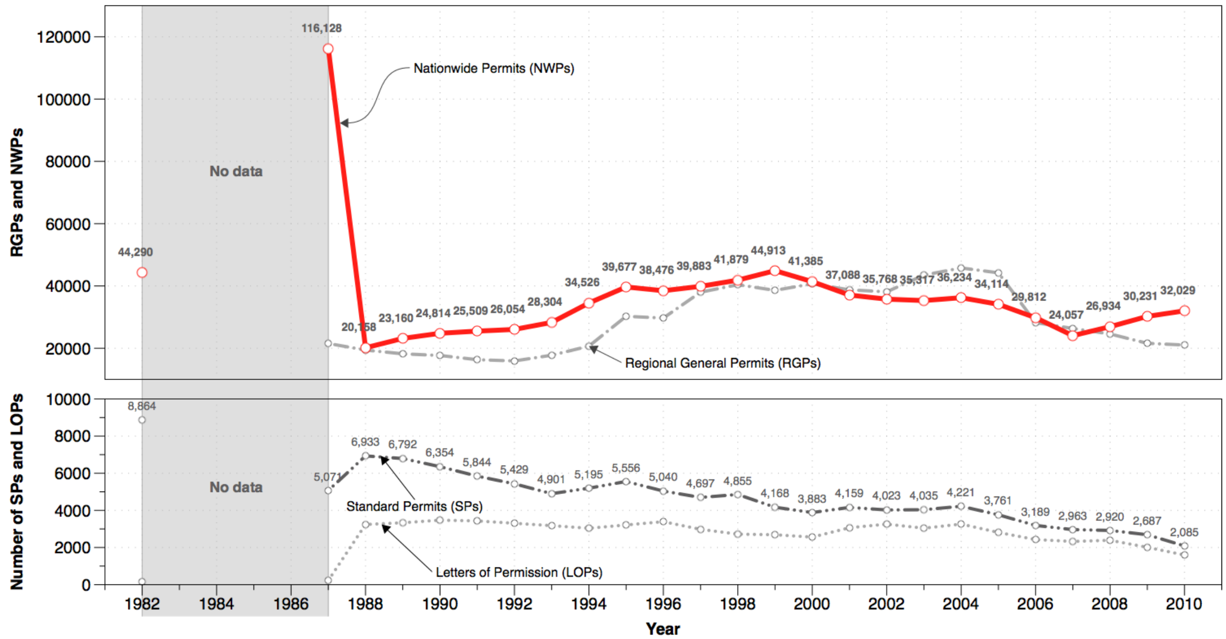


Data from the Corps, Environmental Working Group, and Public Employees for Environmental Responsibility

The number of activities authorized by Nationwide Permits declined consistently between 1999 and 2007 (Figure 4.2); in that time interval, the number of activities authorized by Nationwide Permits declined by 25,612 or 26%.

Because many Nationwide Permits have historically authorized discharges of dredged or fill material into waters of the United States and other activities without requiring permittees to provide any information to the Corps, we assume that the Nationwide Permits have authorized a substantial, but unknown number of activities. As a result, our estimates of the number of activities authorized by the Nationwide Permits and the number of acres impacted by those activities may underestimate the actual number of activities that have occurred in the past (see Ellis 2005)

Figure 4.2 Number of Activities the Corps Authorized using Nationwide Permits each Year between 1982 and 2010.



Data from the Corps, Environmental Working Group, and Public Employees for Environmental Responsibility

Based on the data they received from the Corps, the Environmental Working Group (1996) concluded that the Corps underestimated the number of activities it authorized using Nationwide Permits by 32 to 100%, depending on the permit number. PEER estimated that the Corps authorized about 36,000 to 39,000 activities each year, or a total of 112,804 activities under Nationwide Permits in 1995, 1996 and 1998 (PEER 1999). The data available do not allow us to produce more reliable or robust estimates; nevertheless, for the purposes of this consultation, we assume that the estimates discussed in this subsection are minimum estimates.

Over the 24 years of available data, about 910,740 discharges of dredged or fill material have been authorized by Nationwide Permits. As we have already discussed, analysis of historical data assumed these are minimum estimates and that the actual number of discharges of dredged or fill material into waters of the United States are substantially higher because they do not account for the number of authorizations that did not require permittees to notify the Corps. We also assume that some estimates contained in PCNs had some error associated with them.

4.4.2 Impact Magnitude and Distribution

The limitations in the data available since 1977 affects our ability to estimate the magnitude and distribution of impacts authorized under the Nationwide Permits. During the original consultation, the Corps and NMFS determined that data for the years 1999, 2007 and 2010 were the best available data for making these estimates for the purpose of projecting impacts of future Nationwide Permit authorizations.

Magnitude of Activities and Impacts Authorized by Nationwide Permits

We focused the scope of the discussion on those permits that occur in the 19 Corps Districts whose jurisdictions overlap with NMFS species. In addition, some activities authorized by Nationwide Permits are not expected to produce indirect or direct effects to endangered species, threatened species, or designated critical habitat under NMFS' jurisdiction, or would produce minor or extremely limited effects. These permits and the others that involve activities that directly or indirectly affect endangered or threatened species under NMFS' jurisdiction are listed in Table 4.5.

Table 4.5 The Nationwide Permits which are Likely to Involve Activities that may Impact Threatened and Endangered Species under NMFS' Jurisdiction and their Designated Critical Habitat*.

NWP #	Permit name (using naming conventions in 2011 proposed rule)	NWP #	Permit name (using naming conventions in 2011 proposed rule)
1	Aids to navigation	29	Residential developments
3	Maintenance	31	Maintenance of existing flood control facilities
4	Fish and wildlife harvesting, enhancement, and attraction devices	33	Temporary construction, access and dewatering
7	Outfall structures and associated intake structures	35	Maintenance dredging of existing basins
8	Oil and gas structures on the outer continental shelf	36	Boat ramps
12	Utility line activities	39	Commercial and institutional developments
13	Bank stabilization	40	Agricultural activities
14	Linear transportation projects	43	Stormwater management facilities
17	Hydropower projects	46	Discharges into ditches
26	Headwaters and isolated waters	48	Existing commercial shellfish aquaculture activities
27	Aquatic habitat restoration, establishment, and enhancement activities	52	Water based renewable energy generation pilot projects
28	Modifications of existing marinas		

* We determined that Nationwide Permit 52 "Water Based Renewable Energy Generation Pilot Projects" may cause impacts to ESA listed resources under NMFS' jurisdiction. However, historic data are not available to make estimates.

If we assume that permits potentially affecting species under NMFS' jurisdiction account for 79% of the 910,740 Nationwide Permit activities authorized since 1982, and 77,023 of these authorizations were under Nationwide Permits 26 and 27, we are left with an estimated 642,461 authorizations.

With an average impact of 0.2 acres per activity, baseline contributed by these remaining permits amounts to an estimated 128,492 acres, giving a net baseline impact estimate for all permits listed in Table of 314,252 acres of jurisdictional and other waters of the United States.

Spatial Patterns of Activities and Impacts Authorized by Nationwide Permits

Table 4.6 summarizes District-specific data provided by the Corps for the years 2007 and 2010 (we did not have similar data for 1999) and supplemented with data from other sources for the 19 Corps Districts that overlap the distribution of endangered or threatened species under NMFS' jurisdiction or critical habitat that has been designated for those species. In 2007, 48.89% of all of the activities authorized using Nationwide Permits occurred in those Districts of concern. There was little change in 2010, with a statistically insignificant decline to 47%. While the frequency of authorized activities did not appear to change in these districts, the relative magnitude of the activities increased from 59% of all of the acreage impacted by activities authorized by Nationwide Permits in 2007 to 87% in 2010. The broad difference between these two data points complicates estimation of geographically pertinent baseline impact. With data for only two years, there is no way to know whether either observation is an aberration or whether the large difference reflects a large amount of variability among years. In such cases it is appropriate to provide an estimate in terms of a range. Using the baseline impact estimate of 314,252 acres derived above for those permits potentially affecting species under NMFS' jurisdiction (Table 4.5), the baseline estimate for impacts within districts which overlap with the distribution of species under NMFS' jurisdiction is between 185,408 to 273,339 acres.

The 2007 and 2010 data offer finer resolution of the distribution of these impacts among Corps Districts and which species are likely exposed. Slightly more than half of the 51,051 activities authorized by all Nationwide Permits in 2007 and 2010 occurred within those Districts that occur along the Atlantic Coast. The second largest number of activities authorized by Nationwide Permits occurred in the Pacific Southwest, followed by the Pacific Northwest. The smallest number of activities authorized by the Nationwide Permits occurred in the Western Pacific.

About 82% of the 30,479 acres impacted by those activities also occurred along the Atlantic Coast and that region had the highest mean-acreage-impacted-per-activity value, about 1 acre, over those two years. The high percentage of activities and acres impacted along the Atlantic Coast in 2007 and 2010 resulted from the contribution of the Jacksonville Corps District, which has jurisdiction over the State of Florida, Puerto Rico and the U.S. Virgin Islands. That District experienced the largest number of activities authorized by Nationwide Permits and the largest acreage impacted by those activities in 2007 and 2010: within the boundaries of Jacksonville the Corps District, about 6,466 activities were authorized impacting about 22,953 acres. The pattern of activities and acreage impacted in that Corps District was inconsistent: the largest number of activities were authorized in 2007, but the largest acreage were impacted in 2010 (the mean-acreage-impacted-per-activity values for 2007 and 2010, respectively, were 0.2 and 14).

The Gulf Coast Corps Districts had the second highest mean-acreage-impacted-per-activity value for the two years (0.56), followed by the Pacific Northwest (mean-acreage-impacted-per-activity 0.14) and the Pacific Southwest (mean-acreage-impacted-per-activity 0.12). Without the activities and acreage impacted in the Jacksonville Corps District, the other Districts along the Atlantic Coast would have had mean-acreage-impacted-per-activity that is slightly lower than the Pacific Southwest (0.1). Alaska had the smallest mean-acreage-impacted-per-activity value for the two years.

There is very little information on where activities authorized by Nationwide Permits occur at spatial scales that have higher resolution than the Corps Districts. However, three studies examined the spatial distribution of Nationwide Permits within particular sub-basins (Brody *et al.* 2008, Highfield 2008) or counties (Ellis 2005). Those studies suggest an important pattern: activities authorized by Nationwide Permits tended to be concentrated in limited spatial areas and that concentration increases the probability of impacts in the form of space-crowded perturbations and the gradual disturbance and loss of land and habitat, or incremental and decremental effects.

Brody *et al.* (2008) studied the spatial distribution of standard permits (individual), letters of permission, general permits and Nationwide Permits the Corps issued in coastal areas of the states of Florida and Texas from 1991 to 2003. Based on their analyses, about 56% of the activities authorized in both states were authorized by Nationwide Permits (60.1% in Florida, 45.9% in Texas). In Florida, about 43% of permitted activities were located outside of urban areas and 49% of those activities were located within the 100-year floodplains. In Texas, about 78% of permitted activities were located outside of urban areas and 39% of those activities were located within the 100-year floodplains. In Texas, about 47% of the activities affected estuarine wetlands; in Florida about 55% of the activities occurred in palustrine wetlands.

In Florida, Nationwide Permits authorized 44% of the activities that affected estuarine wetland ecosystems, 60% of the activities that affected lacustrine wetland ecosystems, 48% of the activities that affected riverine wetland ecosystems and 47% of the activities that affected marine wetland ecosystems. In Texas, Nationwide Permits authorized 39% of the activities that affected estuarine wetland ecosystems, 44% of the activities that affected lacustrine wetland ecosystems, 41% of the activities that affected riverine wetland ecosystems and 58% of the activities that affected marine wetland ecosystems. Brody *et al.* (2008) concluded that the Corps increasingly used Nationwide Permits to authorize residential projects that occurred in palustrine wetlands in areas outside of urban areas over the study period. In particular, they highlighted the effects of these projects in coastal Texas around Galveston and Corpus Christi Bays where there were no large protected areas to buffer outward growth (as is the case in southern Florida), and there are no mandated growth management or comprehensive planning regulations that could help concentrate growth in urban areas. They concluded that palustrine wetlands will increasingly be altered by smaller-scale, residential projects authorized by Nationwide Permits, particularly in coastal Texas that is one of the fastest growing areas of the country

Table 4.6 Summary of the Estimated Annual Number and Percentage of Activities the Corps Authorized using the Nationwide Permits and the Acreage Affected by those Activities from 2007 to 2010, for Corps Districts that have ESA Listed Resources under NMFS' Jurisdiction*.

Corps District	Total Activities in subset	Total Acres Filled in subset	Mean Acreage Impacted Per Activity	Reported Mitigation
Alaska	2,889	252.029	0.0872	14.675
Baltimore	55	25.058	0.4556	14.552
Charleston	1,326	81.095	0.0612	33.75
Galveston	1,176	418.962	0.3563	409.94
Honolulu	390	52.567	0.1348	0
Jacksonville	4,904	974.73	0.1988	2,373.94
Los Angeles	1,806	336.047	0.1861	467.092
Mobile	1,108	145.782	0.1316	252.227
New Orleans	1,138	128.514	0.1129	112.799
New York	2,151	237.373	0.1104	153.904
Norfolk	3,018	134.875	0.0447	641.403
Philadelphia	585	48.839	0.0835	47.035
Portland	2,145	254.131	0.1185	1,243.95
Sacramento	1,974	176.444	0.0894	216.861
San Francisco	653	39.515	0.0605	590.191
Savannah	2,352	299.56	0.1274	445.711
Seattle	2,182	517.1	0.237	593.606
Walla Walla	1,521	141.36	0.0929	126.303
Wilmington	4,664	560.158	0.1201	1,213.25
Totals	**36,037**	**4,824.14**	0.1339	**8,951.19**
All Districts	**73,713**	**8,118.75**	0.1101	**12,751.71**
Percent of All Districts	**0.4889**	**0.5942**	-	**0.7020**

* Data provided by the Corps.

Brody *et al.* (2008) also concluded that a large percentage of wetland alteration permits in both states were issued within the 100-year floodplain (an average of 48% and 39% in Florida and Texas, respectively). They argued that these results were ecologically significant because wetland alteration within floodplains increases impervious surface area and reduces or eliminates a wetland's ability to capture and store water runoff. Disrupting the natural hydrological system can exacerbate flooding or create flood problems in areas not originally considered vulnerable to flooding.

Highfield (2008) studied the impacts of CWA section 404 permits issued by the Galveston Corps District in coastal counties in Texas from 1996 through 2003. Based on his study, activities authorized by permits tended to be concentrated in particular sub-basins. Specifically, activities in one sub-basin located north of the City of Houston and intersecting six counties: Leon, Houston, Polk, Trinity, Madison and Walker Counties, accounted for about 74% of the permits he studied. Activities authorized by Nationwide Permits and General Permits accounted for 21% and 67% of those permits, respectively. This sub-basin was the largest in his study area and had a higher concentration of wetlands, which would explain the concentration of permits.

4.4.3 Information relating to Aggregate Impacts of the Corps Nationwide Permit Activities

As noted in the *Approach to the Assessment* section of this Biological Opinion, we are concerned with "aggregate impacts" as recognized under the ESA. Nevertheless, information concerning related types of such impacts is relevant to our understanding under the ESA. This section discusses that information.

In 1977, in response to concerns about the potential cumulative impacts of activities that would be authorized by Nationwide Permits that were raised by members of the public and the Environmental Protection agency, the Corps stated its intention to "remain aware of potential cumulative impacts that may occur on a regional basis as a result of these Nationwide Permits. If adverse cumulative impacts are anticipated from any of the discharges of dredged or fill material into waters of the United States subject to these Nationwide Permits, we intend to take appropriate administrative action, including the exercise of authority express in 232.4-4 to require individual or general permits for these activities" (the Corps 1977 page 37131). The Corps has reiterated that commitment each time it has reauthorized Nationwide Permits.

However, numerous studies have identified cumulative impacts resulting from activities historically authorized by Nationwide Permits. Some of those studies have resulted in administrative changes to the Nationwide Permit Program (for example, the Corps decision not to reissue Nationwide Permit 26 after it expired on June 7, 2000). In its 1995 report on wetland identification and delineation, the National Research Council (1995) recommended that the Corps review Nationwide Permit 26 because of the cumulative wetland losses that resulted from its use. The 1995 National Research Council report was influential in the Corps decision to not reissue Nationwide Permit 26 (see the December 13, 1996, issue of the Federal Register [61 FR 65891]).

Several authors have determined that the Corps' assessments generally failed to consider the cumulative impacts of its authorizations. A review of the Corps' permitting program in southern California concluded that the Corps appeared to evaluate CWA section 404 permits on an individual basis without consideration of cumulative impacts at watershed or regional spatial scales (Allen and Feddema 1996). That review also concluded that the effects of several projects had accumulated to have substantial consequences for aquatic ecosystems without being objectively monitored or detected by the Corps.

The National Research Council's review of wetland compensatory mitigation (NRC 2001) stated that Nationwide Permits that do not require pre-construction notification "make it difficult for the Corps to determine overall program impacts." Separate reviews of CWA section 404 permitting –including the Corps Nationwide Permit Program– in southern California (Stein and Ambrose 1998) and the implementation of the Nationwide Permit Program in the Commonwealth of the Northern Mariana Islands (Gilman 1998) reached similar conclusions: the Corps either did not take sufficient action address cumulative impacts in southern California, or it did not collect sufficient information to consider the cumulative impacts of the activities it authorized, particularly Nationwide Permits.

Nationwide Permits historically have had the potential to combine to produce time-crowded, space-crowded and incremental impacts that have been determined by many investigators to have ecologically significant adverse consequences on the hydrology of natural drainage systems, water quality and the organisms they support. Various reviewers[31] have discussed the various categories of activities that have significant direct and indirect adverse effects on watershed hydrology, water quality, and the aquatic communities and the ecological integrity of aquatic habitats (e.g., Allan 2004, Brown and Froemke 2012, Paul and Meyer 2001, and Zedler and Kercher (2005)). In particular, Nationwide Permits 3, 12, 14, 29, 39, and 40 have authorized discharges of dredged or fill material into non-tidal waters of the United States for maintenance, road construction, residential housing, retail stores, industrial facilities, restaurants, business parks, and shopping centers. In 1999, 2007 and 2010, these Nationwide Permits authorized more than 93,700 activities impacting more than 4,300 acres of jurisdictional wetlands and other waters of the United States.

These investigators concluded that the Corps appears to have evaluated CWA section 404 permits on an individual basis without adequate consideration of cumulative impacts at watershed or regional spatial scales, and that there have been "large losses in available habitat functionality due to a concentration of many projects" which may seriously affect species inhabiting the area. A similar evaluation of permits issued by the Corps' Los Angeles District reported an 8% net loss of wetlands (Fenner 1991).

Stein and Ambrose (1998) studied activities the Corps authorized in the Santa Margarita River watershed in San Diego and Riverside Counties, California from 1985 to 1993. They reported that about 74% of total riparian area was slightly to substantially adversely affected relative to pre-permit site conditions, and less than 1% was enhanced. Nationwide Permit's accounted for 55% of area subjected to substantial adverse impacts. At the time of their study, the watershed supported 30 listed species and 40 other regionally rare, special status species. Nearly half of the

[31] The Corps noted during its review of a draft of this Biological Opinion that it is their opinion that these investigators rarely took into full account activities in watersheds that are not regulated by the Corps.

authorizations that were permitted in the watershed were followed by adverse to substantially adverse effects to listed species habitat, and no permits resulted in any enhancement of listed species habitat. About 40% of area affected by Nationwide Permits resulted in adverse to substantially adverse effects to the habitat of endangered or threatened species. Adverse impacts to listed species habitats occurred in all acreage categories these authors studied. The authors reported projects also had substantial adverse indirect effects, due for example to development of adjacent non-jurisdictional floodplains, inhibiting exchange of water, flood energy, sediment, nutrients and organisms between active channels and floodplains; fragmentation of habitat corridors, including threat to a mountain lion population corridor in the watershed; and loss of habitat heterogeneity and structure. Stein and Ambrose concluded that the Corps' section 404 implementation had failed to minimize cumulative impacts.

However, Stein and Ambrose (1998) acknowledged that activities that the Corps does not have the authority to regulate, such as the alteration of non-wetland riparian areas and the development of non-jurisdictional floodplains, result in substantial contributions to cumulative impacts to these resources. They also recognized that it is difficult to manage cumulative impacts to riparian ecosystems because so many different public and private landowners hold title to those lands. Stein and Ambrose noted that the Corps' section 404 implementation had failed to minimize cumulative impacts but that the Corps permit program could reduce such impacts by imposing a lower acreage limit for Nationwide Permits that will be issued to replace Nationwide Permit 26. They also suggested that a stronger role for regional planning and local zoning to protect floodplains and riparian areas would help manage cumulative impacts.

Similarly, an examination of 46 permits requiring mitigation in Texas from 1982 to 1986 (ignoring the majority of permits that did not require mitigation and non-reporting permits; Fort Worth, Galveston, and Tulsa Districts), reported a net loss of 31% of wetlands even after considering mitigation requirements (Sifneos, Kentula, and Price 1992). About half of the wetlands (by number) impacted in Texas were about 5 acres or smaller in size. Sifneos, Cake and Kentula (1992) reviewed the effects of the Corps permitting on freshwater wetlands in Louisiana, Alabama and Mississippi. The Corps required compensatory mitigation for only 8% of the nearly 25,000 acres of wetlands impacted by the Corps permits in Louisiana from 1982 to 1987, implying a net loss of at least 92% of the permitted fill area. Gosselink and Lee (1989) stressed the adverse effects of incremental, cumulative loss of bottomland hardwood forest wetlands in the South on ecosystem processes and plant and animal species. They attributed range restriction and fragmentation of swallow-tailed kite and threatened bald eagle populations and extirpation of the ivory-billed woodpecker in part to bottomland hardwood forest loss and fragmentation, and cite indirect effects--of cultivation of filled wetlands and use of mobile, bioaccumulative pesticides there—in the decline of endangered brown pelican and osprey in downstream areas. Extensive contiguous habitat area is important to the survival of large, far-ranging mammals and raptors, such as the endangered red wolf and endangered Florida panther, and of forest interior specialist bird species, notably many neotropical migrants. These are species for which bottomland hardwood forest is a common or preferred habitat (Gosselink and

Lee 1989).[32].

Ellis' (2005) study of the aggregate impacts of activities authorized by the Corps permits in Montana highlighted the aggregate impacts of bank stabilization activities authorized using Nationwide Permit 13 on 10 rivers in Montana, particularly the Yellowstone River (the longest free-flowing river in the lower 48 states). In four Montana counties, the Corps had authorized almost 82,000 linear feet (16.4 miles) of new bank stabilization structures on the Yellowstone River between 1990 and 2002. In the Billings area (in Yellowstone County, Montana), dikes and armoring had increased from approximately 21% of the channel's length in 1957 to 41% in 1999 (citing Aquoneering and Womack and Associates 2000). In Park County, she reported that the Yellowstone River contained at least 9,134 feet of riprap, 108 rock barbs, 106 rock jetties and 32 car bodies at the time of her study. One 8-mile section of the river, from Pine Creek to Carters Bridge, had been covered by rock riprap over 16% of its channel length and at least 62 rock barbs and jetties were added to this stretch between 1987 and 1998 (citing Natural Resources Conservation Service 1998). She also reported that the Corps' program had had similar effects on the Big Hole, Bitterroot, Clark Fork, Flathead Rivers, Missouri, Musselshell, Ruby and Sun Rivers.

In response to concerns about the cumulative impacts of bank stabilization and other types of fill activities in the upper Yellowstone River watershed, the Corps' Omaha District conducted a special area management plan (USACE 2011). A special area management plan is a comprehensive plan that guides the use of land and water resources in a watershed or other type of geographic area to provide natural resource protection and reasonable development, often with a general permit or abbreviated permitting procedures to facilitation implementation of the special area management plan (USACE Regulatory Guidance Letter 05-09). The Omaha District's special area management plan examined bank stabilization and other fill activities along a 48-mile reach of the Yellowstone River in Montana to analyze and select "feasible, defensible, science-based alternatives for modification of the Corps Regulatory Program for the upper Yellowstone River." The preferred alternative identified by the special area management plan consisted of revoking certain Nationwide Permits and adding new regional conditions to other Nationwide Permits to minimize adverse effects to the Yellowstone River caused by activities authorized by CWA Section 404 permits, including the Nationwide Permits.

We acknowledge that a host of other Federal, State, and local agencies and private institutions and individuals are responsible for activities that convert permeable to impervious surfaces. We also acknowledge that in some geographic areas and during some time intervals activities authorized by the Corps permits are responsible for only a fraction of this conversion. Nevertheless, we can acknowledge the contribution of other entities and still assess the

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[32] The Corps noted during its review of a draft of this Biological Opinion that it is their opinion that Gosselink and Lee (1989) recognized that cumulative effects are due to a variety of activities that occur in the landscape (not just CWA section 404 activities), and that it is difficult to show clear cause and effect relationships for species that respond to an assortment of human activities or other stressors. The Corps also noted that the authors also stated that differences in jurisdiction by government agencies (or the lack of jurisdiction) over the various categories of activities that contribute to cumulative effects makes it difficult to effectively manage cumulative effects.

contribution of the Corps permits to this larger problem.

Brody *et al.* (2008) also produced data that demonstrates that a disproportionate number of activities authorized by Nationwide Permits occur in the 100-year floodplain (an average of 48% and 39% of the authorizations issued in Florida and Texas, respectively) where those activities were more likely to affect water storage and hydrology. In their study, Brody *et al.* (2008) stated that additional research should examine other important factors that affect land use decisions and permit issuance, such as socioeconomic, demographic and political considerations. Heimlich (1998) estimated that approximately 82 percent of wetland acreage in the conterminous United States is located on privately owned land, and the Corps regulations recognize that landowners have a right for reasonable use of their property (see 33 CFR 320.4(g)(1)).

Highfield (2008, 2012) quantified the aggregate impacts of Nationwide Permits on stream flows in the catchment areas he studied. Although he did not report spatial or temporal patterns in the distribution of activities authorized using Standard and General Permits and Letters of Permission, he reported a statistically significant and positive relationship in the pattern of activities authorized by Nationwide Permits. He also concluded that Standard Permits, General Permits, Nationwide Permits and Letters of Permission had a statistically significant effect on mean and peak annual flows. He concluded that the cumulative impacts (aggregate impacts) of Standard Permits, General Permits, Nationwide Permits and Letters of Permission had a statistically significant effect on peak annual flow and peak annual flow. Specifically,

1. Each general permit increased mean annual flows by 0.07% and peak annual flows by 0.05%;
2. Each Nationwide Permit increased mean annual flows by 0.28% and peak annual flows by 0.26%;
3. Each letter of permission increased mean annual flows by 0.41% and peak annual flows by 0.26%; and
4. Each standard permit increased mean annual flows by 2.1% and peak annual flows by 1.65%.

It is important to note that these are collective impacts that resulted from activities authorized by the Corps in combination with a variety of other activities that are not regulated by the Corps or the CWA. Activities that are not under the Corps' jurisdiction also alter watershed hydrology and thus may also contribute to changes the peak annual flows of rivers and streams.

During consultation, the Corps noted that most of the studies discussed above were conducted in the 1980s and 1990s and do not take into account changes in the Corps Regulatory Program that have occurred during the past decade or so. The Corps has made changes to its permitting program when substantive concerns are identified. When the Corps replaced Nationwide Permit 26 with activity-specific Nationwide Permits, it decreased the acreage limit from 3 acres to 1/2-acre to reduce the contribution of the Nationwide Permit Program to cumulative impacts to jurisdictional waters and wetlands. That change to the Nationwide Permit Program responded to various concerns expressed about cumulative impacts, such as those raised by the National Research Council (1995) and Stein and Ambrose (1998). Proposed activities that no longer qualify for Nationwide Permit authorization because of the lower acreage limit now require individual permits, including activity-specific public interest reviews and 404(b)(1) Guidelines analyses, unless the project proponent modifies the regulated activity by reducing impacts to qualify for Nationwide Permit authorization. Stein and Ambrose (1998) found that many project proponents redesigned the regulated activities to qualify for Nationwide Permit authorization or to reduce compensatory mitigation projects, and recognized that the structure of the section 404 permit program encourages avoidance of impacts to aquatic resources. Similar conclusions were reached by Allen and Feddema (1996).

The Corps also noted that when they reissued the Nationwide Permits in 2007, it changed the pre-construction notification thresholds for Nationwide Permits 39, 40 and 42 require pre-construction notification for all activities authorized by those Nationwide Permits. Prior to 2007, the pre-construction notification was not required for losses of less than 1/10-acre of jurisdictional waters and wetlands. Requiring pre-construction notification for all activities authorized by these Nationwide Permits was intended to provide district engineers the opportunity to review all proposed activities for those Nationwide Permits and provide greater assurance that they only authorize activities resulting in minimal adverse environmental effects.

The issuance and reissuance of Nationwide Permits is a rulemaking activity that the Corps conducts every five years. The rulemaking process involves interagency review overseen by the Office of Management and Budget's Office of Information and Regulatory Affairs in accordance with Executive Order 12866. The interagency review process provides Federal agencies with the opportunity to review and comment on draft proposed and draft final rules before they are published in the Federal Register. However, this is a separate process from the ESA section 7 consultation process.

Federal agencies that are usually involved in this process include: the U.S. Environmental Protection Agency, the Department of the Interior (including the U.S. Fish and Wildlife Service), the Department of Commerce (including NMFS), the Department of Agriculture, the Advisory Council on Historic Preservation and the Small Business Administration. During the interagency review process, changes are made to proposed and final Nationwide Permits in response to agency comments, including concerns they may have about the environmental impacts of activities authorized by Nationwide Permits.

In 2008, the Corps issued a comprehensive regulation for aquatic resource compensatory mitigation (33 CFR part 332), and the Corps noted during consultation that the regulation adopted nearly all of the recommendations made by the National Research Council in its study of wetland compensatory mitigation under Section 404 of the CWA (NRC 2001). The 2008 mitigation rule established detailed standards and requirements for aquatic resource compensatory mitigation projects, to help ensure that the required compensatory mitigation offsets the permitted losses of jurisdictional waters and wetlands. The 2008 mitigation rule emphasizes the use of ecological performance standards, monitoring, compliance actions and adaptive management to help ensure that wetland and stream compensatory mitigation projects fulfill their objectives to offset authorized losses of aquatic resource functions.

The 2008 mitigation rule encourages the use of ecological assessment methods to evaluate proposed impacts to jurisdictional waters and wetlands and proposed compensatory mitigation projects intended to offset permitted losses of those waters and wetlands. The Corps has funded the development of assessment methods, especially the hydrogeomorphic approach for assessing wetland functions (Smith et al. 1995). Twenty-seven hydrogeomorphic assessment guidebooks have been published by the Corps' Engineering Research and Development Center, and other hydrogeomorphic assessment guidebooks have been developed by other agencies. Corps Districts also use assessment methods developed by academic institutions, consultants, and other agencies, such as condition assessments (e.g., the California Rapid Assessment Method[33]) and other types of ecological assessment methods.

The Corps also notes that since these studies were conducted, they have made significant improvements to its data collection efforts for its Regulatory Program. Its current automated information system, ORM2, is a geospatial database that is used to record all permit actions and other regulatory activities, including the locations of proposed and authorized activities, the amounts and types of proposed and authorized impacts to jurisdictional waters and wetlands, and the amounts and types proposed and required compensatory mitigation. In ORM2, the Corps tracks impacts and compensatory mitigation for all types of jurisdictional waters, including tidal and non-tidal wetlands, rivers and streams, lakes, estuarine waters, and marine waters. The improvements to the Corps' data collection practices brought about by the deployment and implementation of ORM2 have enhanced the Corps' ability to report and assess program impacts, including its contribution to the national goal of "no overall net loss" of wetlands. The information collected in ORM2 is used by Corps District, Division, and headquarters offices for impact assessment, including cumulative impact assessment, as well as analyses to support making modifications to the Nationwide Permits, including suspending or revoking certain Nationwide Permits or adding regional conditions to make one or more Nationwide Permits more restrictive and thus more protective of the aquatic environment.

The Corps has also implemented performance measures that emphasize the conduction of compliance actions for permitted activities and compensatory mitigation projects, to ensure that authorized activities do not impact more jurisdictional waters and wetlands than stated in the individual permits or general permit verifications. The performance measures also require Corps districts to conduct field visits on compensatory mitigation project sites, to help assess whether the required compensatory mitigation is meeting its objectives or whether remediation or adaptive management is necessary to ensure ecologically successful compensatory mitigation.

As discussed above, in areas of the country where substantive concerns about cumulative impacts due to regulated activities are identified, the Corps notes that it has taken a variety of actions, including conducting special area management plans to tailor the CWA section 404 permit program to more effectively address those cumulative impacts. The Corps also notes that it has conducted special area management plans in a number of watersheds in California (San Diego Creek, San Juan Creek/San Mateo Creek, San Jacinto River/Santa Margarita River, and Otay River), as well as City of Superior, Wisconsin; Middle River Neck (Maryland); and other areas of the country (Institute for Water Resources 1997).

Because historically many Nationwide Permits have authorized discharges of dredged or fill

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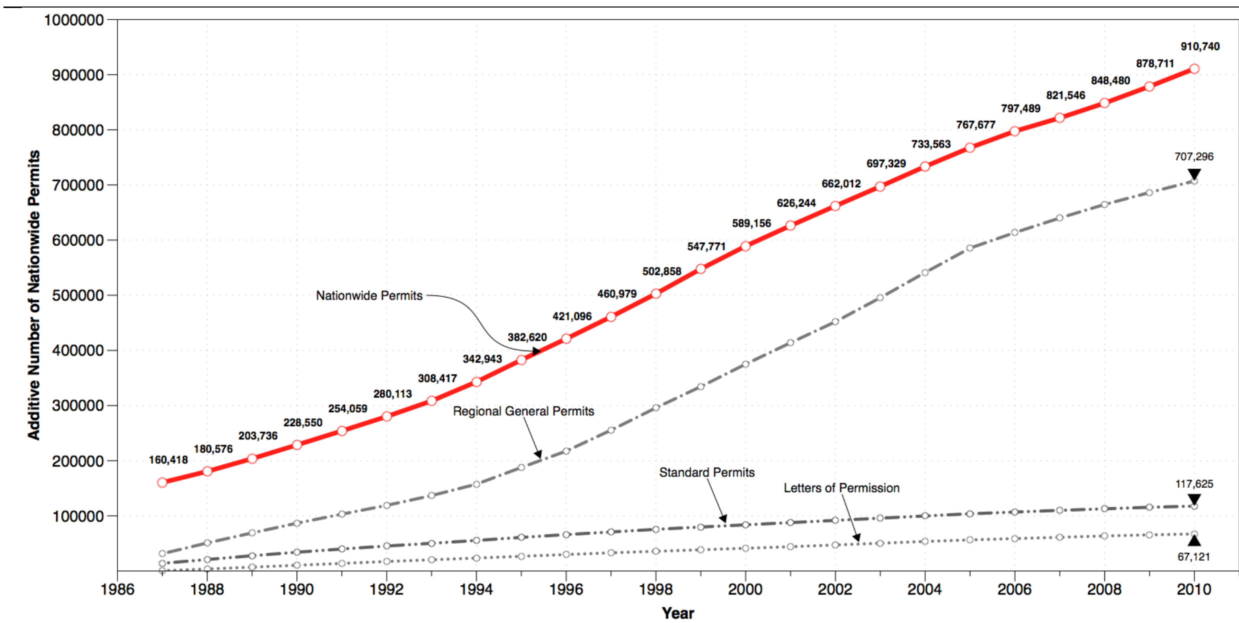
[33] http://www.cramwetlands.org/

material into waters of the United States and other activities without requiring permittees to provide any information to the Corps, we assume that the Nationwide Permits have authorized a substantial number of activities. Figure 4.3 presents estimates of the cumulative number of activities that have been authorized by Nationwide Permits between 1987 and 2010[34]. Between 1987 and 2010, the number of activities authorized by the Nationwide Permits has increased consistently.

Based on the more detailed data the Corps provided, for the years 1999, 2007 and 2010, Nationwide Permits authorized activities in jurisdictional wetlands and other waters of the United States that resulted in about 37,578 acres of compensatory wetlands. For these three years, we estimate that 35,749.5 acres of jurisdictional wetlands and other waters of the United States were authorized with those Nationwide Permits that involve activities that may have direct or indirect effects on species under NMFS' jurisdiction. About 20,426.6 acres of compensatory mitigation was required for these activities (an effective rate of 0.6 acres of mitigation for every acre impacted). Compensatory mitigation may not be required for impacts that are judged to be wholly beneficial or temporary in nature.

Figure 4.3 Cumulative Number of Activities the Corps Authorized using Nationwide Permits each Year between 1987 and 2010. Data on Standard Permits, Letters of Permission and Regional General Permits are Provided for Context.



Data from the Corps, Environmental Working Group and Public Employees for Environmental Responsibility.

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[34] Based on data we received from the Corps, Environmental Working Group, and Public Employees for Environmental Responsibility. Because the absence of data prior to 1982 and between 1982 and 1987, we began this time series with 1987.

Pre-construction Notification

Evidence suggests that the Corps has historically not reviewed significant percentages of PCNs to insure they are complete and the information is correct. As we reported earlier, Ellis (2005) concluded that the Corps' database contained no information about the size of project impacts for 29.1% of all 404 permits issued (1,819 of the 6,261 permits issued), with missing data for 27% of Standard Permits, 28% of Nationwide Permits and 49% of General Permits. Brody *et al.* discarded 7,294 of 45,897 (16%) of the records they collected from the Corps' database because those records either did not contain geographic information or the information was insufficient because of data entry errors.

The Corps historically has not routinely conducted field inspections of PCNs to verify that the information contained in those notifications captures the activity and impacts that actually occurred. Sifneos *et al.* (1992) reported that between 60 and 90% of the permits they examined in the States of Alabama, Louisiana, and Oregon had not been monitored by the Corps. Kentula (1986) reported that the Corps had not conducted site visits on 49% of the permits she studied in the State of Washington. Storm and Stellini (1994) reported that the Corps had monitored only one-third of the sites in Washington where monitoring was required and had no records of site visits for 55% of the sites in Oregon where monitoring had been required. The National Research Council (2001), General Accounting Office (2005), Mason and Slocum (1987), Morgan and Roberts (1999) and others all concluded that the virtual absence of compliance inspections by the Corps had allowed substantial numbers of permittees to ignore the conditions of their permits. These values are for standard permits, which supposedly receive greater scrutiny from the Corps. The point of Nationwide Permits is to authorize activities that would receive much less scrutiny than standard permits, so monitoring rates for PCNs are likely to be much lower than the data on standard permits suggests.

The evidence available suggests that the terms and conditions the Corps had previously attached to each Nationwide Permit, Regional and case-specific conditions, and the process the District Engineers used to review PCNs historically did not place the Corps in a position to know or reliably estimate the individual or aggregate impacts of Nationwide Permits to ESA listed threatened or endangered species under NMFS' jurisdiction or any critical habitat that had been designated for those species.

Impervious Surface Cover

The activities authorized under the Corps' Nationwide Permits historically have added to the impervious surface of the watersheds occupied by NMFS listed species and critical habitat. The activities that the Corps has historically authorized by Nationwide Permits have replaced porous soils with impervious surfaces. Generally, the contribution of these activities to impervious surface cover is a small fraction of the overall impervious surface cover existing in a given watershed.

The National Research Council (2009) defines "impervious surface" in its report on Urban Stormwater in the United States as: "a hard surface area which either prevents or retards the entry of water into the soil. Common impervious surfaces include roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled surfaces." The authors of that report go on to state that this definition includes nominally “pervious” surfaces that are sufficiently compacted or otherwise so low in permeability that the rate of runoff from them is similar or indistinguishable from pavement.

The amount of impervious surface cover in a watershed is a reliable indicator of a suite of phenomena that influence a watershed’s hydrology (Center for Watershed Protection 2003, National Research Council 1992, Schueler 1994). Numerous studies from throughout the United States have demonstrated that development in formerly undeveloped (or less developed) watersheds increases the area of impervious surface cover and reduces the capacity of porous surfaces remaining in drainages to capture and infiltrate rainfall. As the percentage of these impervious surface covers increases, the fraction of annual rainfall or melt-water that becomes surface runoff (with corresponding reductions in the amount that infiltrates into the soil or recharges groundwater) decreases and runoff reaches stream channels much more efficiently (Bledsoe 2001, Booth 1990, 1991; Hammer 1972, Hollis 1975, MacRae 1992, 1993, 1996). The relative influence of the area of total impervious surface cover depends on the spatial scale. It has the strongest influence at the scale of catchment basins, a strong influence at the scale of sub-watersheds, moderate influence at the watershed scale and weaker relative influence at the scale of sub-basins and basins (Coleman *et al.* 2005).

Klein (1979) reported a negative linear relationship between impervious area and base flow in the watersheds he studied in the Piedmont province of Maryland. He reported that the diversity of fish and invertebrates began to decline when impervious surface cover area reached between 10 and 12% and declined severely when that area reached 30%. May *et al. (*1997) studied the effects of urbanization on small streams in the Puget Sound region and reported that as the area of total impervious surface cover increased, stream corridor widths decreased and riparian encroachment and the number of interruptions along the length of the buffer both increased. Water quality criteria for chemicals in the water occurred after the area of total impervious surface cover exceeded about 45%, at which point habitat degradation became ecologically significant. As the area of total impervious surface cover increased, habitat attributes that are important for salmon, such as pools and the presence of woody debris, declined along with the benthic index of biotic integrity, and the ratio of Coho salmon to cutthroat trout. When the area of total impervious surface cover exceeded 5%, this latter ratio declined substantially suggesting that Coho salmon were being competitively excluded by the trout in these streams.

Roy *et al. (*2003) calculated indices of biotic integrity for fish communities and habitat at 267 sites in small watersheds in 30 small streams in the Etowah River basin in the State of Georgia and reported that indices of biotic diversity began to decline when the area of total impervious surface cover reached 15-20%. Wang *et al. (*2003) also calculated indices of biotic integrity for fish communities and habitat in 39 coldwater trout streams in Minnesota and Wisconsin. When impervious surfaces represented less than 6% of a watershed, biotic diversity in the streams they studied remained high. When the area of impervious surface cover rose to between 6 and 11%, minor changes in urban surface area could result in major changes in the diversity of the fish fauna in some streams; when the area of impervious surface cover rose above 11%, many species fell out of the fish fauna. When the total impervious area in a catchment basin exceeded 25%, the changes in runoff patterns seriously degraded aquatic ecosystems downstream of the affected area (Department of the Interior 2001, University of Wisconsin 2002 and Wang *et al.* 2003). Miltner *et al. (*2004) conducted similar studies at 267 sites in small watersheds in the major metropolitan areas in the State of Ohio. They reported that the indices were significantly affected in watersheds where the area of total impervious surface cover exceeded 13.8% and were severely degraded when that area exceeded 27.1%.

The transportation projects historically authorized by Nationwide Permit 14 result in impervious surfaces of about 100%. If we apply this percentage to the number of acres affected by this Nationwide Permit in the years 1999, 2007 and 2010, that permit would have resulted in about 884.6 acres of impervious surface in those three years. The residential housing and related activities that are authorized by Nationwide Permit 29 result in impervious cover percentages ranging from 10.6 to 27.8% (for 2.0 acre residential lots to 0.25 acre residential lots, respectively (see Table 4.7). If we apply these percentages to the number of acres affected by Nationwide Permit 29 in the years 1999, 2007 and 2010, the activities authorized by this permit would have increased the amount of total impervious surface by between 42.7 and at least 112 acres of impervious surface in those three years.

The commercial and industrial activities that historically are authorized by Nationwide Permit 39 have been found to result in impervious cover percentages ranging from 53 to 96% and the agricultural activities historically authorized by Nationwide Permit 40 have been found to result in impervious cover percentages of about 1.9%. If we apply these percentages to the number of acres affected by Nationwide Permit 39 in the years 1999, 2007 and 2010, the activities authorized by this permit would have increased the amount of total impervious surface by between 101 and at least 183 acres in those three years.

Table 4.7 Estimates of the Percent Impervious Surface Cover Associated with Different Land Use Cover (after Cappiella and Brown 2001 and Bannerman 2001).

Land Use	% Chesapeake Bay Impervious Cover (Cappiella and Brown 2001)	% Ultra-Urban Connected Impervious Cover (Bannerman 2001)
Agriculture	1.9	-
Open urban land	8.6	-
1/4 – 2.0-acre residential lot	27.8 - 10.6	-
High-density residential	33	31
Multi-family	43	49
High-rise residential	-	64
Schools	30	39
Industrial	53	69
Commercial	72	83
Downtown commercial	-	96

In combination, the direct effects of activities authorized by Nationwide Permits 14, 29, and 39 would have resulted in at least 1,028 to 1,180 acres of impervious surface cover in the three years for which data are available. If we assume that these results are representative and calculate the acreage of total impervious surface cover per year (342.75 to 393.15, which captures the upper and lower ranges of impervious surface associated with Nationwide Permits 29 and 39), the activities authorized by these three permits would have increased the amount of total impervious surface cover by at least 1,710 to 1,900 acres of total impervious surface cover over the past five years (and an equal amount over the five-year period of the Nationwide Permits) or at least 8,500 to 11,795 acres over the past 30 years.

Changes in Flow Regimes

In addition to the direct loss of wetlands, the information available demonstrates that the aggregate impacts of the activities historically authorized by Nationwide Permits have been sufficiently large to change the flow regimes and physical structure of river systems and simplify or degrade aquatic ecosystems. These changes have resulted in declines in the abundance of endangered or threatened species (Beechie *et al.* 1994, Lichatowich 1989, Lucchetti and Fuerstenberg 1993, May *et al.* 1997, Moscrip and Montgomery 1997, Scott *et al.* 1986).

Highfield (2008) reported that the percentage developed area in a catchment area was a significant predictor of peak annual flows and had greater effect on those flows than percentage area of palustrine scrub/shrub wetlands, which reduced peak flows. Specifically, a 1% increase in palustrine scrub/shrub led to a 17.68% decrease in peak annual flows, a 1% increase in developed area on average increased peak annual flows between 50 and 63%. From those data, Highfield concluded that the percentage of a sub-basin that was developed or had impervious surface greatly increased and offset any reductions in peak-flows associated with palustrine scrub/shrub wetlands. Twenty-eight of the Nationwide Permits have been in place since 1990, including those Nationwide Permits that authorize activities that convert permeable wetlands to impervious surfaces. These Nationwide Permits have been in place long enough to have had these kinds of impacts on mean and peak annual flows (table 4.8).

Floodplain Protection

Although the effect of activities authorized by Nationwide Permits on floodplains has not been studied extensively, the few studies that have been conducted suggest that Condition 10 (Fills Within 100-Year Floodplains) has not historically prevented activities authorized by Nationwide Permits from causing adverse environmental effects on 100-year floodplains or the contribution of those floodplains to the hydrology of watersheds.

As we discussed earlier, Brody *et al.* (2008) produced data that demonstrates that a disproportionate number of activities authorized by Nationwide Permits occurred in floodplains where those activities were more likely to affect water storage and hydrology. In Florida, about 48.4% of activities authorized by standard permits (individual), letters of permission, general permits and Nationwide Permits from 1991 to 2003 were located within the 100-year floodplain in Florida. In Texas, the percentage was 38.7%. They argued that these results were significant because wetland alteration within floodplains increases impervious surface cover area and reduces or eliminates a wetland’s ability to capture and store water runoff. Disrupting the natural hydrological system can exacerbate flooding or create flood problems in areas not originally considered vulnerable to flooding.

Table 4.8 Incremental impact estimates of General Permits, Nationwide Permits and Individual (Standard) Permits on Mean and Peak Annual Flows (after Highfield 2008).

	Mean Annual Flow				Peak Annual Flow			
Years	**General**	**Nationwide**	**Letter**	**Individual**	**General**	**Nationwide**	**Letter**	**Individual**
1	254.2153	675.9207	218.1969	455.808	1828.512	6320.264	1393.356	3572.351
	14.93%	39.69%	12.81%	26.77%	10.66%	36.86%	8.13%	20.83%
2	508.4307	1351.841	436.3938	911.6159	3657.024	12640.53	2786.713	7144.702
	29.86%	79.38%	25.63%	53.53%	21.33%	73.71%	16.25%	41.66%
3	762.646	2027.762	654.5906	1367.424	5485.536	18960.79	4180.069	10717.05
	44.78%	119.07%	38.44%	80.30%	31.99%	110.57%	24.38%	62.49%
4	1016.861	2703.683	872.7875	1823.232	7314.049	25281.06	5573.425	14289.4
	59.71%	158.76%	51.25%	107.06%	42.65%	147.42%	32.50%	83.33%
5	1271.077	3379.604	1090.984	2279.04	9142.561	31601.32	6966.781	17861.76
	74.64%	198.45%	64.06%	133.83%	53.31%	184.28%	40.63%	104.16%
10	2542.153	6759.207	2181.969	4558.08	18285.12	63202.64	13933.56	35723.51
	149.28%	396.90%	128.13%	267.65%	106.63%	368.55%	81.25%	208.31%
15	3813.23	10138.81	3272.953	6837.119	27427.68	94803.96	20900.34	53585.27
	223.91%	595.35%	192.19%	401.48%	159.94%	552.83%	121.88%	312.47%
20	5084.307	13518.41	4363.938	9116.159	36570.24	126405.3	27867.13	71447.02
	298.55%	793.80%	256.25%	535.30%	213.25%	737.10%	162.50%	416.63%
25	6355.383	16898.02	5454.922	11395.2	45712.8	158006.6	34833.91	89308.78
	373.19%	992.25%	320.31%	669.13%	266.56%	921.38%	203.13%	520.78%

Increases based on the average annual number of permits issued from 1996 – 2003 and average mean annual flows and peak annual flows. Values represent estimated flow increases and percent increases over given number of years

4.4.4 Mitigation of Impacted Areas

As noted in the *Description of the Action* section of this Biological Opinion, prospective Nationwide Permit permittees can compensate for their impacts through three primary mechanisms (General Accounting Office 2005, Martin *et al.* 2006):

1. Permittee-Responsible Mitigation.
   Permittee-responsible mitigation refers to aquatic resource restoration, establishment, enhancement and/or preservation activity undertaken by a permittee (or an authorized

agent or contractor of a permittee) to provide compensatory mitigation for which the permittee retains full responsibility (33 CFR 332.2).

2. Mitigation Banks.
Mitigation banks refer to sites or suites of sites where resources (e.g., wetlands, streams, riparian areas) are restored, established, enhanced or preserved for the purpose of providing compensatory mitigation for impacts caused by activities authorized by the Corps permits. In general, mitigation banks sell compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the mitigation bank sponsor. The operation and use of mitigation banks are governed by legal documents called mitigation-banking instruments (33 CFR 332.2).

3. In-lieu Fee Mitigation.
In-lieu fee mitigation refers to a program involving the restoration, establishment, enhancement, and/or preservation of aquatic resources through funds paid to a governmental or non-profit natural resources management entity to satisfy compensatory mitigation requirements for the Corps permits. Similar to a mitigation bank, an in-lieu fee program sells compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the in-lieu program sponsor. However, the rules governing the operation and use of in-lieu fee programs are somewhat different from the rules governing the operation and use of mitigation banks. The operation and use of in-lieu fee programs are governed by legal documents that are called in-lieu fee program instruments (33 CFR 332.2).

Based on a review by the Environmental Law Institute (ELI, 2006), 59.8% of *wetland mitigation* requirements were satisfied using permittee-responsible mitigation, 31.4% using a mitigation bank, 8.4% using in-lieu-fee mitigation and 0.4% using other mechanisms. The same study reported that 81.5% of *stream mitigation* requirements were satisfied using permittee-responsible mitigation, 7.1% using a mitigation bank, 10.0% using in-lieu-fee mitigation and 1.2% using other mechanisms.

In addition to requiring mitigation projects, permittees must construct projects effectively before the project is likely to replace the physical, chemical, biotic or ecological functions of the wetlands that have been destroyed because of a permit. Although the historic evidence is limited, the Corps appears to have been less likely to require compensatory mitigation for activities that are authorized by Nationwide Permits. For example, Martin *et al.* (2006) estimated that the Corps required compensatory mitigation for about half of the activities they authorize with Standard Permits but about 21% of the activities they authorize with general permits (which included Nationwide Permits), although these values vary widely depending on geography (Table 4.9).

Historically, mitigation has not necessarily offset baseline impacts. Compliance with Corps-required compensatory mitigation has been highly variable. Compliance has been very low when monitoring is limited or does not occur or when permits are not specific about mitigation requirements. For example, Mason and Slocum (1987) evaluated 32 wetlands in Virginia and concluded that permittees had complied with specific requirements to create wetlands on 86% of the time, while permits without such conditions had compliance rates of about 44%. When time limits for completion were specified in permits, all mitigation efforts complied with the permits while only half of the mitigation efforts associated with permits that did not specify deadlines or were compliant. Lowe *et al.* (1989) estimated that 86% of the 29 permits they surveyed did not contain sufficient detail or clarity to ensure the success of the created wetland or to facilitate enforcement of their conditions.

Table 4.9 Estimated Percentage of Permits that Required Compensatory Mitigation from October 2002 to September 2003 (from Martin *et al.* 2006).

Corps Division	No. Permits Issued	Percentage of Permits Requiring Compensatory Mitigation		
		Standard Permits	General Permits	All Permits
Lakes and Rivers	12,924	24	28	21
Mississippi Valley	14,576	86	25	31
North Atlantic	15,829	30	6	6
Northwestern	8,397	91	30	30
Pacific Ocean	1,267	14	8	9
South Atlantic	23,478	72	20	24
South Pacific	4,500	79	69	36
Southwestern	4,907	33	7	10
National Average		**51**	**19**	**21**

In southeast Florida, a study of 195 wetland mitigation projects concluded that only 40 (20.5%) of those projects had actually been constructed and those 40 projects mitigated about half of the 430 hectares of wetlands that had been required by permits had been constructed (Erwin 1991). A review of compliance rates in the State of Ohio provided the only study that reported 100% compliance (Fennessy and Roehrs 1997).

An evaluation of permit compliance and wetland mitigation in the State of Illinois concluded that only two of 54 permits had complied with all of the conditions for which compliance could be determined (Gallihugh 1998). Rates of compliance with special conditions – requirement to provide monthly erosion control inspections during construction, to report conservation easements on all created and preserved wetlands, to report on vegetative sampling, to submit as-built plans following construction of mitigation sites, and to submit hydrological data – ranged from 16% to 49% (the highest compliance was with the requirement to submit as-built plans).

Morgan and Roberts (1999) concluded that “some applicants apparently believe that they will not be held accountable for their projects.” The National Research Council (2001) concluded that the virtual absence of compliance inspections by the Corps made it possible for substantial numbers of permittees to ignore the conditions of their permits (citing an 8 April 1999 memorandum to all for Corps’ Commanders, Major Subordinate Commands, and District Commands from Major General Russell Furman that established compliance inspections as a low priority as a matter of standard operating procedure. In contrast, evaluating and issuing permits and self-reporting and self-certification for compliance were both considered high priorities). The Council concluded that if the Corps recognized mitigation compliance and increased compliance as a priority, mitigation would more likely be carried out as specified in section 404 permits.

Johnson *et al.* (2000) evaluated compliance 45 compensatory wetland mitigation projects that had been required in western and eastern Washington State to determine whether the compensatory mitigation project had been implemented, whether it had been implemented according to its plan, and whether it was meeting its performance standards (those assessable by the methods of this study). They concluded that 42 (93%) of the 45 projects evaluated had been implemented. However, there were spatial differences: on the west side (which corresponds to the boundaries of the Seattle District) 35 (92%) of 38 projects had been implemented, 3 (8%) had not. On the east side (which corresponds to the boundaries of the Walla Walla District) 7 (100%) of 7 projects had been implemented. Johnson *et al.* (2000) also reported that 23 of 42 (55%) projects had been implemented to plan, 3 could not be determined and 16 (38%) had not been implemented to plan. They also reported that the level of compliance varied with the Corps District: on the west side, 22 of 35 (63%) projects had been implemented to plan, 2 (6%) could not be determined, and 11 (31%) had not been implemented to plan; on the east side, 1 of 7 (14%) projects had been implemented to plan, 1 (14%) could not be determined, and 5 (71%) had not been implemented to plan. Overall, they reported that 12 of 34 (35%) projects with performance standards had met all standards that were assessed, 6 had met at least 1 of the standards that were assessed, and 16 (47%) had not met any of the standards that were assessed. On the west side, 11 of 28 (39%) projects with performance standards had met all standards that were assessed, 5 had met at least 1 of the standards that were assessed, and 12 (43%) had not met any of the standards that were assessed. On the east side, 1 (17%) of 6 projects with performance standards had met all standards that were assessed, 1 (17%) had met at least 1 of the standards that were assessed, and 5 (67%) had not met any of the standards that were assessed.

An evaluation of 345 wetland mitigation projects the Indiana Department of Environmental Management required for permit it issued through its Water Quality Certification program between 1986 and 1996 concluded that nearly 35% of the mitigation sites had not been constructed and permittees appeared to have ignored their mitigation requirement (Robb 2000). Permittees had constructed 214 (62%) of the sites although 70 of these sites (20%) were incomplete and permittees had not attempted to construct the mitigation on 49 (14%) of the sites.

A study of 391 projects that required compensatory mitigation to satisfy permit conditions imposed by the State of Massachusetts concluded that the majority of projects (54%) did not comply with the Massachusetts wetland regulations for reasons that included failure to construct the project, insufficient size or hydrology, and insufficient cover by wetland plants (Brown and Veneman 2001). A study of compensatory mitigation conducted by the National Research Council (2001) concluded that between 70 and 76% of the mitigation required in Corps' permits was implemented, and about 50 – 53% of the implemented mitigation projects did not meet permit requirements.

The GAO (2005) reviewed 152 permit files in which permittees were required to perform compensatory mitigation, but found little evidence that permittees had submitted monitoring reports to satisfy the conditions of their permits or that the Corps had inspected the mitigation projects for compliance with permit conditions. Of the 89 permits for which the Corps required permittees to submit monitoring reports, monitoring reports only appeared to have been submitted in 21 cases (24%) and the Corps only appeared to have conducted on-site inspections for 15% of the projects.

The Corps Districts appeared to have provided more oversight of the 85 mitigation banks and 12 in-lieu-fee arrangements than of permittee-responsible mitigation projects, although the GAO (2005) concluded that, even in the former cases, oversight by the Corps was limited. Out of 60 mitigation banks that were required to submit monitoring reports, 70% appeared to have submitted those reports. Out of 6 in-lieu-fee arrangements that were required to submit monitoring reports to the Corps, all but one had submitted at least one report and the Corps personnel had conducted on-site inspections for 5 of the 12 arrangements.

Of the 22 areas that had been studied, the proportion of compensatory mitigation projects that had been initiated as required ranged from 4 to 100%, with an average compliance rate of 58%. There was wide geographic and temporal variation (see Table 4.10). Two (8%) of the studies reported 100% compliance rates, 41.67% reported compliance rates between 50 and 92%, 29% reported compliance rates between 20 and 50%, and 12.5% reported compliance rates less than 20%.

Minkin and Ladd (2003) supported this general pattern. They identified 177.7 acres of forested wetlands and 6.8 acres of palustrine open water wetlands that had been destroyed or adversely affected by the activities authorized by the 60 projects they reviewed. Nevertheless, the mitigation projects they reviewed created, restored or enhanced 47.4 acres of open water systems and only 24.7 acres of forested wetlands to compensate for these losses. Of the 24 acres of forested wetlands, they concluded that only about 17 acres approximated a natural forested wetland ecosystem. They concluded that replacing forested wetlands with open water and emergent systems had caused a considerable loss of function, particularly for wildlife habitat and water quality.

Table 4.10 Proportion of Permits in Compliance with Mitigation Requirements (after Turner *et al.* 2001, supplemented with additional data).

Location	Number of Permits	Proportion Compliant	Proportion Not Compliant	Source
California				
Orange County	15	0.13	0.87	Sudol (1996)
Southern California	75	0.42	0.58	Allen and Feddema (1986)
Sacramento/Central Valley	30	0.50	0.50	DeWeese (1994)
Ventura/Los Angeles Counties	79	0.69	0.31	Ambrose and Lee (2004)
Florida				

Location	**Number of Permits**	**Proportion Compliant**	**Proportion Not Compliant**	**Source**
Northeast	29	0.79	0.21	Lowe *et al. (*1989)
Northeast	201	0.86	0.14	Miracle *et al. (*1998)
South Florida	42	0.10	0.90	Erwin (1991)
Southwest Florida WMD	33	0.33	0.67	OPPAGA (2000)
Southwest Florida WMD	254	0.82	0.18	OPPAGA (2000)
St. Johns River WMD	nr	0.78	0.22	OPPAGA (2000)
Suwannee River WMD	nr	1.00	0.00	OPPAGA (2000)
Northeast District DEP	nr	0.67	0.33	OPPAGA (2000)
Southeast District DEP	nr	0.87	0.13	OPPAGA (2000)
Illinois	nr	0.04	0.96	Gallihugh (1998)
Indiana	345	0.62	0.38	Robb (2000)
Massachusetts	84	0.49	0.51	Brown and Veneman (1998)
Ohio	14	1.00	0.00	Fennessy and Roehrs (1997)
Ohio	5	0.80	0.20	Wilson and Mitsch (1996)
Virginia	32	-		Mason and Slocum (1987)
with permit conditions	-	0.86	0.14	Mason and Slocum (1987)
w/o permit conditions	-	0.44	0.56	Mason and Slocum (1987)
with time limits	-	1.00	0.00	Mason and Slocum (1987)
without time limits	-	0.50	0.50	Mason and Slocum (1987)
Washington	17	0.53	0.47	Storm and Stellini (1994)
Washington (east-west combined)	45	0.93	0.07	Johnson *et al. (*2000)
East side	38	0.92	0.08	Johnson *et al. (*2000)
West-side	7	1.00	0.00	Johnson *et al. (*2000)
Implemented to plan (east-west combined)	42	0.55	0.45	Johnson *et al. (*2000)
Implemented to plan (east side)	7	0.14	0.86	Johnson *et al. (*2000)

Location	Number of Permits	Proportion Compliant	Proportion Not Compliant	Source
Implemented to plan (west side)	35	0.63	0.37	Johnson *et al. (*2000)
Met performance standards	34	0.35	0.65	Johnson *et al. (*2000)
Met performance standards (east side)	6	0.17	0.83	Johnson *et al. (*2000)
Met performance standards (west side)	28	0.39	0.61	Johnson *et al. (*2000)
Washington	29	0.21	0.79	Mockler *et al. (*1998)

Replacement of Lost Function

In some cases, compensatory mitigation required by the Corps replaces the acreage impacted by a permittees' activity with an equal or greater amount of acreage. However, this does not appear to have been true for a majority of the cases historically. Forest wetlands were the type of wetland most frequently destroyed or degraded (38% of impacted wetlands) and used to compensate for the loss of natural wetlands (38% of compensatory wetlands). Estuarine intertidal emergent wetlands had the highest area impacted (52%) and compensated (62%). About 90% of the time, the wetlands that were destroyed or degraded provided habitat for wildlife; about 83% of the time, wildlife was the objective of the compensatory mitigation. Endangered species were listed as affected in 20% and 21% of the wetlands that were impacted and that were provided to compensate for those impacts, respectively.

Sifneos *et al.* (1992) evaluated the effects of section 404 permitting on freshwater wetlands in Louisiana, Alabama and Mississippi. The Corps required compensatory mitigation for only 8% of the nearly 25,000 acres of wetlands impacted by activities authorized by the Corps permits in Louisiana from 1982 to 1987, implying a net loss of at least 92% of the permitted fill area.

An evaluation of compensatory mitigation projects in six New England States[35] conducted by Kettlewell *et al.* (2008) conducted a watershed-based assessment of the impacts of wetland permits and compensatory mitigation on the Cuyahoga River watershed in northeastern Ohio. Specifically, they examined the effectiveness of wetland mitigation regulations and any resulting cumulative changes to wetland and landscape structure. They reported that the majority of permittee-responsible mitigation projects (67%) were not successful at meeting permit requirements in terms of wetland area. Those projects that relied on mitigation banks and in-lieu fee mitigation resulted in a net increase in wetland area, but the Cuyahoga River watershed experienced a net loss of wetland acreage because wetland losses were compensated in

[35] Although the Corps has suspended the Nationwide Permit Program in New England States, these studies are reflective of the Corps' historical practice.

mitigation banks located outside the watershed.

Most historic reviews of wetlands that are actually created, restored, or enhanced to compensate for the loss of wetland ecosystems that are destroyed or degraded by activities authorized by permits issued by the Corps or a State agency generally have not replaced the ecological and hydrological functions of the original wetlands (Allen and Feddema 1996, Mager 1990, Race and Fonseca 1996, Roberts 1993, Sudol 1996).

Eliot (1985) reviewed wetland mitigation projects in the San Francisco Bay area and concluded that they frequently failed to achieve their purposes and almost half had not been built before the dates specified in permits. Quammen (1986) reviewed mitigation projects throughout the country, including Florida, New England and Virginia, and concluded that few of them complied with permit requirements and their ability to compensate for the lost functions and values of the original wetlands was unknown. These results are similar to reviews published by Allen and Feddema (1996), Atkinson *et al. (*1993), Erwin *et al. (*1994), Kentula *et al. (*1992), Mager (1990), Reinartz and Warne (1993), Roberts (1993), Sifneos *et al. (*1992), Turner *et al. (*2001), Wilson and Mitsch (1996). The National Research Council (1992) also concluded that mitigation efforts could not claim to have duplicated the functions and values of wetlands that had been destroyed or modified through human action. Race (1996) cited studies by the Florida Department of Environmental Regulation that concluded that only 4.6 to 12% of the mitigation was ecologically successful and 28% were so unsuccessful that major remediation was recommended.

In the 1980s and early 1990s, ponds with a fringe of emergent vegetation represented the majority of the compensatory mitigation required to comply with CWA section 404 (Kentula 1994). Open water ponds, which appear to be the most common and successful form of “created wetland,” were created to mitigate activities that occurred in a wide variety of wetland ecosystems in California, Oregon and Washington (Gwin *et al.* 1999). Between 1998 and 2004, the wetland type that increased the most were freshwater ponds, many of which were created to mitigate for the destruction or modification of other wetland ecosystems. In this time interval, the area covered by freshwater ponds increased by 12.6% or almost 700,000 acres (281,500 hectares), which was the largest increase of any type of wetland or deepwater habitat (Dahl 2006). Without the increase associated with ponds, the contiguous United States would have experienced a net loss of wetlands between 1998 and 2004.

A review of 61 permits for 128 projects in six counties around Chicago, Illinois concluded that 17% of the wetland vegetation proposed was established, and an additional 22% had established wetlands but with vegetation other than that proposed (Gallihugh 1998). Fifty-two percent of the wetlands had excessive or unplanned open water, and 9% had insufficient hydrology. The wetland area lost was 117 hectares and the approved wetland mitigation amounted to 144 hectares.

In a review of the 68 wetland mitigation banks that were in existence in 1996, Brown and Lant (1999) concluded that the mitigation banks resulted in a net loss of more than 21,000 acres of wetlands, or 52% of the banked “mitigated” acreage, nationally. In a review of 11 compensatory wetland studies reported by Turner *et al.* (2001), the percentage of wetlands that met tests of functional equivalency ranged from 0 to 67%. Fennessy and Roehrs (1997), who reported that

100% of the permits they reviewed in the State of Ohio complied with the requirement to mitigate, also reported that none of the mitigation projects had successfully replaced the physical, chemical, biotic or ecological functions of the original wetlands.

In their review of 40 mitigation sites in King County, Washington, Mockler *et al. (*1998) identified 31 mitigation projects that had been implemented; of these 6 sites (21%) were considered to have successfully satisfied their performance standards while 23 (79%) had not. One site (3%) had replaced the hydrological and ecological functions of original wetlands while 28 (97%) did not. The investigators identified design flaws (hydrology inputs not as represented in design; plants inappropriately specified; and slopes steeper than 3:1), installation flaws (project not installed as designed; soil compacted, and soil not amended as designed) and maintenance flaws (mowed not weeded; and not mulched or irrigated during establishment year) as the cause of most failures.

A study of 60 randomly selected compensatory mitigation projects in six New England states had higher compliance rates (67 percent), but 10 projects (17 percent) failed to approximate the wetlands they were intended to replace (Minkin and Ladd 2003). However, information on permit conditions was missing for seven projects (12 percent) and information on functions and values or types of impacted wetlands was missing for six projects (10 percent), making it impossible to determine success for those projects. These authors concluded that with projects that replaced specific wetland functions, the replacement had less ecological value than the wetland ecosystems that had been destroyed or degraded by the permitted activities.

Ambrose and Lee (2004) evaluated compensatory mitigation projects associated with permits issued in Los Angeles and Ventura Counties, California, from 1991 to 2003. They reported that 46% of the projects fully satisfied the acreage requirement, 24% failed to satisfy the acreage requirement, and 30% could not be determined. Only 2% of the projects they reviewed produced wetlands that were the functional equivalent of the original wetlands, 60% were partially successful, and 38% failed to replace the functions of the wetlands that had been lost. Specifically, 29% of the sites they evaluated provided marginal to poor wetland conditions (based on 15 attributes that measure landscape context, hydrology, abiotic structure, and biotic structure), 67% of the sites were sub-optimal, and only 4% of the sites provided optimal conditions. With the exception of dissipation of flood energy, 66% of the mitigation sites failed to replace (46%) or only partially replaced (20%) the flood storage, biogeochemistry, sediment accumulation, wildlife habitat and aquatic habitat functions of the wetlands that had been impacted.

As mentioned above, Kettlewell *et al.* (2008) conducted a watershed-based assessment of the impacts of wetland permits and compensatory mitigation on the Cuyahoga River watershed in northeastern Ohio. Specifically, they examined the effectiveness of wetland mitigation regulations and any resulting cumulative changes to wetland and landscape structure. They reported that the majority of permittee-responsible mitigation projects (67%) were not successful at meeting permit requirements in terms of wetland area. Those projects that relied on mitigation banks and in-lieu fee mitigation resulted in a net increase in wetland area, but the Cuyahoga River watershed experienced a net loss of wetland acreage because wetland losses were compensated in mitigation banks located outside the watershed.

Kettlewell *et al.* (2008) also compared to kind of wetlands created by compensatory mitigation and concluded that these projects tended to replace scrub/shrub and forested wetlands with open-water/emergent wetland. In addition, compensatory mitigation tended to reduce the number of wetland sites in a watershed (from 134 impacted wetlands to 65 mitigation wetlands) and increased their size. Based on these data, we infer that compensatory mitigation concentrates wetlands in watersheds, which changes their physical, chemical, biotic and ecological functioning in a watershed.

Micacchion *et al.* (2010) studied 26 randomly selected mitigation wetlands in the State of Ohio, including sites that had been constructed less than five years earlier; five to ten years earlier; and more than ten years earlier. On each site, they collected data on vegetative communities (using the Vegetation Index of Biotic Integrity), amphibious community (using the Amphibian Index of Biotic Integrity), and land uses in the areas around the mitigation sites (using the Landscape Development Intensity Index). Two of the sites they studied did not meet their definition of a wetland because no significant plant communities of any kind had developed. Of the remaining 24 sites, 38.5% (10 sites) were in poor ecological condition, 42.3% (11 sites) were in fair ecological condition and 19.2% (5 sites) were in good ecological condition based on vegetative communities the sites supported. Of these 24 sites, 87.5% (21 sites) were in poor ecological condition, 8.3% (2 sites) were in fair ecological condition and 4.2% (1 site) were in excellent ecological condition based on amphibious community. Overall, they concluded that 61.5% (16 sites) of the 26 sites failed to replace the wetlands that had been destroyed, 15.38% (4 sites) were potential successes and 23.08% (6 sites) were successes.

Based on the data available, there has historically been a relatively low rate of compliance with the requirement to provide compensatory mitigation and only a small percentage of compensatory mitigation projects replaced the hydrologic, chemical and ecological functions of the wetlands they were designed to replace.

5.0 Effects of the Action

The *Description of the Proposed Action* summarized the Nationwide Permits the Corps authorizes or re-authorizes whose direct and indirect consequences are considered in this Biological Opinion. The *Status of the Listed Resources* identified the endangered species, threatened species and designated critical habitat that may be affected and are likely to be adversely affected by the Nationwide Permits. The *Status* also summarizes the status and trend of those species and other ecological information that might be relevant to our effects' analyses. The *Environmental Baseline* is national in scope and summarizes the available data on the condition of the action area, including a summary of the Corps' historical contribution to the baseline.

This analysis of the Effects of the Action revises that of the previous Biological Opinion based on the results of the reinitiated consultation with the Corps. As we described in the *Approach to the Assessment* chapter of this Biological Opinion, our analysis of the probable effects of the Nationwide Permits on endangered and threatened species and designated critical habitat under the jurisdiction of NMFS has two components. First, we describe the number and magnitude of activities that have been authorized by the Nationwide Permits and project the number of authorizations expected to occur annually based on inter-annual variation between 2010 and 2012. We then place the spatial and temporal patterns of these impacts and their collective effects in context of the geographic and temporal occurrence of endangered and threatened species and designated critical habitat under the jurisdiction of the NMFS, then describe the effectiveness of the control measures that the Corps has included in its program to prevent adverse impacts to those species.

Although the impacts of the activities that the Corps authorizes under the Nationwide Permit Program have the potential to adversely affect endangered and threatened species under NMFS' jurisdiction, and critical habitat that has been designated for those species, the Corps has made numerous and substantial modifications to its program such that it will reliably collect and analyze information on those activities, share that information with NMFS, and use that information to conduct ESA section 7 consultations –as necessary – on any such activity that may affect ESA listed resources under NMFS' jurisdiction. The Corps will thus be in a position to prevent or modify those activities before they would jeopardize any endangered or threatened species under NMFS' jurisdiction, or destroy or adversely modify any critical habitat that has been designated for those species. These modifications and their ability to protect ESA listed resources under NMFS' jurisdiction are summarized in Section 5.5.1 of this section, and discussed in depth in the *Integration and Synthesis* section of this Biological Opinion.

5.1 Corps Data used for the Effects Analysis

In January 2013 the Corps provided NMFS with data from its ORM2 database for the purpose of projecting impacts that will occur under the Nationwide Permit program. These data include the actions, impacts and mitigation records for activities authorized under the existing Nationwide Permits between 2010 and 2012. The rationale for using these data for this purpose is two-fold: 1) as discussed in Section 1.5, prior to 2010 data were not consistently entered into the Corps' ORM2 database, so the 2010-2012 data are more complete and of the best available quality relative to data from prior years, and 2) activities occurring between 2010 and 2012 were authorized under the existing Nationwide Permits and, relative to older data, most closely resemble the Nationwide Permits. It is important to note that ORM2 is a live database. District personnel continually enter and update data, so the data collection from ORM2 for this analysis is a "snap shot" in time and can only provide an estimate of the number of activities and impacts authorized by the Nationwide Permits. For this reason, analyses results are expressed in general terms in the text (e.g., 5,078,880 linear feet is expressed as approximately five million linear feet.)

Summary statistics reported in an early draft of the Biological Opinion suggested to the Corps that a number of unusually large impact values occurred among these data. The Corps reviewed their data and identified 515 apparently anomalous entries. The Districts that authorized these actions were asked to verify or correct these entries. The Corps provided these data corrections to NMFS in September of 2013, and at NMFS request, reevaluated and resubmitted a subset of the corrected data in November of 2013.

Resolution of Data Anomalies

Many of the anomalies corrected by the Districts were the result of reporting the project area over which impacts occurred rather than the actual physical space occupied by the authorized impacts within the project area. ORM2 impact entries are intended to represent the discrete physical area affected by the authorized action, not the ecologically relevant impact area. For example, when authorizing navigation markers, the Corps records the area occupied by each of the markers whereas a Biological Opinion for the same event would consider the area marked as the impact area. The permits affected by this data entry behavior included Nationwide Permit 1 (Aids to Navigation), Nationwide Permit 10 (Mooring Buoys), Nationwide Permit 11 (Temporary Recreational Structures) and Nationwide Permit 5 (Scientific Measurement Devices).

Anomalous entries for impacts expressed in terms of linear feet were primarily attributed to reporting the entire project extent rather than the extent of the authorized impact. This error affected many of the permits, but occurred most frequently in Nationwide Permits 3, 12 and 13. The Districts also determined that a number of impacts were recorded as square feet rather than acres. Conversion of these errors reduced impact acreage by several orders of magnitude. Corrections made to volumes of substrate were due to identifying materials placed in uplands for Nationwide Permit16 as fill.

As indicated in section 5.1, in response to the discovery the anomalous data in its ORM2 database, the Corps has instituted data entry guidance, integrated warnings and guidance into the database user interface, and instituted a QA/QC process. **Appendix A** includes both the analyses from the 2012 Biological Opinion and our subsequent analysis of the Corps-supplied 2010-2012 data to demonstrate the implications of the data correction and to preview how the data collection and entry improvements described above may affect future impact estimates.

5.2 Number of Activities Authorized by Nationwide Permits

Number of Activities Authorized by Nationwide Permits

According to data that the Corps provided in 2013, the Corps has authorized approximately 95 thousand actions from 2010 to 2012, with about 29 to 34 thousand actions with impacts in a given year with variability among years of 8% (Table 5.1). These authorization frequencies and year-to-year variation is consistent with data considered in the baseline, which ranged between 20 and 44 thousand authorizations per year. The Corps indicated that the 2010-2012 data do not include the 25-26% of permit applications recorded by the Corps that were not authorized. About half of these applications were withdrawn and the other half did not require a permit. Only a very small proportion of permit applications, about 0.2%, were denied without prejudice.

According to data that the Corps provided in 2013, the Corps has authorized approximately 95,000 actions from 2010 to 2012, with about 29 to 34 thousand actions in a given year with variability among years of 8% (see Table 5.1). According to those data, these numbers do not include the 25-26% of permit applications recorded by the Corps that were not authorized. About half of these applications were withdrawn and the other half did not require a permit. Only a very small proportion of permit applications, about 0.2%, were denied without prejudice.

Table 5.1 Summary Data for the Number of Actions, Impacts and Required Mitigation Efforts.

Year	Actions with Impacts	Impacts (% Permanent)	Mitigation
2010	32,173	36,231 (60%)	3,925
2011	28,986	37,005 (64%)	4,633
2012	34,075	43,106 (56%)	6,357
Average	31,745	38,781 (60%)	4,972
Year-to-year variation	8%	10%	25%
Annual Projection[a]	29,369-34,121	35,302-42,260	3,816-6,128
Projection over 5 years[a]	146,845-170,605	176,510-211,300	19,080-30,640

Each action tracked in ORM2 may involve multiple impacts and mitigation requirements. Over the past three years, the Corps authorized between 36 to 43 thousand impacts with 39 to 63 hundred specific mitigation requirements. Variability over the three years in the number of actions with impacts was less than 10%. Meanwhile, the number of mitigation requirements increased by more than 15% each year, resulting in an overall variation of 25% between 2010 and 2012. Baseline data for mitigation is reported in terms of reported acreage rather than number of mitigation efforts required.

We make note of annual variation and potential trends to help us identify whether the action consulted on will likely mirror what has occurred in the past or may be in the process of shifting in frequency or magnitude. While there are only three years of data available, the suggestion of a trend is strengthened when taking into account the prior evidence of periodicity in the number of permits authorized, as described in the baseline section, and potential causal factors. For example, a shift might reflect the possibility that improving economic conditions stimulated a greater proportion of larger actions that would require mitigation.

If we assume that the frequency and variability of the Corps authorizations will be similar over the next permit period, the frequency of future authorizations can be estimated using the variability observed from the data in hand using the 95% confidence interval of the mean over three years. The results of this approach tells us that within any given year, 29 to 34 thousand actions could be authorized resulting in about 34 to 43 thousand impacts requiring 37 to 62 hundred mitigation efforts. If we assume that the frequency and variability of the Corps authorizations reflect an increasing trend, the frequency of future authorizations can be estimated by increasing estimates for each subsequent year by the inter- annual percent variation.

ORM2 classifies impacts as either permanent or temporary. The relative proportion of permanent impacts is given in parentheses in Table 5.1. Among impacts recorded between 2010 and 2012, 56% to 64% of impacts were classified as permanent. Variation among years in the number of permanent authorized impacts was low, at around five percent, while year-to-year variation in the number of temporary impacts was about 18% with no apparent trend. Using this information, an estimated 22 to 24 thousand permanent impacts will be authorized per year under the current permit.

About 80% of the actions authorized between 2010 and 2012 were distributed among six of the Nationwide Permits (Table 5.2). The most frequently authorized permits were:

- Utility line projects (Nationwide Permit 12) - 28%
- Linear transportation projects (Nationwide Permit 14) - 18%
- Maintenance (Nationwide Permit 3) - 17%
- Bank stabilization (Nationwide Permit 13) - 11%
- Aquatic habitat (Nationwide Permit 27) - 5%
- Minor discharges (Nationwide Permit 18) - 3%

Year-to-year variability in the numbers of utility line, maintenance, bank stabilization, aquatic habitat permits and minor discharges of dredged or fill material into waters of the United States was fairly low, with 10% or less variation among years. This contrasts with the 32% variation among years for the number of linear transportation project permits authorized. The number of these permit authorizations spiked from about 4,000 to 5,000 authorized in 2010 and 2011 to nearly 8,000 permits in 2012. Other less frequently authorized permits were also marked by high levels of year-to-year variation that resulted in very broad confidence intervals for projections and, in some cases, suggested shifts or trends.

Table 5.2 Projected number of authorizations for Nationwide Permits*.

Permit	Number of Actions 2010-2012	Year to year variation	Annual projection	5 Year Projection
1. Aids to navigation [a,b,e,g]	251	45%	41-127	205-635
2. Structures in artificial canals [a,e,g]	350	77%	15-219	75-1,095
3. Maintenance [b,e]	15,819	7%	4,850-5,696	24,250-28,480
4. F&W harvesting, enhancement & attraction devices [a,b,g]	343	49%	51-177	255-885
5. Scientific measurement devices [a]	431	6%	135-153	675-765
6. Survey [a]	769	24%	186-326	930-1,630
7. Outfall structures & associated intake structures [b]	1,050	13%	297-403	1,485-2,015
8. Oil & gas structures on the Outer Continental Shelf [b,]	8	33%	2-4	10-20
9. Structures in fleeting & anchorage areas [a,]	71	79%	2-46	10-230
10. Mooring buoys [a]	262	34%	53-121	265-605
11. Temporary recreational structures [a]	283	18%	75-113	375-565
12. Utility line [b]	26,695	9%	8,006-9,790	40,030-48,950
13. Bank stabilization [b,e]	10,608	2%	3,471-3,601	17,355-18,005
14. Linear transportation projects [b,]	17,260	32%	3,672-7,834	18,360-39,170
15. U.S. Coast Guard approved bridges [a,e]	70	4%	22-24	110-120
16. Return water from upland contained disposal areas [a]	210	4%	67-73	335-365
17. Hydropower projects [b]	22	43%	4-20	20-50
18. Minor discharges	2,783	1%	820-1,036	4,100-5,180
19. Minor dredging [a]	417	11%	122-156	610-780

Permit	Number of Actions 2010-2012	Year to year variation	Annual projection	5 Year Projection
20. Response operations for oil & hazardous substances [a]	21	14%	6-8	30-40
21. Surface coal mining[e]	105	2%	27-43	135-215
22. Removal of vessels[e]	77	5%	11-41	55-205
23. Approved categorical exclusions	2,145	22%	541-889	2,705-4,445
24. Tribe or State administered CWA section 404 programs[a,c]	4	Single year	0	0
25. Structural discharges [a]	127	12%	36-48	180-240
27. Aquatic habitat [b,e]	4,489	7%	1,385-1,607	6,925-8,035
28. Modifications of existing marinas [a,b,e]	136	27%	31-59	155-295
29. Residential developments [b]	1,744	13%	493-669	2,465-3,345
30. Moist soil management for wildlife [a]	8	67%	1-5	5-25
31. Maintenance of existing flood control facilities [b]	205	79%	7-129	35-645
32. Completed enforcement actions [a,f]	159	28%	36-70	180-350
33. Temporary construction, access & dewatering [b]	1,642	14%	460-634	2,300-3,170
35. Maintenance dredging of existing basins [a,b,e]	520	35%	105-241	525-1,205
36. Boat ramps [a,b]	950	9%	283-351	1,415-1,755
37. Emergency watershed protection & rehabilitation	436	44%	73-217	365-1,085
38. Cleanup of hazardous & toxic waste[e]	282	18%	75-113	375-565
39. Commercial & institutional developments [b]	1,939	5%	608-684	3,040-3,420
40. Agricultural [b,e]	243	22%	61-101	305-505
41. Reshaping existing drainage ditches	172	18%	46-68	230-340

Permit	Number of Actions 2010-2012	Year to year variation	Annual projection	5 Year Projection
42. Recreational facilities[e]	677	5%	212-240	1,060-1,200
43. Stormwater management facilities [a,b]	617	3%	199-213	995-1,065
44. Mining [a]	192	2%	49-79	245-395
45. Repair of uplands damaged by discrete events[e]	201	36%	40-94	200-470
46. Discharges into ditches [b,e]	80	22%	20-34	100-170
47. Reserved [47][a,d]	2	Single year	0	0
48. Existing commercial shellfish aquaculture [b,,g]	263	1.68%	up to 255	up to 1275
49. Coal remining [a,g]	42	5%	41,447	30-110
50. Underground coal mining[g]	54	28%	41,632	60-120

[a] Pre-construction notice not required
[b] Permits not included in this group are expected to have very low impact. Permits of special concern identified in (Table 3.)
[c] Four permits authorized in 2012
[d] Two permits authorized in 2010
[e] Possible increasing trend in annual authorizations
[f] Possible decreasing trend in annual authorizations
[g] 2012 authorizations greater than twice the number authorized in 2010 and 2011
* We determined that Nationwide Permit 52 "Water Based Renewable Energy Generation Pilot Projects" may cause impacts to ESA listed resources under NMFS' jurisdiction. However, this Nationwide Permit is new and, thus, historic data are not available.

5.3 Impacts Authorized by Nationwide Permits

The magnitude of impacts authorized between 2010 and 2012 totaled about 47 thousand acres, giving an annual average impact of just under 16 thousand acres per year and 0.5 acres per impact. Projection of future impacts is complicated by an apparent trend. These data are consistent with the trend in increasing impact magnitude reported in the baseline data. In the current data, impacts increased by between 4 and 5 thousand acres each year. This increase is accompanied by a corresponding increase in the number of authorizations. The prospect that this increase is a trend is fortified by a temporal correspondence with the increasing numbers of construction permits issued as the U.S. economy recovers from economic recession (U.S. Department of Commerce, accessed 9/10/2013).

Further, permit authorizations directly linked with development did increase over this period (Nationwide Permits 29 and 39), as did permits associated with the development and maintenance of infrastructure (Nationwide Permits 2, 3, 13, 14, 23 and 35). The size of project impacts may also be increasing: between 2010 and 2012, the average per authorization acreage rose from approximately 0.6 acres to just over 1 acre per authorization. The data do not reflect an increase in total linear feet impacts, but total volume substrate increased from 28 to 38 million cubic feet between 2010 and 2011 and increased by another 10 million cubic feet in 2012. Using the trajectories suggested by the volume substrate impact data, annual impacts could climb to from 72 to 133.5 million cubic feet per year between 2013 and 2017. The data correction did not appreciably change the proportion of permanent impacts expressed in terms of linear feet or volume substrate. Permanent impacts did increase among impacts expressed in terms of acres. The average impact sizes vary broadly among the different Nationwide Permits (Table 5.3).

Table 5.3 Per Permit Comparison of Average Impact Size (% permanent impacts in parentheses)*

	Corrected Data (September)		
Permit	**Linear Feet**	**Acres**	**Volume Substrate**
1. Aids to navigation [a,b,e,g]	14.8 (98%)	0.006 (26%)	
2. Structures in artificial canals [a,e,g]	73 (79%)	0.013 (82%)	
3. Maintenance [b,e]	214 (66%)	0.146 (49%)	93,364 (31%)
4. F&W harvesting, enhancement & attraction devices [a,b,g]	9,086 (98%)	0.057 (57%)	126,900
5. Scientific measurement devices [a]	62 (47%)	0.026 (19%)	
6. Survey [a]	517 (9%)	0.17 (8%)	211 (48%)
7. Outfall structures & associated intake structures [b]	85.4 (66%)	0.038 (83%)	3,001 (56%)
8. Oil & gas structures on the Outer Continental Shelf [b]	8,560 (100%)	0.074 (46%)	
9. Structures in fleeting & anchorage areas [a]	287 (35%)	0.179 (26%)	
10. Mooring buoys [a]	31.8 (76%)	0.008 (98%)	
11. Temporary recreational structures [a]	217 (8%)	0.092 (2%)	
12. Utility line [b]	264 (24%)	0.242 (16%)	61,992 (0%)
13. Bank stabilization [b,e]	215 (93%)	0.075 (71%)	4,365 (76%)
14. Linear transportation projects [b,]	134 (68%)	0.064 (66%)	11,362 (100%)
15. U.S. Coast Guard approved bridges [a,e]	240 (62%)	0.104 (64%)	24,300 (100%)
16. Return water from upland contained disposal areas [a]	136 (51%)	0.136 (50%)	129,420 (1%)
17. Hydropower projects [b]	141 (95%)	0.262 (93%)	
18. Minor discharges	80.6 (84%)	0.034 (77%)	319 (70%)
19. Minor dredging [a]	106 (81%)	0.019 (60%)	386 (78%)
20. Response operations for oil & hazardous substances [a]	1,012 (49%)	1 (12%)	
21. Surface coal mining[e]	3,007 (81%)	4.8 (73%)	
22. Removal of vessels[e]	167 (8%)	0.081 (6%)	12150
23. Approved categorical exclusions	177 (86%)	0.272 (79%)	146,150 (100%)
24. Tribe or State administered CWA section		0.425 (5%)	

Permit	Corrected Data (September)		
	Linear Feet	Acres	Volume Substrate
404 programs[a,c]			
25. Structural discharges [a]	287 (100%)	0.13 (5%)	
27. Aquatic habitat [b,e]	1,696 (70%)	6.9 (75%)	438,244 (50%)
28. Modifications of existing marinas [a,b,e]	173 (88%)	0.13 (80%)	16,010 (100%)
29. Residential developments [b]	193 (95%)	0.11 (95%)	
30. Moist soil management for wildlife [a]	20 (100%)	11.9 (1%)	
31. Maintenance of existing flood control facilities [b]	5,691 (11%)	5.4 (8%)	456,980 (46%)
32. Completed enforcement actions [a,f]	446 (73%)	0.71 (85%)	29,997
33. Temporary construction, access & dewatering [b]	190 (20%)	0.26 (18%)	12,776(1%)
35. Maintenance dredging of existing basins [a,b,e]	583 (51%)	1.6 (35%)	144,232 (74%)
36. Boat ramps [a,b]	40.6 (93%)	0.03 (95%)	749 (64%)
37. Emergency watershed protection & rehabilitation	627 (71%)	0.16 (92%)	3186
38. Cleanup of hazardous & toxic waste[e]	772 (56%)	1.9 (80%)	942,782 (26%)
39. Commercial & institutional developments [b]	271 (74%)	0.13 (90%)	
40. Agricultural [b,e]	508 (80%)	0.13 (78%)	
41. Reshaping existing drainage ditches	2,171 (72%)	0.87 (43%)	432,000 (100%)
42. Recreational facilities[e]	149 (90%)	0.08 (88%)	
43. Stormwater management facilities [a,b]	300 (76%)	0.17 (59%)	21,645 (75%)
44. Mining [a]	468 (97%)	0.16 (78%)	218,646
45. Repair of uplands damaged by discrete events[e]	367 (82%)	0.43 (41%)	11,853 (34%)
46. Discharges into ditches [b,e]	1.8 (91%)	0.001 (88%)	25,214
47. Reserved [47][a,d]		0.15 (95%)	
48. Existing commercial shellfish aquaculture [b,g]	883 (100%)	35.1 (11%)	
49. Coal remining [a,g]	460 (66%)	0.31 (75%)	
50. Underground coal mining[g]	447 (68%)	0.24 (96%)	

[a] Pre-construction notice not required
[b] Permits not included in this group are expected to have very low impact. Permits of special concern identified in (Table 3.).
[c] Four permits authorized in 2012
[d] Two permits authorized in 2010
[e] Possible increasing trend in annual authorizations
[f] Possible decreasing trend in annual authorizations
[g] 2012 authorizations greater than twice the number authorized in 2010 and 2011
* We determined that Nationwide Permit 52 "Water Based Renewable Energy Generation Pilot Projects" may cause impacts to ESA listed resources under NMFS' jurisdiction. However, this Nationwide Permit is new and, thus, historic data are not available.

Integrating the number of permit authorizations from 2010-2012 with the average impact per authorization indicates the relative importance of each permit in terms of net impact. The permit specific impact projections in Table 5.4 were calculated by multiplying the number of permit actions between 2010 and 2012 by the average magnitude of impact per action and dividing by three to estimate impact per year for that permit. Using this approach,

- Nine permits were found to account for 90% of linear feet impacts (4.7 million feet for Nationwide Permits 3, 4, 12, 13, 21, 27, 31, 37 and 39).
- Six permits accounted for 90% of acreage impacts (14 thousand acres for Nationwide Permits 3, 12, 14, 27, 31 and 48).
- Four permits accounted for 90% of volume impacts (38 million cubic feet for Nationwide Permits 3, 27, 35 and 38).

These top contributors include 21 of the Nationwide Permits of special concern that NMFS has identified for endangered and threatened species under our jurisdiction. Examining just those permits affecting NMFS listed resources:

- Five permits account for greater than 90% of impacts expressed in terms of linear feet (4 million feet for Nationwide Permits 3, 12, 13, 14 and 27),
- Four permits for impacts expressed in terms of acreage (13,000 acres for Nationwide Permits 3, 12, 27, and 48), and
- Three permits for impacts expressed in terms of volume substrate disturbed (30 million cubic feet for Nationwide Permits 3, 27 and 35).

We determined that Nationwide Permit 52 "Water Based Renewable Energy Generation Pilot Projects" may cause impacts to ESA listed resources under NMFS' jurisdiction. However, this Nationwide Permit is new and, thus, historic data are not available.

Table 5.4 Projected Annual per Permit Impacts*

Permit	Projected Annual Impact (# actions* average impact per action)/3		
	Linear Feet	Acres	Cubic Feet
1. Aids to navigation[a,b]	133.5	0.5	0
2. Structures in artificial canals[a]	760	1	0
3. Maintenance[c,b]	570,037.1	426.5	9,305,260
4. Fish and wildlife harvesting, enhancement and attraction devices[a,b]	109,036.7	6.1	42,300
5. Scientific measurement devices[a]	1,652.9	3	0
6. Survey[a]	10,852.7	38.9	634.4
7. Outfall structures and associated intake structures[b]	10,018.3	10.7	16,004.1
8. Oil and gas structures on the Outer Continental Shelf[b]	2,853.3	0.1	0

Permit	Projected Annual Impact (# actions* average impact per action)/3		
	Linear Feet	Acres	Cubic Feet
9. Structures in fleeting and anchorage areas[a]	1,338.3	1.7	0
10. Mooring buoys[a]	402.8	0.5	0
11. Temporary recreational structures[a]	7,218.6	4.7	0
12. Utility line[c,b]	1,141,578	1,677.9	433,940.8
13. Bank stabilization[c,b]	621,095.7	70.3	32,007.7
14. Linear transportation projects[c,b]	402,718	326.2	75,746.8
15. U.S. Coast Guard approved bridges[a]	1,443.3	2.1	8,100
16. Return water from upland contained disposal areas[a]	500	3.6	258,839.4
17. Hydropower projects[b]	375.7	1.6	0
18. Minor discharges[c]	19,484	26.9	743.7
19. Minor dredging[a]	777.2	1.1	34,738.6
20. Response operations for oil and hazardous substances[a]	2,023.3	5.3	0
21. Surface coal mining	166,380	291.2	0
22. Removal of vessels[c]	335	1.3	4050
23. Approved categorical exclusions	63,097.4	193	194,866.7
24. Tribe or State administered CWA section 404 programs[a]	0	0.6	0
25. Structural discharges[a]	1,529.3	3.7	0
27. Aquatic habitat[c,b]	1,410,151	7,724.8	3,944,196
28. Modifications of existing marinas[a,b]	2,190.3	4.2	5,337
29. Residential developments[b]	53,870.2	62.7	0
30. Moist soil management for wildlife[a]	6.7	35.9	0
31. Maintenance of existing flood control facilities[b]	89,163.1	355.6	1,980,249
32. Completed enforcement actions[a]	19,469.7	28.1	9,999
35. Maintenance dredging of existing basins[a,b]	3,109.6	168.2	16,778,947
36. Boat ramps[a,b]	4,856.6	6.3	1,497.8
37. Emergency watershed protection and rehabilitation[c]	76,494.5	15.2	1,062

Permit	Projected Annual Impact (# actions* average impact per action)/3		
	Linear Feet	Acres	Cubic Feet
38. Cleanup of hazardous and toxic waste	23,689.2	188.1	8,170,776
39. Commercial and institutional developments[b]	105,004.6	99.5	0
40. Agricultural[b]	19,812.3	7.8	0
41. Reshaping existing drainage ditches[c]	75,982.6	25.5	144,000
42. Recreational facilities	11,546.5	19.2	0
43. Stormwater management facilities[a,b]	27,712.1	31.9	43,290.6
44. Mining[a]	24,988.6	4.9	72,882
45. Repair of uplands damaged by discrete events[c]	24,808.1	17.5	11.853
46. Discharges into ditches[b]	378.4	0.3	84,048.1
47. Reserved [47][a]	0	0	0
48. Existing commercial shellfish aquaculture[c,b]	589	3,676.5	0
49. Coal remining[a]	35,278.2	15.4	0
50. Underground coal mining	18,323	5.1	0

[a] Pre-construction notice not required
[b] Permits not included in this group are expected to have very low impact. Permits of special concern identified in Table 3.
[c] Four permits authorized in 2012
[d] Two permits authorized in 2010
[e] Possible increasing trend in annual authorizations
[f] Possible decreasing trend in annual authorizations
[g] 2012 authorizations greater than twice the number authorized in 2010 and 2011
* We determined that Nationwide Permit 52 “Water Based Renewable Energy Generation Pilot Projects” may cause impacts to ESA listed resources under NMFS’ jurisdiction. However, this Nationwide Permit is new and, thus, historic data are not available.

5.3.2 Geographic Distribution of Activities and Impacts

Distribution among Corps Districts

Our geographic analysis of the 2010-2012 data begins by evaluating the 19 Districts that overlap the distribution of endangered or threatened species under NMFS’ jurisdiction or critical habitat that has been designated for those species. Table 5.5 describes the annual average number of actions and impacts for the permits of special concern along with the percentage of impacts with required mitigation. The table also reflects the total number of mitigation credits required for 2010-2012 within each District because a small number of permits required mitigation credits. Net impacts between 2010 and 2012, less required mitigation, include approximately five million linear feet, 20 thousand acres and nearly 15 million cubic feet of substrate. These values do not take into account mitigation achieved through the purchase of mitigation credits.

Mitigation credits are obtained from mitigation banks or in lieu fee programs and are tracked through the Corps' RIBITS. Data extracted from RIBITS in April 2013 included just under 15 hundred matching records for mitigation bank credit withdrawals in the Districts and actions of interest. These records indicate a total of nearly 365 thousand credits were purchased within these Districts between 2010 and 2012. Our analyses broadly matched authorized impacts and credits required recorded in ORM2 with credits withdrawn in RIBITS identified for the same action identifier. The analysis is necessarily restricted to area mitigated because the ORM2 database does not specify the classification of mitigation credits required. It therefore does not appear possible, using these two databases, to determine whether the mitigation achieved is "in-kind." In a similar vein, neither database tracks wetland function, so it is not possible to evaluate whether mitigation has matched ecological function.

The amount of area mitigated was calculated by multiplying the magnitude of impact (acres or linear feet) by the ratio of withdrawn credits to required credits. In this way, if withdrawn and required credits are equivalent, the area mitigated would be the area of authorized impact and if withdrawn credits were half that of required credits, the area mitigated would be half the area of authorized impact. Through this analysis, net impacts between 2010 and 2012, less mitigation achieved through mitigation bank withdrawals, includes approximately five million linear feet, 100 thousand acres and 51 million cubic feet of substrate.

These authorizations, less required mitigation expressed in terms of linear feet or acreage, amount to approximately 1.8 million linear feet, 14 thousand acres and 13million cubic feet of substrate dredged or fill impacts to aquatic resources. A total of 10.7 thousand mitigation credits for nearly two thousand activities were also required among these authorizations. The proportion of acres requiring mitigation between 2010 and 2012 is consistently lower than the proportion of mitigated acreage reported from most districts in the 2007-2010. The exceptions are the Philadelphia and Walla Walla Districts that had similar mitigation rates in each of the data sets and the New York District, which required greater than 100% mitigation between 2010 and 2012 relative to the 65% acres mitigated between 2007 and 2010.

Table 5.5 Impacts among the Corps Districts.

Corps District	Average Annual Number of Impacts	Linear Feet			Acres			Annual Average Volume Substrate
		Annual Average Impact	Proportion Mitigation Required	2010-2012 Bank Mitigated	Annual Average Impact	Proportion Mitigation Required	2010-2012 Bank Mitigated	
Alaska	372	457,869.98	3%		281.17	4%	0.59	219,932.32
Baltimore	66	45,018.97	8%		214.42	1%		900
Charleston	474	35,332.40	24%	2,157.16	56.62	>100%	9.02	1,807.00
Galveston	1126	271,792.30		1,295,236.04	2,446.52	13%	8029.67	2,902,995
Honolulu	98	19,421.79			6.29			249,954.31
Jacksonville	1630	232,256.02	2%	1,274,741.24	1,417.43	>100%	34.97	6,827,092
Los Angeles	3123	226,713.16	12%		642.69	21%		238,750.83
Mobile	532	190,658.71	3%	18,387.02	1,047	5%	440.01	26,373.60
New Orleans	139	41,304.32	2%	2,188.00	137.97	5%	102.7	
New York	831	93,200.02	10%		98.42	>100%		495,748.3
Norfolk	981	100,501.42	3%		46.71	83%		933,957.74
Philadelphia	121	12,197.87			22.26	>100%		31,638.16
Portland	614	117,833.95	1%		238.7	1%	0.13	890,000.94
Sacramento	2373	147,549.73	20%	1,156.18	767.48	15%	391.76	317,923.31
San Francisco	331	56,352.49	1%		87.97	77%		699,038.29
Savannah	863	96,424.32	9%	1,251,761.38	96.62	5%	330.91	688,936.72
Seattle	812	154,006.4	4%		3629.6	2%	0.85	67,699.66
Walla Walla	541	127,583.1	4%		40.03	9%		27,429 (formerly 32,143.66)
Wilmington	1577	194,411.42	15%	2571.19	405.29	66%	8.46	2,132,296
Estimated total per year	16,604	2,620,428		1,282,732.74	11,683		3,116.36	219,932.32

Distribution within Watersheds where Species and Designated Critical Habitat under NMFS Jurisdiction Occur

This Biological Opinion includes an additional analysis of impacts within watershed subbasins where there is designated critical habitat or, for those species without designated critical habitat, where listed species occur. Between 2010 and 2012 the Corps authorized approximately 3.6 thousand impacts to aquatic resources in terms of linear feet, eight thousand impacts in terms of acreage and 169 impacts expressed as volume substrate within these subbasins.

The data extracted from RIBITS included 204 matching records for mitigation bank credit withdrawals in the subbasins of interest, providing a nearly ten thousand mitigation credits. The lag time between impact end and credit withdrawals for most actions within listed species areas was less than 6 months, with no mitigation lags extending beyond two years. Proceeding in the same manner as calculating mitigation bank withdrawals among Districts, net impacts between 2010 and 2012, less required mitigation or mitigation achieved through mitigation bank withdrawals, includes 567 thousand linear feet and 14 thousand acres. To place this in relative terms, about 17% of the impacts to acreage within critical habitat require mitigation while 70% of impacts measured in terms of linear feet require mitigation.

5.3.3 Activities and Impacts Authorized by Specific Nationwide Permits of Concern

As we note in section 2.1 of this Biological Opinion, our programmatic consultations examine the decision-making processes that are integrated into Federal agency programs to determine whether those decision-making processes are likely to comply with the requirements of ESA section 7(a)(2) to insure that the activities that Federal agencies authorize, fund or carry out are not likely to jeopardize the continued existence of endangered species or threatened species under the jurisdiction of NMFS or result in the destruction or adverse modification of critical habitat that has been designated for those species.

Sections 5.0 – 5.2 of this Biological Opinion present data on the effects of all of the Nationwide Permits, including the projected number of authorizations (Table 5.2), comparison of average impact size including percentage of permanent impacts (Table 5.3) and the projected annual per permit impacts (Table 5.4).

We then focus the scope of the discussion on those permits that occur in the 19 Corps Districts whose jurisdictions overlap with NMFS species. We do not assess any of the permits that did not occur in those districts because they would have “no effect” on NMFS species or critical habitat.

In addition, some activities authorized by Nationwide Permits are not expected to produce indirect or direct effects to endangered species, threatened species, or designated critical habitat under NMFS’ jurisdiction, or would produce minor or extremely limited effects. For example, Maintenance of Existing Marinas (Nationwide Permit 28) does not authorize dredging, additional slips, dock spaces, or expansion in waters of the U.S. and therefore would be extremely unlikely to result in adverse effects. Similarly, Moist Soil Management for Wildlife (Nationwide Permit 30) authorizes only on-going activities, does not authorize construction of new dikes, roads, water control structures, etc. and does not authorize conversion of wetlands to uplands or any loss of aquatic functions and services; thus, it should never cause effects that reach the scale where adverse effects occur. Other permits do not authorize activities where endangered or threatened species under NMFS' jurisdiction or critical habitat designated for those species occur, or are likely to be exposed to the direct or indirect effects of those other permits. For example, Nationwide Permit 16 (Return Water from Upland Contained Disposal Areas) authorizes return water from an upland contained dredged material disposal area, which is administratively defined as a discharge of dredged material by 33 CFR 323.2(d), even though the disposal itself occurs on the upland and does not require a CWA section 404 permit.

Similarly, some Nationwide Permits would not elicit responses that are likely to have adverse consequences for those listed resources. Examples of these are Nationwide Permits 9, 10 and 11. Nationwide Permit 9 authorizes structures, buoys, floats and other devices placed within anchorage or fleeting areas to facilitate moorage of vessels where the U.S. Coast Guard has already established such areas for that purpose. Nationwide Permits 10 authorizes non-commercial, single-boat, mooring buoys. Nationwide Permit 11 Temporary Recreational Structures, which authorizes temporary buoys, markers, small floating docks and similar structures placed for recreational use during specific events such as water skiing competitions and boat races or seasonal use, and requires that such structures are removed within 30 days after use has been discontinued.

The activities authorized by the remainder of the existing and proposed Nationwide Permits may have direct, indirect and aggregate impacts to endangered species, threatened species and designated critical habitat that are exposed to them. All Nationwide Permits, including those that are expected to produce minor or extremely limited effects, are subject to the protective measures that the Corps has included in its Nationwide Permit Program, as well as General Condition 18 (see sections 1.2 thru 1.6 of this Biological Opinion). In addition, the Corps must consult with NMFS under section 7 of the ESA on any such activity that it authorizes by these Nationwide Permits if the Corps determines that those activities may affect any threatened or endangered species under NMFS' jurisdiction, or any critical habitat that has been designated for those species.

Of those Nationwide Permits that may have direct, indirect and aggregate impacts to endangered species, threatened species and designated critical habitat, our analysis shows that the overwhelming majority of the authorizations, and the resulting area that is impacted by those permits, have been authorized by the 21 Nationwide Permits presented in Table 5.6. In addition, we determined that Water Based Renewable Energy Generation Pilot Projects (Nationwide Permit 52) might cause significant impacts to ESA listed resources under NMFS' jurisdiction. However, this Nationwide Permit is new to the Nationwide Permit Program and thus, historic data are not available. Our analysis therefore focuses on these remaining Nationwide Permits of concern. Table 5.6 displays the activities authorized by these permits.

Table 5.6 Average Annual Impacts within Pertinent Watersheds for Nationwide Permits of Special Concern.

Permit	Actions	Linear Feet	Acres	Volume Substrate
1. Aids to navigation	97 (up to 199)	10 (9-11)	0.4 (up to 1)	
3. Maintenance	863 (736-990)	89,159 (49,021-129,297)	60.2 (7-113)	437,073 (265,064-609,082)
4. F and W harvesting, enhancement, and attraction devices	14 (11-17)	106,308 (up to 312,647)	2.4 (up to 5)	
7. Outfall structures and associated intake structures	63 (57-69)	1,007 (666-1,348)	2.1 (1-4)	12,958 (up to 38,355)
8. Oil and gas structures on the Outer Continental Shelf	1	8,560	0.1607	
12. Utility line	1,007 (527-1,487)	117,906 (64,374-171,438)	199 (35-363)	144,000 (up to 415,268)
13. Bank stabilization	507 (383-631)	60,864 (47,123-74,605)	15.4 (14-17)	2,205 (up to 6,527)
14. Linear transportation projects	638 (593-683)	27,003 (18,466-35,540)	49.8 (32-67)	233 (up to 690)
17. Hydropower projects	2	18	0.01	
27. Aquatic habitat	464 (449-479)	222,758 (158,107-287,409)	1673.4 (256-3091)	200,617 (up to 549,022)
28. Modifications of existing marinas	18 (8-28)	733 (18-1,448)	2.8 (0-5)	
29. Residential developments	94 (82-106)	1488 (96-2,880)	10.6 (9-12)	
31. Maintenance of existing flood control facilities	19 (7-31)	5,047 (up to 10,174)	25.7 (14-37)	3,700 (up to 10,952)
33. Temporary construction, access and dewatering	118 (91-145)	5,032 (1,050-9,014)	20.7 (6-35)	647 (up to 1,674)
35. Maintenance dredging of existing basins	34 (10-58)	20 (up to 60)	25.5 (10-41)	3,708,797 (1,951,493-5,466,101)
36. Boat ramps	24 (21-27)	433 (153-713)	0.7 (1-1)	104 (up to 309)
39. Commercial and institutional developments	104 (95-113)	3,480 (439-6,521)	14.1 (11-17)	
40. Agricultural	7 (5-9)	2,614 (874-4,354)	0.3 (0-1)	
43. Stormwater management facilities	49 (34-64)	2,570 (487-4,653)	8.5 (2-15)	583 (up to 1,726)
46. Discharges into ditches	5 (2-8)	7 (up to 21)	1.3 (0-3)	
48. Existing commercial shellfish aquaculture	146 (up to 429)	884 (up to 2,615)	5403 (up to 13,817)	

Impacts were not evenly distributed among the permits:

- Ninety percent of impact events were distributed among eight permits, Nationwide Permits 1, 3, 12, 13, 14, 27, 33 and 39.

- Nationwide Permits 3, 4, 12, 13 and 27 contributed more than 90% of impacts in terms of linear feet.
- Nationwide Permits 27 and 48 contributed more than 90% of impacts in terms of acreage, with approximately 0.01% of these impacts classified as authorized fill.
- Greater than 90% of impacts expressed in terms of volume of substrate removed were authorized under Nationwide Permits 3 (Maintenance) and 35 (Maintenance Dredging of Existing Basins).
- Taken together Nationwide Permits 3, 4, 12, 13, 27, 35, and 48 authorized the largest magnitude of impacts within the subbasins where listed species occur.

Trends in increasing numbers of authorizations in the subbasins were suggested for some permits. Nationwide Permit 1 (Aids to Navigation) tripled in each successive year while Nationwide Permit 12 (Utility line projects) were twice as frequent in 2011 and 2012 than 2010. Both Nationwide Permits 28 (Modifications in Existing Marinas) and 35 (Maintenance Dredging of Existing Basins) doubled in 2012. It is notable that acreage impacts increased from approximately 1.5 thousand acres in 2010 to nearly 11 thousand acres in 2012. Greater than 60% of the 2012 impacts to acreage were authorized by Nationwide Permit 48 (Existing Commercial Shellfish Aquaculture).

5.3.4 Aggregate Impacts

Because of the nature of the activities they authorize, the aggregate impacts of Nationwide Permits include the time-crowded, space-crowed, interactive, and incremental impacts of activities authorized by the Corps permits alone; impacts that result from those activities combined with activities authorized by standard, general permits, and letters of permission; and interactions between those activities and activities authorized by other Federal agencies, State and local governments, private action, or natural phenomena (see section 2.4 of this Biological Opinion).

To provide some insight into the potential magnitude of the aggregate impacts of the Nationwide Permits, we assess the additive effects of the Nationwide Permits over time. Focusing on the Nationwide Permits special concern, 95 thousand actions with just over 116 thousand discrete impacts to 94 thousand acres were authorized between 2010-2012. Just over 9 thousand of those impacts expressed in terms of acreage were significant enough to require mitigation, accounting for direct mitigation of about 2 thousand acres and approximately 10.7 thousand mitigation bank credits. These data suggests that annual impacts to acreage would be 1.8 to 2.5 thousand acres. Further analysis of aggregate impacts is also reflected later in the *Integration and Synthesis* section below.

Impervious Surface Cover

Of the potential aggregate impacts of the Nationwide Permit Program to ESA listed species and their designated critical habitat, the accumulation of impervious surface cover is of particular concern. As noted, the amount of impervious surface cover in a watershed is a reliable indicator of a suite of phenomena that influence a watershed's hydrology (Center for Watershed Protection

2003, National Research Council 1992, Schueler 1994). Numerous studies from throughout the United States have demonstrated that development on formerly undeveloped (or less developed) areas increases the area of impervious surface cover reduces the capacity of porous surfaces remaining in drainages to capture and infiltrate rainfall. As the percentage of these impervious surfaces increases, the fraction of annual rainfall or melt-water that becomes surface runoff (with corresponding reductions in the amount that infiltrates into the soil or recharges groundwater) and runoff reaches stream channels much more efficiently (Bledsoe 2001, Booth 1990, 1991; Hammer 1972, Hollis 1975, MacRae 1992, 1993, 1996). The relative influence of the area of total impervious surface cover depends on the spatial scale. It has the strongest influence at the scale of catchment basins, a strong influence at the scale of sub-watersheds, moderate influence at the watershed scale and weaker relative influence at the scale of sub-basins and basins (Coleman *et al.* 2005).

Peak discharge rates for floods in drainages with high levels of impervious surface cover area were higher with equivalent rainfall than they were before impervious surface cover area increased (Booth 1990, Hammer 1972, Henshaw and Booth 2000, Leopold 1973). In addition, stormwater discharges over impervious surfaces transported sediment and pollutants more efficiently, which degraded the quality of receiving waters (Booth 1991, Booth and Jackson 1997, Booth and Reinelt 1993, Booth *et al.* 2002, Burges *et al.* 1998, Cappiella and Brown 2001, Jennings and Jarnagin 2002). In most studies relating indices of biotic integrity to the total area of impervious surface cover, investigators reported measurable changes in the hydrology of rivers and streams when the area of total impervious was between 7 and 12%, with biotic degradation increasing when the percentage was between 11 and 25%, and substantial declines in biotic diversity occurring when the percentage exceeded 20 to 30% (Booth 1991, Booth and Jackson 1997, Booth and Reinelt 1993, Booth *et al.* 2002, Burges *et al.* 1998, Cappiella and Brown 2001, Jennings and Jarnagin 2002, Klein 1979, Schueler 1994). However, ephemeral and intermittent streams in the arid regions of southern California were reported to be more sensitive to increases in the area of total impervious surface cover. For example, Coleman *et al. (*2005) reported response thresholds of about 2 to 3% of the area of total impervious surface cover for ephemeral and intermittent streams in the arid regions of southern California.

Changes in runoff and flow have been shown to adversely affect aquatic habitat and species, including endangered and threatened species (Benke *et al.* 1981, Booth and Jackson 1997, Garie and McIntosh 1986, Jones and Clark 1987, and Pedersen and Perkins 1986). Coho salmon are particularly sensitive to the effects of urbanization and their abundance usually declines as watersheds become increasingly urbanized (Birtwell *et al.* 1988, Brown *et al.* 1994, Slaney *et al.* 1996, Mrakovcich 1998). For example, a study of the effects of impervious area on 22 small streams in the Puget Sound lowland ecosystem concluded that Coho salmon were the dominant salmonid in those streams that had a total impervious area less than 5% (May 1998). Above 5%, cutthroat trout dominated. A separate study concluded that when the total impervious area in a stream system exceeded 20% (May *et al.* 1996), the percentage of fine sediment (<0.85 mm) commonly exceeded 15%, a percentage that is harmful to salmon and aquatic insects (Barnard 1992, McHenry *et al.* 1994). These results are supported by the conclusions of other studies that demonstrated that fine sediment in salmon spawning gravels increased by 2.6 to 4.3 times in watersheds with more than 4.1 miles of roads per square mile of land area (Cedarholm *et al.*

1980, Matthews 1999) and that bull trout (*Salvelinus confluentus*) do not occur in watersheds with more than 1.7 miles of road per square mile in the Interior Columbia River basin (Haynes and Norne *et al.* 1996).

Nationwide Permits that Contribute to Impervious Surface Cover

Of the Nationwide Permits we identified to be of special concern, we determined eight of these Nationwide Permits may result in permanent impervious surface cover and the aggregate impacts of those Nationwide Permits have the potential to contribute to changes that correspond to large scale hydrologic phenomena that are critical to the survival and recovery of threatened and endangered species under NMFS' jurisdiction and their critical habitat. The aggregate impacts of these types of activities are not immediately evident on a case-by-case basis, nor are they as predictable as the other Nationwide Permits. These Nationwide Permits of concern are described below.

Nationwide Permit 12 Construction, maintenance or repair of utility lines

Nationwide Permit 12 authorizes activities required for the construction, maintenance, repair and removal of utility lines and associated facilities. This includes associated substations, access roads and tower foundations. These surfaces are often comprised of pavement, cement or other impervious materials.

Plant regrowth is discouraged from graveled surfaces by grading which removes organic substrate followed by compaction and/or addition of inorganic substrate. The removal of plants reduces water transpiration while compaction reduces water infiltration and retards plant reestablishment. Repair of graveled surfaces where plants have reestablished would similarly reduce transpiration and infiltration. Permanent impacts under this permit average 16% of impacts to acreage and 24% of impacts expressed in terms of linear feet. The projected annual direct impact for this permit within subbasins where species and critical habitat under NNMFS jurisdiction occur is nearly 200 acres and 118 thousand linear feet.

Nationwide Permit 13 Bank stabilization

Nationwide Permit 13 authorizes bank stabilization activities necessary to prevent erosion from natural fluvial processes (i.e., movement of water and substrate in the natural dynamic transformation of shoreline) or when altered hydrology amplifies erosion to the extent that water quality or real property is threatened. Approaches to bank stabilization include some methods that add impervious materials (example figure below) to the banks in the form of riprap (i.e., large angular stones), concrete blocks or even poured concrete.

While these materials are immediately effective in preventing erosion of the bank receiving treatment, addition of impervious materials bankside alters adjacent habitat and influences fluvial processes beyond the immediately treated area. The collective effects of multiple bank stabilization efforts along a waterway may have the net effect of completely revising substrate and other habitat factors, thereby altering the species that may thrive in the waterway. Bank stabilization activities are analogous to the impervious area that are within the watershed, but not proximate to a given waterway, because both alter hydrology and fluvial processes. Greater than 70% of impacts authorized under this permit are permanent. The projected annual direct impact for this permit within subbasins where species and critical habitat under NMFS jurisdiction occur is approximately 15 acres and 61 thousand linear feet.

Nationwide Permit 14 Linear transportation projects

Nationwide Permit 14 authorizes activities required for the construction, expansion, modification or improvement of linear transportation projects (e.g., roads, highways, railways, trails, airport runways and taxiways). Clearly, these projects involve the creation of additional impervious surface cover. The projected annual direct impact for this permit within subbasins where species and critical habitat under NNMFS jurisdiction occur is nearly 50 acres a little over 27 thousand linear feet about 70% of these impacts identified as permanent.

Nationwide Permit 29 Residential developments

Nationwide Permit 29 authorizes discharges of dredged or fill material into non-tidal waters of the United States for the construction or expansion of a single residence, a multiple unit residential development, or a residential subdivision. The projected annual direct impact for this permit within subbasins where species and critical habitat under NNMFS jurisdiction occur is nearly 11 acres and over 1500 linear with nearly all impacts identified as permanent.

Nationwide Permit 31 Maintenance of existing flood control facilities

Nationwide Permit 31 authorizes discharges of dredged or fill material resulting from activities associated with the maintenance of existing flood control facilities, including debris basins, retention/detention basins, levees, and channels. Maintenance associated with these authorizations can include returning structures and paved areas to their as-built condition. Repairing what has reverted to a more pervious surface due to cracks, weathering and plant colonization will add additional impervious surface cover to the watershed relative to previous conditions. Less than 20% of the impacts authorized under this permit are under permanent. The projected annual direct impact for this permit within subbasins where species and critical habitat under NNMFS jurisdiction occur is nearly 26 acres and approximately five thousand linear feet.

Nationwide Permit 33 Temporary construction activities

Nationwide Permit 33 authorizes temporary structures, work and discharges of dredged or fill material into waters of the United States, including cofferdams, necessary for construction activities or access fills or dewatering of construction sites, provided that the associated primary activity is authorized by the Corps of Engineers or the U.S. Coast Guard. While the impervious surface used during these activities is temporary, the associated impervious surfaces will affect hydrology and fluvial processes for that period over which they exist. Lingering effects after removal may or may not allow the waterway/waterway processes to return to their original condition. The projected annual direct impact for this permit within watersheds of concern is just over 20 acres, with about 1% of these impacts identified as permanent. About five thousand linear feet of impacts would be authorized per year, with 20% identified as permanent. Nationwide Permit 36 (Boat ramps).

Nationwide Permit 36 authorizes activities required for the construction of boat ramps that may be constructed with impervious materials such as concrete, rock, crushed stone or gravel and pre-cast concrete planks or slabs. The projected annual direct impact for this permit within subbasins where species and critical habitat under NMFS jurisdiction occur is just under 0.7 acres and about 433 linear feet, with nearly all impacts identified as permanent.

Nationwide Permit 39 Commercial and institutional developments

Nationwide Permit 39 authorizes discharges of dredged or fill material into non-tidal waters of the United States for the construction or expansion of commercial or institutional developments. These include building foundations, building pads and attendant features constructed with impervious materials that are necessary for the use and maintenance of those structures. These features may include roads, parking lots, garages and storm water management facilities. The projected annual direct impact for this permit within subbasins where species and critical habitat under NNMFS jurisdiction occur is approximately 14 acres and about 35 hundred linear feet. Greater than 70% of these impacts would be identified as permanent.

5.4 Impacts of Nationwide Permits to ESA Listed Resources under NMFS' Jurisdiction

As we have discussed, most of the endangered or threatened species under the jurisdiction of NMFS occur in freshwater, coastal, or estuarine ecosystems during all or portions of their life cycles and are thus likely to be exposed to some of the direct or indirect effects of activities authorized by the Nationwide Permit Program. In addition to the impacts we have discussed in this Opinion thus far, many of the species that have been listed as endangered or threatened were listed, in part, due to impacts from Corps-issued permits within waters of the United States where those species or the critical habitat occur.

CWA section 404 permits the Corps were specifically identified as one of several reasons for listing Sacramento River winter-run Chinook salmon and Central California Coast, South Central California Coast, Central Valley, Upper Columbia River, Snake River Basin, Lower Columbia River, and Northern California steelhead were listed as threatened and Southern California steelhead. Destruction or degradation of jurisdictional wetlands and other waters of the United States caused by activities the Corps authorized with section 404 permits was specified as a contributing factor for listing steelhead species and designation of their critical habitat (71 FR 834 (01/05/2006); 70 FR 170 (September 2, 2005) and 78 FR 2725 (January 14, 2013)).

Several of NMFS' designations of critical habitat also acknowledge the potential impacts of Corps' permitted activities to the identified features important to the conservation of the subject species. See: 63 FR 46693 (September 2, 1998); 70 FR 52630 (September 2, 2005); 78 FR 2725 (January 14, 2013); 64 FR 24049 (May 5, 1999); and 73 FR 7816 (February 11, 2008).

5.4.1 Summary of Potential Effects to Listed Resources

As we explained the *Approach to the Assessment* in Section 2.1 of this Biological Opinion, during traditional consultations on specific actions, NMFS uses an assessment framework that begins by identifying the physical, chemical, or biotic components of proposed actions that are likely to have individual, interactive, or collective direct and indirect effects on the environment; we then determine whether listed species or designated critical habitat are likely to be exposed to those potential stressors; we estimate how listed species or designated critical habitat are likely to respond to any exposure; then we conclude by estimating the risks those responses pose to the individuals, populations, and species or designated critical habitat that are likely to be exposed.

However, Federal agency programs, such as the Nationwide Permits program, authorize, fund or carry out activities over large geographic areas over long periods of time, with substantial uncertainty about the number, location, timing, frequency and intensity of specific activities those programs would authorize, fund or carry out. Our traditional approaches to section 7 consultations, which focus on the specific effects of a specific proposal, are not designed to deal with the spatial and temporal scales and level of uncertainty that is typical of consultations on agency programs.

Rather than trying to adapt traditional consultation approaches to programmatic consultations, we are utilizing an assessment framework that specifically allows us to help Federal agencies insure that their programs comply with the requirements of section 7(a)(2) of the ESA as described in the Interagency Endangered Species Consultation Handbook (U.S. Fish and Wildlife Service and NMFS 1998; Chapter 5).

Specifically, our programmatic consultations examine the decision-making processes that are integrated into Federal agency programs to determine whether those decision-making processes are likely to insure that specific actions the agency authorizes, funds, or carries out through the program comply with the requirements of ESA section 7(a)(2). That is, during programmatic consultations we ask whether or to what degree the Federal action agency (in this case, the Corps) has structured its proposed program so that the agency:

1. Collects the information necessary to allow it to know or reliably estimate the probable individual and cumulative consequences of its program on the environment, generally, and listed resources specifically;
2. Evaluates the information it collects to assess how its actions have affected the environment, generally, and endangered species, threatened species, and designated critical habitat specifically; and, when this information suggests that the activities authorized, funded, or carried out by its program no longer comply with the mandate and purposes of its program or of section 7(a)(2) of the ESA; and
3. When this information suggests that the activities authorized, funded, or carried out by its program no longer comply with the mandate and purposes of its program or of section 7(a)(2) of the ESA, does the action agency use its authorities to bring those activities into compliance with program mandates and the requirements of section 7(a)(2) of the ESA.

The current Nationwide Permit Program authorizes many different types of activities that directly or indirectly produce stressors which affect threatened or endangered species and their designated critical habitat under NMFS jurisdiction. Effects to these species range from injury to individuals to alteration of habitat quality and spatial extent. A programmatic analysis requires examining this broad array of activities and stressors with factors contributing to the decline and endangerment of threatened and endangered species considered in this Biological Opinion. Contributing factors are identified in ESA listing rules, NMFS web pages, status reports and recovery plans. In some cases the factors are identified in terms of the activities or sources of multiple stressors (e.g., gas and oil exploration, urbanization, agriculture), in other cases specific stressors are identified (e.g., entrainment mortality, temperature). We examine the impacts of the

Nationwide Permit Program and the extent to which it may contribute to the larger problem and factors influencing NMFS listed species and their designated critical habitat.

Many of the current Nationwide Permit-authorized activities change degrade or destroy habitat. For example, when an activity disturbs substrate or alters flow, the structure and function of aquatic habitat is affected through subsequent changes in the transport and deposition of sediment, gravel and large woody debris. Nationwide Permits also authorize placement of fill, which can create short-term pulses of sediment and ultimately reduce the spatial extent of aquatic habitat. Habitat alteration by Nationwide Permit authorized projects may present barriers to passage for listed species either by physically blocking access or creating impassable conditions due to excess vessel traffic, anthropogenic noise or avoidance of poor water quality. Anthropogenic noise results from Nationwide Permits authorizing construction (e.g., pile driving) or exploration (e.g., seismic surveys). Poor water quality can result from chemical discharges and alterations in physical parameters such as temperature and dissolved oxygen.

The previous sections describe the frequency, magnitude and distribution of activities authorized by the Nationwide Permits. The following pages describe these activities in terms of the stressors they contribute and the effects of these stressors on endangered and threatened species and their critical habitat under NMFS jurisdiction.

Stressors of the Action

Physical Injury

Direct physical injury of endangered and threatened species under NMFS' jurisdiction may be the result of entanglement, bycatch, entrainment, and in the case of immobile organisms and life stages, dislodging or burying. Animals may become entangled in mooring lines and netting authorized under Nationwide Permit1 (Aids to Navigation), Nationwide Permit 4 (Fish and Wildlife Harvesting Enhancement, and Attraction Devices), and Nationwide Permit 48 (Existing Commercial Shellfish Aquaculture Activities). Nationwide Permit 4 may also result in bycatch or, when using oyster or crab dredges, dislodgement or damage to immobile species such as Johnson's seagrass or corals. Impingement is the trapping of an aquatic organism against a water intake screen as water is drawn into a facility.

Entrainment is the intake of an aquatic organism along with water or sediment drawn into a facility or suction dredge. Entrainment may occur both during construction and in the operation of these projects once completed. Nationwide Permits authorizing discharges of dredged materials resulting from maintenance or construction cover dredging activities, which may employ suction dredges that can entrain organisms.

Disturbance

Any activity occurring in Waters of the United States has the potential to cause organisms to avoid the project area due to the noise and physical activity of equipment and personnel during the installation or operation of the project. Activities occurring in the evening and nighttime contribute additional disturbance in the form of lighting. The likelihood of avoidance is related to the type, frequency and intensity of the disturbance and the sensitivity of the individual or species considered. Individual sensitivities are affected by life stage, reproductive status and prior experience (i.e., acclimation) to disturbance. Disturbance is potentially contributed by all

Nationwide Permits because, even if the completed project has minimal impact, the activity required to install the project involves disturbance of some kind.

Habitat Suitability

Nationwide Permits authorize the placement of structures and discharge of dredge and fill into waters of the United States where endangered and threatened species and designated critical habitat under the jurisdiction of NMFS occur. Nationwide Permits also authorize additions of impervious cover to a watershed either directly or through attendant features. The habitat stressors associated with these authorizations include increased turbidity and sedimentation and altered watershed flow. Increased turbidity affects light penetration, which in turn affects submerged aquatic vegetation and foraging ability of sight feeders. Fine silt particles suspended in the water column also irritate gills and potentially cause gill tissue injury. Sedimentation, either through the placement or redistribution of sediment, covers the original substrate within the habitat. Sedimentation may embed graveled areas important for salmonid nesting or bury immobile organisms and important foraging and rearing habitat such as seagrass beds. Increased impervious cover in a watershed decreases groundwater recharge rates and increases stormwater flow. Groundwater recharge, which is the water that has soaked into the ground, is important to the maintaining the hyporheic flow (i.e. where there is mixing of shallow groundwater and surface water), which maintains the long-term water supply and thermal regime of streams. Increased stormwater flow results in the rapid overland supply of water to streams, which may result in erosion and the introduction of soil, sediment and associated contaminants into habitats. Increased rates of flow can also present a physical stress to animals and can affect the food chain by increasing drift of invertebrate prey species

Toxicants

Nationwide Permit activities which disturb sediment or involve the use of construction equipment, boats or certain construction materials have the potential to discharge toxicants into Waters of the United States. Sediment suspension into the water column alters the microenvironment around sediment particles such that any contaminant bound the particles may repartition into the water column. Construction equipment is typically fueled and lubricated with petrochemicals or other potentially toxic substances. Further, wear and tear during the operation of equipment can release particulates, which may contain metal, pigments and plasticizers. Pilings and other wood structures may leach creosote constituents or other preservatives into water and objects (e.g., boats, buoys, docks) treated with antifouling coatings will leach the antifoulant into water. Activities authorized under permits with these activities have the potential to contribute toxicants. Each of the 22 Nationwide Permits of special concern involves sediment disturbance, the use of construction equipment or boats or the use of objects and materials that may discharge toxicants.

Effects to Species and their Designated Critical Habitat

Cetaceans

Nationwide Permit Stressors contributing to the decline and endangerment of the eleven cetacean species listed as endangered or threatened under the ESA include entanglement, anthropogenic noise and impairment of critical habitat with respect to water quality, prey quality and availability, and habitat suitability. The ESA listed cetacean species include the Cook Inlet beluga whale (*Delphinapterus leucas*), blue whale (*Balaenoptera musculus*), bowhead whale (*Balaena mysticetus*), false killer whale (*Pseudorca crassidens*), fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), Southern Resident killer whale (*Orcinus orca*), North Pacific right whale (*Eubalaena japonica*), North Atlantic right whale (*Eubalaena glacialis);* sei whale (*Balaenoptera borealis*), and the sperm whale (*Physeter macrocephalus*).

The major physical injury risk to cetaceans posed by Nationwide Permit stressors is through entanglement. Animals may become entangled in mooring lines and netting authorized under Nationwide Permit 1 (Aids to navigation), Nationwide Permit 4 (Fish and wildlife harvesting enhancement, and attraction devices), and Nationwide Permit 48 (Existing commercial shellfish aquaculture activities). Beluga, bowhead, killer, humpback, fin, sei, gray and the right whales are known to, or may potentially encounter devices like pots and fish weirs. Injury and mortality due to these encounters is likely under reported, especially for larger cetaceans, because some animals are able to break through the gear and swim away with injuries that eventually prove lethal or affect their survival. Bycatch reduction gear adopted by the fishing industry, such as sinking ground lines and breakaway lines, are among the techniques used to reduce the risk of entanglement.

Lobster trap gear and anchored gillnet gear are believed to pose the most serious risks of entanglement and serious injury to right whales frequenting Cape Cod Bay and Great South Channel right whale critical habitat. As a result, regulations developed under the Atlantic Large Whale Take Reduction Program restrict the use of lobster and anchored gillnet gear in Cape Cod Bay and Great South Channel critical habitat. The most restrictive measures apply during peak right whale abundance: January 1 to May 15 in Cape Cod Bay, and April 1 to June 30 in the Great South Channel critical habitat. Measures include prohibitions on the use of lobster trap gear and anchored gillnet gear in the Great South Channel critical habitat during periods of peak right whale abundance (with the exception of gillnet gear in the Great South Channel Sliver Area), and, for Cape Cod Bay critical habitat, anchored gillnet gear prohibitions and lobster trap restrictions during peak right whale abundance. During non-peak periods of right whale abundance, lobster trap and gillnet fishers must modify their gear by using weak links in net and/or buoy lines, follow gillnet anchoring requirements and meet mandatory breaking strengths for buoy line weak links, amongst others. Additional measures (i.e., gear marking requirements, and prohibitions on the use of floating line and the wet storage of gear) apply within as well as outside of critical habitat. All of these measures are intended to reduce the likelihood of whale entanglements or the severity of an entanglement should an animal encounter anchored gillnet or lobster gear.

Disturbance caused by the installation and operation of projects authorized by Nationwide Permits can result in avoidance of the project area, interfere with communication and navigation and, in toothed whales, echolocation. Anthropogenic noise was specifically identified as a contributing factor to the listing of all ESA listed cetaceans. The Nationwide Permits authorize relatively near-shore activities, so beluga, bowhead, killer, humpback, fin, sei, gray and the right whales are most likely to encounter Nationwide Permit-authorized sources of disturbance such as equipment operation, pile driving and seismic survey. While listing documents for humpback whales expressed uncertainty regarding the effects of noise, acoustic impacts from vessel operation and oceanographic research using active sonar are of increasing concern in Hawaii.

The primary constituent elements of critical habitat essential to the conservation of Cook Inlet beluga whales include unrestricted passage within or between the critical habitat areas, and an absence of in-water noise levels that result in the abandonment of habitat. Southern resident killer whale critical habitat requires passage conditions to allow for migration, resting, and foraging. Disturbance from human activities can interfere with movements of the whales and impact their passage in Puget Sound. Vessels engaged in Nationwide Permit-authorized activities may prevent whale passage, and may increase energy expenditure and impact foraging behavior. Sound from such may also reduce the effective echolocation and reduce availability of fish for southern resident killer whales in their critical habitat (Holt 2008).

Nationwide Permits that authorize the installation of structures or discharges of dredged or fill material into waters of the United States in nearshore, and offshore areas and/or result in the discharge of dredge and fill materials in coastal waterways such as Nationwide Permit 1 (aids to navigation), Nationwide Permit 3 (maintenance), Nationwide Permit 4 (fish and wildlife harvesting, enhancement, and attraction devices and activities), Nationwide Permit 8 (oil and gas structures on the outer continental shelf), Nationwide Permit 14 (linear transportation projects), and Nationwide Permit 52 (water-based energy generation pilot projects) overlap with the distribution of Southern resident killer whales.

The primary constituent elements of critical habitat essential to the conservation of southern resident killer and Cook Inlet beluga whales also include the availability and quality of prey species. The primary prey species for the Southern resident killer whales are Chinook salmon while primary prey for Cook Inlet beluga includes four species of Pacific salmon (Chinook, Coho, sockeye and chum salmon) and Pacific eulachon. To the degree that activities authorized by Nationwide Permits affect the distribution and abundance of salmon populations in the region; those activities would also affect the forage base for these fish eating whales. Anadromous prey are affected by Nationwide Permit-authorized actions inland that result in the removal of sediment and substrate or embedding substrate to the extent where the spawning habitat becomes unsuitable. Prey populations are also affected by Nationwide Permit-authorized structures that block migration or reduce bank vegetation shading waterways. Removal or reduction of bank vegetation results in warmer streams and reduced input of plant debris into the nutrient cycle of salmon streams. Overfishing, habitat losses and hatchery practices were major causes of decline in salmonid prey base of Southern resident killer whales in Puget Sound and Georgia Basin. Wild salmon stocks have declined in many areas of this species critical habitat (PFMC 2008). By contrast, at this time NMFS has no information to suggest prey availability has been a factor in the decline or is impeding the recovery of the Cook Inlet beluga whale.

While the Nationwide Permits are not expected to significantly affect the krill, plankton, and other small pelagic organisms that make up prey base of baleen whales (blue, fin, humpback, sei, right, bowhead and gray whales), conflicts in habitat use are attributed to the decline of humpback whale. Conflicts may occur should Nationwide Permits authorize actions that occupy areas where humpback whales aggregate.

Water quality and waters free of toxins or other harmful agents were identified as critical habitat primary constituent elements for essential to the conservation of southern resident killer and

Cook Inlet beluga whales. Water quality of critical habitat in Puget Sound, in general, is degraded and a major concern for water quality is oil spills. However, there has been a declining trend in spill incidents (WDOE 2007). Pollution continues to affect the quality of Southern Resident killer whale prey in Puget Sound. While water quality and habitat suitability of the intertidal and subtidal waters of Cook Inlet could be modified from a variety of fill placement and channel modifications resulting from coastal development, Upper Cook Inlet is designated as Category 3 on the CWA Section 303(d) list of impaired waterbodies, which means that insufficient information in is available to determine whether the waterbody meets water quality standards.

Contaminants contributed by Nationwide Permit authorized activities either directly or through contaminant repartitioning due to sediment redistribution may be introduced into the ocean by rivers, coastal runoff, and various industrial activities, including offshore oil and gas or mineral exploitation (Grant and Ross 2002, Garrett 2004, Hartwell 2004). Long-lived species and species at the top of the food chain are particularly susceptible to contaminants that bioaccumulate and biomagnify (i.e., increasing concentrations in predators relative to prey). The accumulation of persistent pollutants through trophic transfer may cause mortality and sub-lethal effects in long-lived higher trophic level animals (Waring *et al.* 2008), including immune system abnormalities, endocrine disruption, and reproductive effects (Krahn *et al.* 2007). Recent efforts have led to improvements in regional water quality and monitored pesticide levels have declined, although the more persistent chemicals (e.g., inorganics, organochlorines, PCBs, etc.) are still detected and are expected to endure for years (Mearns 2001, Grant and Ross 2002).

Exposure to hydrocarbons released into the environment via discharges associated with equipment operation for any of the Nationwide Permits or oil and gas activities authorized by Nationwide Permit 8 pose risks to marine species. Cetaceans are generally able to metabolize and excrete limited amounts of hydrocarbons, but chronic exposure over time risks accumulations to toxic levels (Grant and Ross 2002). Cetaceans have a thickened epidermis that greatly reduces the likelihood of petroleum toxicity from skin contact with oils (Geraci 1990), but they may inhale these compounds at the water's surface and ingest them while feeding (Matkin and Saulitis 1997). Hydrocarbons also have the potential to impact forage species, and therefore may affect listed species indirectly by reducing food availability.

Pinnipeds

Activities authorized by Nationwide Permit 1 (Aids to Navigation), Nationwide Permit 3 (Maintenance), Nationwide Permit 4 (Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities), Nationwide Permit 8 (Oil and gas Structures on the Outer Continental Shelf), Nationwide Permit 14 (Linear Transportation Projects), and Nationwide Permit 52 (Water-Based Energy Generation Pilot Projects) overlap with the distribution of Hawaiian monk seals and the Western DPS of Steller sea lions while activities that would be authorized by Nationwide Permits 1 and Nationwide Permit 8, overlap with the distribution of the Arctic DPS of ringed seals. Pinnipeds are potentially harmed directly though entanglement in netting or mooring lines authorized under Nationwide Permits 1 and 4, the remaining activities potentially contribute toxics and disturbances that may directly affect individuals or alter prey and habitat resources.

While acute toxicity events are not expected from Nationwide Permit activities, repeated exposure to lower levels of contaminants may result in immune suppression and/or endocrine disruption (Atkinson *et al.* 2008). As primary carnivores with an average lifespan of 25 to 30 years, bioaccumulation and biomagnification are factors in exposures to and effects caused by toxic substances.

The Nationwide Permits contribute to factors specifically identified as responsible for the listing of the Steller sea lion (*Eumetopias jubatus*), the Guadalupe fur seal (*Arctocephalus townsendi*), the Hawaiian monk seal (*Monachus schausinslandi)* and the ringed seal (*Phoca hispida*). These include incidental capture in fishing gear, which may be authorized under Nationwide Permit 4, and habitat modification due to development, including oil and gas exploration and development, the structures for which are authorized under Nationwide Permit 8.

Anthropogenic disturbance is identified as a stressor affecting critical habitat for the Hawaiian monk seal and Steller sea lion. Essential features of critical habitat for the conservation of Hawaiian monk seals specifically include areas with low levels of anthropogenic disturbance. Activities that occur within the critical habitat of western Steller sea lions that may disrupt essential life functions include boat and airplane traffic and research activities. In addition to these, oil and gas exploration (Nationwide Permit 8), coastal development (e.g. Nationwide Permits 12, 13, 14, 28, 29, 33, 36 and 39), and pollutant discharge (potentially under any Nationwide Permit) within Steller sea lion critical habitat were also identified as sources of disruption for essential life functions.

Sea Turtles

Nationwide Permit-associated stressors and activities include stressors associated with threats to sea turtles. These threats include entanglement in fishing gear (Nationwide Permit 4), shoreline armoring, bank stabilization and erosion control (Nationwide Permit 13), and coastal development (e.g. Nationwide Permits 14, 28, 29, 33, 36 and 39). While toxic pollutant discharges are covered under CWA section 402, pollutants have been identified as contributing factors to sea turtle endangerment and may be discharged by activities and structures authorized under Nationwide Permits or by the equipment used to install Nationwide Permit-authorized projects. These pollutants include those that are discharged from marina and dock construction and use and aquaculture.

Because of the number of sea turtles that were being captured and killed in pound nets in portions of Chesapeake Bay, NMFS' promulgated regulations that constrain the configuration of pound nets set in portions of the Virginia side of the Bay (69 *Federal Register* 24997, 71 *Federal Register* 36024). Thus far, however, those regulations do not affect pound net fisheries elsewhere in Chesapeake Bay or along the Atlantic or Gulf Coasts; sea turtles continue to be captured in these fisheries.

Leatherback and Green sea turtles have been impacted historically by domestic fishery operations that often capture, injure and even kill sea turtles at various life stages. In the U.S., lines used for pot gear for the U.S. Lobster and Red Crab fisheries cause entanglement resulting in injury to flippers, drowning, and increased vulnerability to boat collisions (Lutcavage *et al.* 1997). In the Caribbean region, sea turtles are impacted spiny lobster fisheries in addition to various State and artisanal fisheries. Leatherbacks are more likely to become entangled in fishing gear because they are less maneuverable and larger than other sea turtle species (Davenport, 1987).

Coastal development can deter or interfere with nesting, affect nest success, and degrade foraging habitats for sea turtles. Structural impacts to nesting habitat include the construction of buildings and pilings, beach armoring and renourishment, and sand extraction (Lutcavage *et al.* 1997; Bouchard *et al.* 1998). 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 evoke a change in the natural behaviors of both adults and hatchlings (Ackerman, 1997; Witherington *et al.* 2003; Witherington *et al.* 2007).

Many nesting beaches have already been significantly degraded or destroyed, while increasing coastal populations and tourism development threaten others. Sea walls, rock revetments, and sandbag installations impact nesting habitat. Destruction and modification of loggerhead nesting habitat in the North Pacific result from coastal development and construction, placement of erosion control structures and other barriers to nesting, beachfront lighting, vehicular and pedestrian traffic, sand extraction, beach erosion, beach sand placement, beach pollution, removal of native vegetation, planting of non-native vegetation (NMFS and USFWS, 1998). Mosier (1998) reported that fewer loggerheads made nesting attempts on beaches fronted by seawalls and found that when turtles did emerge in the presence of armoring structures, more returned to the water without nesting than those on non-armored beaches.

Habitat can also be impacted by beach renourishment projects, which result in altered beach and sand characteristics, affecting nesting activity and nest success. In some areas, timber and marine debris accumulation as well as sand mining reduce available nesting habitat (Bourgeois et al. 2009). Because hawksbills prefer to nest under vegetation (Mortimer 1982, Horrocks and Scott 1991), they are particularly affected by beachfront development and clearing of dune vegetation (Mortimer and Donnelly 2007). The presence of lights on or adjacent to nesting beaches alters the behavior of nesting adults and is often fatal to emerging hatchlings as they are attracted to light sources and drawn away from the sea. For example, up to 50 percent of some olive ridley hatchlings disoriented upon emergence in some years (Witherington and Bjorndal 1991, Witherington 1992, Karnad *et al.* 2009).

Habitat aspects that are important for green and hawksbill sea turtle survival and recovery include important natal development habitat, refuge from predation, shelter between foraging periods, and food for green sea turtle prey. The effects of vessel traffic, coastal construction activities, pollution and dredge and fill activities all significantly threaten these habitat features.

Leatherback critical habitat was identified adjacent to Sandy Point, St. Croix, US Virgin Islands (44 FR 17710). This habitat is essential for nesting, which has been increasingly threatened since 1979, when tourism increased significantly, bringing nesting habitat and people into close and frequent proximity due to increased coastal development. However, studies do not currently support significant critical habitat deterioration. NMFS also designated critical habitat for leatherback sea turtles in waters along Washington State, Oregon and California. The primary constituent elements of these areas includes migratory pathway conditions to allow for safe and timely passage and access between high use foraging areas, pathways which could be disrupted through Nationwide Permit-authorized activities such as in-water energy development and aids to navigation (Nationwide Permits 1 and 52). At this time, there are no data to suggest that these primary constituent elements have been significantly degraded.

In nearshore waters, 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, 1997). Other nearshore threats include harassment and/or injury resulting from private and commercial vessel operations, military detonations and training exercises, and scientific research activities.

Green sea turtles depend on shallow foraging grounds with sufficient benthic vegetation. Therefore, direct destruction of foraging areas due to dredging, boat anchorage, deposition of spoil, and siltation may have considerable effects on the distribution of foraging green turtles (Coston-Clements and Hoss, 1983; Williams, 1988). Contaminants may reduce the extent, quality and productivity of foraging grounds as well (Frazier, 1980; McKenzie *et al.* 1999; Storelli and Marcotrigiano, 2003).

Sea turtles' coastal habitats are negatively impacted by herbicides, pesticides, oil spills, agricultural runoff, sewage discharge and other chemicals associated with coastal development (Francour *et al.* 1999, Lee Long *et al.* 2000, Waycott *et al.* 2005). Sea turtles accumulate heavy metals through their diets and during egg incubation from surrounding sands (Sahoo *et al.* 1996). Sea turtle tissues have been found to contain organochlorines, which may suppress the immune system of loggerhead sea turtles and may affect metabolic regulation (Keller *et al.* 2004, Keller *et al*. 2006, Oros *et al.* 2009). Such contaminants could cause deficiencies in endocrine, developmental and reproductive health (Storelli *et al.* 2007).

Marine and Anadromous Fish

The Nationwide Permits authorize activities that directly or indirectly produce stressors that have been identified as factors in the threatened or endangered status of marine and anadromous fish under NMFS' jurisdiction and residing in waters where Nationwide Permits would be authorized. This includes the marine species:

- Smalltooth sawfish (*Pristis pectinata*)
- Bocaccio (*Sebastes paucispinis*)
- Canary rockfish (*Sebastes pinniger*)
- Nassau grouper (*Epinephelus striatus* proposed threatened*)*
- Yelloweye rockfish (*Sebastes ruberrimus*)

This also includes the following anadromous species:

- Chinook salmon (*Oncorhynchus tshawytscha*)
- Chum salmon (*Oncorhynchus keta*)
- Coho salmon (*Oncorhynchus kisutch*)
- Sockeye salmon (*Oncorhynchus nerka*)
- Steelhead trout (*Oncorhynchus mykiss*)
- Pacific eulachon (*Thaleichthys pacificus*)

- Green sturgeon (*Acipenser medirostris*)
- Gulf sturgeon (*Acipenser oxyrinchus desotoi*)
- Shortnose sturgeon (*Acipenser brevirostrum*)

Development, habitat degradation and habitat loss are very generic factors contributing to the threatened or endangered status of all marine and anadromous species under NMFS' jurisdiction (see the *Status of Listed Resources* section 3.0 of this Biological Opinion). Nationwide Permits authorize activities within and changes to wetland and aquatic environments and therefore pose a hazard to the aquatic habitats on which ESA listed species under NMFS' jurisdiction rely. The specific types of habitat effects and associated permits are discussed above.

Nationwide Permit authorized activities and stressors are among factors contributing to the decline and ESA listing of NMFS threatened and endangered species including yellow eye and canary rockfish, smalltooth sawfish, Chinook salmon, steelhead trout, and shortnose sturgeon. For example, degradation of rocky shore habitats of bocaccio, canary rockfish and yellow rockfish was specifically attributed to sewer line construction and the installation of cables and pipelines. These activities are authorized under Nationwide Permit 12, Utility lines. Hydropower projects, which would be authorized under Nationwide Permit 17, were specifically identified as contributing factor for steelhead trout and Chinook, chum, coho, and sockeye salmon. Nationwide Permit 40 authorizes agricultural activities, some of which were identified as contributing to the listing status of smalltooth sawfish, gulf sturgeon, steelhead trout and Chinook, chum, coho, and sockeye salmon.

While the deep-water dwelling bocaccio and rockfish species (canary and yellow eye) are not likely to be exposed to the direct or indirect effects of most of the activities that would be authorized by the Nationwide Permits. Larvae of these species and both adult and larval bocaccio might be exposed to water-based renewable energy generation pilot projects that would be authorized by Nationwide Permit 52. One characteristic of the proposed critical habitat for rockfish that may be influenced by Nationwide permit authorized activities is the need for sufficient water quality and levels of dissolved oxygen to support growth, survival, reproduction and feeding opportunities.

Critical habitat primary constituents or "essential habitat" elements identified for NMFS' listed salmonids, gulf and green sturgeon, and Pacific eulachon generically include appropriate or sufficient:

1. Substrate;
2. Water quality;
3. Water quantity;
4. Water temperature;
5. Water velocity;
6. Cover/shelter;
7. Food
8. Riparian vegetation;
9. Space; and
10. Safe passage conditions.

Nationwide permit-authorized activities potentially influence each of these elements directly or indirectly through alternation of riparian habitat, hydrology, sediment distribution and disturbance from human activity, equipment and incidental pollutant discharges.

Sediment and contaminants from Nationwide Permit-authorized activities enter rivers and their tributaries, affecting water quality. Juvenile salmonids that inhabit urban watersheds often carry high contaminant burdens, which is partly attributable to the biological transfer of contaminants through the food web (Varanasi *et al*. 1993). Eulachon ecotoxicological studies show high contaminant burdens, particularly of arsenic and lead (Futer and Nassichuk 1983, Rogers *et al.* 1990, EPA 2002). Degraded water quality can substantially harm all species of listed sturgeon (ASSRT 2007, SSRT 2010, NMFS 2010), USFWS and GSMFC 1995). Habitat degradation due to runoff contaminants can also have a negative impact on smalltooth sawfish (NMFS 2006b). Chemical contamination is also considered a threat to rockfish recovery (NMFS 2008a). Numerous chemical contaminants are also present in spawning rivers, but the exact effect these compounds have on spawning and egg development is unknown (Gustafson *et al.* 2010).

Entrainment is specifically identified as a factor for the decline and endangerment of Chinook salmon, eulachon, green sturgeon and steelhead trout. Those Nationwide Permits authorizing discharges of dredged materials resulting from maintenance or construction cover dredging activities, which may employ suction dredges that can entrain organisms.

In addition to habitat impairment or outright habitat loss, specific habitat characteristics were identified as factors in the listing status for several species. Insufficient water flow and availability were identified as contributing to the listing status of steelhead trout, Gulf sturgeon and green sturgeon.

Increasing water temperature is among the factors contributing to the listing status of eulachon, Chinook salmon, green sturgeon and steelhead trout. Nationwide Permits authorizing the removal or reduction of bank vegetation that shades water will increase water temperatures. Stream bank stabilization projects authorized under Nationwide Permit 13 increase stream temperatures by removing overhanging stream bank vegetation and by occupying the margins of streams, reducing the area of water shaded by any remaining trees. Nationwide Permit projects that result in impervious cover, for example residential and commercial developments authorized by Nationwide Permits 29 or 39, influence stream temperatures directly through removal of riparian vegetation or indirectly through thermal runoff discharges during storm events.

Nationwide Permits involve substrate disturbance or redirection of water flow that may alter transport and deposition of large woody debris, sediment, and gravel in aquatic systems. Sedimentation may bury the limestone bedrock and cobble where Gulf sturgeon spawn or occlude the interstitial spaces of gravel beds where salmonid eggs are laid. Intentional dredging or scouring due to altered flow may remove spawning substrate used by salmonids (i.e., gravel) or eulachon (i.e., sand and silt). Dredging is also a low to moderate threat to eulachon in the Columbia River because eggs could be destroyed by mechanical disturbance or smothered by in-water disposal of dredged materials. The lower Columbia River mainstem provides spawning and incubation sites, and a large migratory corridor to spawning areas in the tributaries.

Marine Invertebrates

The Nationwide Permits that could potentially affect black abalone (*Haliotis cracherodii*) and white abalone (*Haliotis sorenseni)* are those associated with thermal effects (many Nationwide Permits), coastal development (e.g. Nationwide Permits 12, 13, 14, 28, 29, 33, 36 and 39), aquaculture activities (Nationwide Permit 48) and underwater utility lines (Nationwide Permit 12).

Anthropogenic abrasion, breakage and sedimentation are among the factors contributing to the decline and listing of Elkhorn (*Acropora palmata*) and staghorn (*Acropora cervicornis*) corals. Direct injury through Abrasion and breakage may result from the in water construction activities. Activities that would be authorized by Nationwide Permit 1 (aids to navigation), Nationwide Permit 3 (maintenance), and Nationwide Permit 52 (water-based energy generation pilot projects) overlap with the distribution of boulder star coral, elkhorn coral, Elliptical star coral, Lamarck's star coral, rough cactus coral, staghorn coral, and Pacific coral species that are proposed to be listed.

In addition, indirect effects of land based Nationwide Permit authorizations that do not overlap with these species may affect water quality through discharges of sediment and toxicants. Nationwide Permit authorized activities in coastal watersheds introduce sediment into the ocean by a variety of mechanisms, including river discharge, surface runoff, groundwater seeps, and atmospheric deposition through dust generation. The most common direct effect of sedimentation on coral is deposition of sediment on coral surfaces as it settles out from the water column. Corals that are unsuccessful in removing sediment will be smothered and die. Sediment can also induce sublethal effects, such as reductions in tissue thickness, polyp swelling, zooxanthellae loss and excess mucus production. In addition, suspended sediment can reduce the amount of light in the water column, making less energy available for coral photosynthesis and growth. Finally, sediment impedes fertilization of spawned gametes and reduces larval settlement, as well as the survival of recruits. Accordingly, one feature that is essential to the conservation of staghorn and elkhorn corals in their critical habitat is substrate of suitable quality and availability to support successful larval settlement and recruitment and reattachment and recruitment of fragments.

While abalone are known to bioaccumulate high levels of heavy metals (silver, cadmium, and mercury) (Huang *et al*. 2008), there is limited information on adverse effects of metals on abalone species (Gorski and Nugegoda, 2006).

Johnson's seagrass

Factors identified as responsible for the decline of Johnson's seagrass include dredging and sedimentation that may be contributed by activities authorized under many of the Nationwide Permits.

Dredging waterways redistributes sediments, dislodges plants and alters bottom topography. While the period of poor water quality due to suspended sediments may be temporary, alteration and subsequent destruction of the benthic community has been observed in Johnson's seagrass sites. In cases where dredging affects hydrodynamic properties of the area, such as the depth profile, current direction, or current velocity, seagrasses may be severely threatened (Durako, 1988). Important physical and biological features of the critical habitat areas include adequate water quality, salinity levels, water transparency and stable, unconsolidated sediments that are free from physical disturbance.

Seagrass communities require sunlight to penetrate the water column and reach submerged blades (Kenworthy *et al*, 1989). When sediment loading becomes excessive, turbidity in the water column increases and the penetration of sunlight is inhibited. In extreme cases, excessive sediment loading can actually smother seagrasses (Livingston, 1987; McRoy and Williams-Cowper, 1978.

5.5 Addressing the Reasonable and Prudent Alternative from the 2012 Programmatic Biological Opinion

The following sections summarize how the Corps addressed specific elements of the 2012 RPA in their modified action:

RPA Element 1

The first element of the RPA identified in the 2012 Biological Opinion required the Corps to systematically collect the information that would be necessary to know or reliably estimate how many activities may affect endangered or threatened species under NMFS' jurisdiction or critical habitat that has been designated for those species, where and when the activities occurred, the impact of the activity, and whether a permittee complied with any General Conditions of the Nationwide Permits that would apply to their activity (which can be used to verify compliance rates with those conditions and their effectiveness).

To address RPA element 1, the Corps will provide its Regulatory Project Managers with additional training and guidance to ensure accurate data entry into the Regulatory Program's automated information system, ORM2, which is used to produce the semi-annual reports and data submissions. The Corps will also increase its quality assurance/quality control efforts for the ORM2 data to ensure its accuracy.

The Corps will require prospective permittees to provide the following information when they submit PCNs:

- Applicant Information
- Location of the activity (including the particular watershed)
- Area affected (estimated area/linear distance)
- Narrative explanation of how the applicant satisfied requirements/conditions

1. Applicants would use either the Corps permit application form (ENG-4345) or a letter or other comparative document that contains the information specified by paragraph (b) of Nationwide Permit General Condition 31. This information would include the following:
    a. A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the Nationwide Permit activity, in acres, linear feet, or other appropriate unit of measure; any other Nationwide Permit(s),

regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the District Engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the Nationwide Permit. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

b. If the proposed activity will result in the loss of greater than 1⁄10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

c. If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or use the designated critical habitat that may be affected by the proposed work. The Corps will provide information to applicants to facilitate this process (see *5.1.6 RPA Element 9* below). Federal applicants must provide documentation demonstrating compliance with the ESA; See General Condition 18.

The District Project Manager will review every application and all the above information to determine whether it is complete. The District Project Manager will use a general permit decision checklist to ensure that all requirements have been met. Once all requirements/condition have been met, the District Project Manager will verify the permit. If the proposed activity does not satisfy all terms and conditions of the Nationwide Permit, the District Project Manager will notify the applicant that an individual permit is required.

RPA Element 2

The second element of the RPA from the 2012 Biological Opinion required Corps Districts to formally consult with their counterparts in NMFS on procedures Districts impose to comply with the first element of the reasonable and prudent alternative and to identify additional conditions those Districts might impose on Nationwide Permits and on measures to avoid or minimize the incremental, additive, and interactive impacts of activities that would be authorized by Nationwide Permits in those Districts on endangered and threatened species under NMFS' jurisdiction and critical habitat that has been designated for such species.

To address RPA Element 2, the Corps has agreed to work with NMFS Regional Offices to develop new Regional Conditions, or to consult with the appropriate NMFS Regional Office on Nationwide Permit Program.

The Corps has agreed that their Districts will work with their NMFS' Regional counterparts to refine these Regional Conditions and/or to develop new Regional Conditions to reduce potential adverse effects to ESA listed and proposed species and designated critical habitat under NMFS' jurisdiction. Regional conditions may only further restrict the use of Nationwide Permits. They would not increase any limits of the Nationwide Permits nor would they increase PCN thresholds. Regional conditions would also not replace or remove any of the national Nationwide Permit General Conditions.

If Regional Conditions are not available or feasible in a Region, or District, and if the activity may affect ESA listed resources, the Corps is required to request consultation from the appropriate NMFS Regional Office. Some Regional Programmatic Consultation on the Nationwide Permit Program may also occur to cover categories of activities and streamline ESA section 7 compliance at the Regional level. The Corps will also consult with the appropriate NMFS Region on any individual activity or suite of activities that do not fall under one of the Nationwide Permits identified in this proposed action or do not comply with the general or Regional Conditions as agreed to by the Corps and NMFS.

RPA Element 3

The third element of the RPA from the 2012 Biological Opinion required the Corps to analyze the information they receive as a result of the first element to assemble a picture of the individual and aggregate impacts of those individual actions on waters of the United States in those watersheds that overlap with the distribution of endangered or threatened species under NMFS' jurisdiction (and critical habitat that has been designated for those species).

To address RPA Element 3, the Corps agrees to issue semi-annual reports on Corps Regulatory Program permitting activities that would be shared with NMFS to provide information on the contribution of activities authorized by Corps permits. This will include activity-specific information on acres of permanent impacts, in addition to other authorized impacts such as acres of temporary impacts and linear foot impacts, authorized by all types of Corps permits, including the Nationwide Permits.

Summaries and data reports will be grouped by Region and will be sent to the relevant NMFS Regional Offices and to NMFS Headquarters. Within 30 days after a semi-annual report is provided to the NMFS Regional Office, there will be a mandatory meeting between Corps District staff and NMFS Regional staff to discuss the data in the semi-annual report and to determine whether additional permit conditions, consultations, or other protective measures are necessary to address specific types of activities or stressors that affect listed species or designated critical habitat in the watersheds within the Corps District and NMFS Region.

The summaries and data reports will include the following information:

1. Number of activities
2. Area affected, including:

   (a). The proposed area/linear distance submitted in PCNs and reported on the Corps' 10.2 ORM2 Database

   (b) The verified impact indicated in the verification letter issued by the Corps and recorded in the Corps' 10.2 ORM2 Database. The database will also include the impact activity type, authorized impact area, location and required compensatory mitigation

(c) The actual impact collected during compliance inspections (a minimum of 5% of Nationwide Permit verifications issued in a particular year). To calculate actual area affected, the Corps will look at compliance rates from 5% of the authorized activities (or whatever percentage the District inspected) and extrapolate. They would include projects that were not performed as well as those that affected less area than proposed and more area than proposed. They will use these data to determine to estimate how much actual area was affected. Inspections must also include checks on impact activity type, area, location and fulfillment of compensatory mitigation requirements (i.e., must show functional replacement has been achieved).

3. Locations (i.e., affected HUC 10 watersheds) as reported in the Corps' 10.2 ORM2 Database

4. Acreage or linear distance of established, restored or enhanced wetlands specifically required as well as what actually occurred. This information will include:

(a) Acreage (or linear distance) of permittee responsible mitigation from Corps' 10.2 ORM2 Database.

(b) Mitigation bank credits including those required for specific impacts as tracked in the Corps' 10.2 ORM2 database as well as credits available from established mitigation banks as tracked by the Corps' RIBITS database. Conversion of credits to impact acres would occur wherever possible. Corps Districts control the mitigation credit release, after consulting with the Interagency Review Team. The credit release is based on attainment of the applicable performance standards specified in the credit release schedule. Mitigation banks are subject to ESA section 7 consultation when the activities involved in the establishment or operation of the mitigation bank (e.g., earthwork to conduct the wetland or stream restoration activity that will generate mitigation bank credits) may affect listed species or critical habitat. Either formal or informal consultation would be conducted, with the Corps as the action agency unless the bank sponsor is a Federal agency. U.S. Fish and Wildlife Service and NMFS staff participate on the Interagency Review Team and would advise whether ESA section 7 consultation is needed for a particular mitigation bank proposal. The credit classification system is determined during the review of each mitigation bank or in-lieu fee program proposal but must be tied back in RIBITS to the Cowardin classification system at the system level (i.e., riverine, palustrine, estuarine, marine, lacustrine). Districts have the option of further classifying the credits to the Cowardin subsystem or class level.

(c) In Lieu fee program details. An in-lieu fee program must be constructed within three growing seasons of the date the first debit occurs (i.e., when the first credit is secured by a permittee from the in-lieu fee program sponsor) (see 33 CFR 332.8(n)(4)). The in-lieu fee project must be based on a mitigation plan approved by the Corps (after consulting with the Interagency Review Team), with ecological performance standards and a credit release schedule based on attainment of those ecological performance standards. The Corps has no national standard for classifying mitigation bank credits and in-lieu fee program credits. The credit classification system is determined during the review of each mitigation bank or in-lieu fee program proposal but must be tied back in RIBITS to the Cowardin classification system at the system level. Districts have the option of further classifying the credits to the Cowardin subsystem or class level.

5. The kind and functional equivalent of established, restored or enhanced wetlands, specifically authorized including:

(a) Whether compensatory mitigation was required as tracked by the Corps' 10.2 ORM2 database

(b) Type of mitigation: permittee responsible (on site/offsite), mitigation bank credits, in-lieu fee program credits as tracked by the Corps' 10.2 ORM2 database as well the Corps' RIBITS database

6. Compliance with pertinent Nationwide Permit conditions (including mitigation) including:

(a) Number of inspections

(i) A minimum of 5% of all Nationwide Permit verifications issued within the most recent fiscal year.

(ii) A minimum of 5% of active (permittee-responsible mitigations sites each fiscal year

(iii) A minimum of 20% of active mitigation banks and in-lieu fee programs each fiscal year.

(b) Percentage of compliance

(i) Corps will reach resolution on non-compliance with permit conditions and/or mitigation requirements on at least 20% of activities determined to be non-compliant at the end of the previous fiscal year and determined to be non-compliant during the current fiscal year. The Corps shall reach resolution on at least 20% of all pending enforcement actions (i.e., unauthorized activities) that are unresolved.

(c) Factors used to prioritize compliance:

(i) Information provided on compliance certification forms submitted as required by General Condition 30, where the authorized activity and (if required) compensatory mitigation has been completed. This involves focusing compliance efforts in cases where the Corps knows the Nationwide Permit activity has been completed instead of traveling to sites where the work may not have done yet.

(ii) Monitoring reports for compensatory mitigation projects, to verify whether the monitoring report is accurate and whether the compensatory mitigation project is achieving its objectives and performance standards. Site visits are normally required to closeout compensatory mitigation projects.

(iii) Compliance with the Nationwide Permit General Conditions (including General Condition 18), as well as applicable Regional Conditions. If the Corps District added activity-specific conditions to the Nationwide Permit authorization to minimize adverse environmental effects, efforts to ensure compliance would involve prioritizing compliance inspections for those Nationwide Permit verifications with activity-specific conditions added by District Engineers.

(iv) Corps project managers will target compliance inspections in areas where they are conducting other field work or meetings, or along travel routes to that other field work or meetings, to make more efficient use of agency funds and other resources.

(v) The performance measures may also be used to prioritize compliance inspections during each quarter of the fiscal year, to ensure that the performance measures are met or exceeded.

(vi) From the Corps' 2009 Regulatory Standard Operating Procedure (SOP) (pg. 42): "Districts will prioritize compliance inspections and actions to resolve non-compliance based on compensatory mitigation requirements, regional areas of concern, threatened and endangered species, historic properties, navigation concerns, or other controversial issues that the District considers important."

7. Assessment of aggregate impacts, including evidence of aggregate impacts

   (a) Data informing NMFS of the total amount of permanent fill authorized by all types of Corps permits for each 10-digit HUC watershed inhabited by listed species and designated critical habitat under NMFS' jurisdiction.

   (b) The amount of actual impervious surface cover that will result from the activities authorized by the eight Nationwide Permits that NMFS believes contribute impervious surface cover (i.e., Nationwide Permits 12, 13, 14, 29, 31, 33, 36 and 39) as well as other Corps permits for each 10-digit HUC watershed inhabited by listed species and designated critical habitat under NMFS' jurisdiction, the ratio of that additional impervious surface cover to the baseline impervious surface cover for the referenced watersheds, and a notation of those watersheds where the ratio is 1% or greater. To facilitate this, the Corps will:

      i. Conduct rulemaking to modify Nationwide Permits 12, 13, 14 and 36 to require PCN for proposed activities in waters of the United States in watersheds inhabited by listed species and designated critical habitat under NMFS' jurisdiction if those proposed activities are constructed with impervious materials and would thus add to impervious surface cover in a watershed. The Corps already requires PCNs for all activities under Nationwide Permits 29, 31, 33 and 39.

      ii. Provide NMFS with the baseline impervious surface cover as of 2006 (or using the most current data) for each 10- digit HUC watershed inhabited by listed species and designated critical habitat under NMFS' jurisdiction.

Requiring the Corps to systematically collect (Element 1) and systematically analyze (Element 3) the basic information about the activities that would be authorized by Nationwide Permits places the Corps in a position to know or reliably estimate how many activities may affect endangered or threatened species under NMFS' jurisdiction or critical habitat that has been designated for those species, where and when the activities occurred, the impact of the activity, and whether a permittee complied with any General Conditions of the Nationwide Permits that would apply to their activity. These elements also place the Corps in a position to know or reliably estimate compliance rates with the General Conditions of the Nationwide Permits and the effectiveness of those conditions. These elements require the Corps to monitor the direct, indirect, and aggregate impacts of the activities they authorize; monitor the condition of those effects on the sub-watersheds or watersheds in which those activities occur; and monitor the consequences of those effects for listed resources under NMFS' jurisdiction.

RPA Elements 4, 5 & 6

The fourth, fifth, and sixth elements of the RPA from the 2012 Biological Opinion set specific performance triggers for the Nationwide Permit Program and required the Corps to use its authorities to protect ESA listed species under NMFS' jurisdiction, and critical habitat that has been designated for those species.

To address RPA elements 4, 5 and 6 from the 2012 Biological Opinion, the Corps incorporated the following measures into their proposed action:

No Net Loss of Wetland Functions Goal

General Condition 23 requires compensatory mitigation for wetland losses greater than 1/10 acre (see paragraph (c)), and the Corps has the discretion require wetland compensatory mitigation if the proposed Nationwide Permit activity is determined to result in minimal individual and cumulative adverse environmental effects, even if those wetland losses are less than 1/10 of an acre. For any compensatory mitigation required, assessment methods would be used to determine the amount of compensatory mitigation required, where such methods are available and appropriate; in cases where assessment methods are not available or appropriate for use for a Nationwide Permit activity, acreage or linear foot surrogates would be used to quantify the amount of compensatory mitigation required. This approach is consistent with the Corps regulations at 33 CFR 332.3(f)(1).

Also, the discretion provided by paragraph (c) of General Condition 23, to require compensatory mitigation for wetland losses of less than 1/10-acre can be exercised as a result of a modification to a specific action when analyzed in light of the information the Corps has agreed to collect as described above, as a result of an activity-specific ESA section 7 consultation for a Nationwide Permit activity, or a regional programmatic ESA section 7 consultation, if the reasonable and prudent measures or RPAs in the Biological Opinions for those consultations require wetland compensatory mitigation for losses of less than 1/10-acre. Division Engineers can also impose Regional Conditions to lower the threshold for requiring wetland compensatory mitigation for Nationwide Permit activities.

Aggregate Impacts

The Corps will issue guidance to its districts and divisions on conducting cumulative effects analyses for the purposes of the National Environmental Policy Act, CWA Section 404(b)(1) Guidelines, and the ESA. This guidance will include methods to assess collective impacts per 404(b)(1) by watershed/ecoregion and ORM2 database reporting for permitted impacts including the number of all activities (fill, Rivers and Harbors Act section 10 structure, ecological restoration, etc.), area, type of impact, etc. within a HUC-10 watershed. This information will be used to identify the contribution of Corps-permitted activities to the aggregate impacts to ESA listed species and designated critical habitat under NMFS' jurisdiction.

This guidance would explain how Corps Districts are to assess collective impacts for various stages of implementing the Nationwide Permit Program, including: (1) the preparation of biological evaluations to support activity-specific ESA section 7 consultations (under Nationwide Permit General Condition 18) or regional programmatic ESA section 7 consultations; (2) the preparation of supplemental decision documents when Corps Division Engineers approve Regional Conditions for the Nationwide Permits, or suspend or revoke Nationwide Permits in a particular watershed or other geographic area; and (3) District Engineers making minimal effects determinations for case-specific Nationwide Permit PCNs or voluntary requests for Nationwide Permit verifications.

Triggers to Mitigate or Prevent Future Negative Impacts from the Issuance of Nationwide Permits

Corps Division Engineers have the authority to modify, suspend, or revoke Nationwide Permits in a specific geographic area (e.g., a state, watershed, or county), for a particular class of activity, or class of waters within his or her Division (see 33 CFR 330.4(e)(1)). Modifications of Nationwide Permits are provided through Regional Conditions, which may only further restrict the national terms and conditions of a Nationwide Permit.

If the total amount of actual impervious surface cover authorized by Nationwide Permits and other Corps permit activities is greater than 1% of the baseline impervious surface cover in a particular watershed, in addition to notifying the relevant NMFS Regional Office in the next semi-annual report, the Corps will consider that information (as well as other pertinent information) when making its ESA section 7 effect determinations for Nationwide Permit PCNs associated with these eight Nationwide Permits. If section 7 consultation is initiated, the Corps will also consider this information and include it in preparing a biological assessment.

To prevent any future negative impacts that may result from issuance of Nationwide Permits, the Corps would implement the following language: "Incidents where any individuals of fish, marine mammal, abalone, coral or marine plant species listed under the ESA appear to be injured or killed as a result of discharges of dredged or fill material into waters of the United States or structures or work in navigable waters of the United States authorized by this Nationwide Permit in the range of endangered or threatened species under the jurisdiction of the National Marine Fisheries Service shall be reported to the National Marine Fisheries Service, Office of Protected Resources at (301) 713-1401 or Regulatory Division/Branch of the District of the U.S. Army Corps of Engineers [insert phone number]. The finder should leave the plant or animal alone, make note of any circumstances likely causing the death or injury, note the location and number of individuals involved and, if possible, take photographs. Adult animals should not be disturbed unless circumstances arise where it is obviously injured or killed by discharge exposure, or some unnatural cause. The finder may be asked to carry out instructions provided by National Marine Fisheries Service, Office of Protected Resources to collect specimens or take other measures to ensure that evidence intrinsic to the specimen is preserved."

RPA Element 7 and 8

The seventh and eighth elements of the RPA from the 2012 Biological Opinion directed the Corps to develop policy and guidance on assessing the aggregate impacts of Nationwide Permits for Corps project managers, directs the Corps to determine whether or to what degree project managers adhere to that policy and guidance, and requires the Corps to provide annual reports of the aggregate impacts of the actions it authorizes using the Nationwide Permits that overlap with the distribution of endangered or threatened species under NMFS' jurisdiction and critical habitat that has been designated for those species. To address RPA Element 7, the Corps would incorporate the following into their Proposed Action:

Aggregate Impacts Guidance for Corps Districts

As discussed above, the Corps Headquarters will issue guidance to Corps Districts and Divisions on conducting cumulative effects analyses for the purposes of the National Environmental Policy Act, CWA Section 404(b)(1) Guidelines, and the ESA. Corps headquarters will provide guidance to the Districts. This guidance will include methods to assess collective impacts per 404(b)(1) by watershed/ecoregion, and ORM2 database reporting for permitted impacts including the number of all activities (fill, Rivers and Harbors Act section 10 structure, ecological restoration, etc.), area, type of impact, etc. within a HUC-10 watershed. This information will be used to identify the contribution of Corps-permitted activities to the aggregate impacts to ESA listed species and designated critical habitat under NMFS' jurisdiction.

This guidance would explain how Corps Districts are to assess collective impacts for various stages of implementing the Nationwide Permit Program, including: (1) the preparation of biological evaluations to support activity-specific ESA section 7 consultations (under Nationwide Permit General Condition 18) or regional programmatic ESA section 7 consultations; (2) the preparation of supplemental decision documents when Corps Division Engineers approve Regional Conditions for the Nationwide Permits, or suspend or revoke Nationwide Permits in a particular watershed or other geographic area; and (3) District Engineers making minimal effects determinations for case-specific Nationwide Permit PCNs or voluntary requests for Nationwide Permit verifications.

The information from semi-annual reports, the case-specific or regional programmatic ESA section 7 consultations for Nationwide Permit activities in that watershed, and other relevant local information (e.g., watershed studies, State natural resource data, etc.), would be used by Corps Districts and NMFS Regional Offices to identify watersheds in which the aggregate impacts of one or more Nationwide Permits on jurisdictional waters and wetlands or listed species are approaching a level of concern. The Corps Division and District would take action to modify, suspend, or revoke Nationwide Permits to address those concerns, which could include adding new or modified Regional Conditions to restrict or prohibit the use of one or more Nationwide Permits.

To address NMFS' concerns about the addition of impervious surface cover in watersheds containing waters inhabited by listed species, as well as designated critical habitat, under NMFS' jurisdiction, the Corps will conduct rulemaking to modify Nationwide Permits 12, 13, 14, and 36 to require PCN for proposed activities in waters of the United States in watersheds inhabited by listed species and designated critical habitat under NMFS' jurisdiction if those proposed activities are constructed with impervious materials and would thus add to impervious surface cover in a watershed. These additional PCN requirements will provide full assurance that each Nationwide Permit activity constructed with impervious materials is evaluated by the Corps to determine if the Nationwide Permit activity may affect listed species and designated critical habitat. It is not necessary to modify the PCN requirements for Nationwide Permits 29, 31, 33 and 39 because those Nationwide Permits currently require PCN for all activities.

If the total amount of actual impervious surface cover authorized by Nationwide Permits and other Corps permit activities is greater than 1% of the baseline impervious surface cover in a particular watershed, the Corps will consider that information (as well as other pertinent information) when making its ESA section 7 effect determinations for Nationwide Permit PCNs associated with these eight Nationwide Permits. If section 7 consultation is initiated, the Corps will also consider this information and include it in preparing a biological assessment. The Corps will provide this information in its next semi-annual report (see below).

Reporting and Coordination with NMFS

To address Element 8 of the RPA, the Corps will also submit semiannual reports to the relevant NMFS Regional Offices. The reports will contain information that will inform assessment of the aggregate impact by watershed (HUC 10). In its first semiannual report, the Corps will provide NMFS with the baseline impervious surface cover as of 2006 [or using the most current data] for each 10-digit HUC watershed inhabited by listed species and designated critical habitat under NMFS' jurisdiction. The summary will also include type of authorized impacts (e.g., total area), number of permits, compensatory mitigation required, etc**.** The raw data (by verified Nationwide Permit activity) will be provided in addition to the summary.

Within 30 days after each semi-annual report or data submission is provided to the NMFS Regional Office, there will be a mandatory meeting between Corps District staff and NMFS Regional staff to discuss the data and determine whether additional permit conditions, consultations, or other protective measures are necessary to address specific types of activities or stressors that affect listed species or designated critical habitat in the watersheds within the Corps District and NMFS Region.

Establishing specific performance triggers for the Nationwide Permit Program and requiring the Corps to use its authorities to prevent waters of the United States from being degraded by activities that would be authorized by the Nationwide Permits (Element 3) places the Corps in a position to take timely and effective corrective actions (Elements 4, 5, and 6) when the consequences of those actions exceed measurable standards and criteria. Requiring the Corps to provide that information to NMFS Regional Offices (Elements 2 and 7) allows NMFS to monitor compliance with these obligations and to intervene if a particular Corps District does not appear to comply with those obligations.

RPA Element 9

The final element of the alternative required the Corps to develop and publish policy and guidance so that prospective permit applicants provide better information when they submit pre-discharge notifications to the Corps (to comply with RPA Element 1). To satisfy this element of the RPA from the 2012 Biological Opinion, the Corps has agreed to incorporate the following into their Proposed Action:

Information Packages for Potential Users

The Corps agrees to establish, in consultation with NMFS, guidelines for developing information packages to post on Corps District web sites to assist prospective users of the Nationwide Permits to comply with General Condition 18. These information packages would help project proponents better assess whether any listed species or designated critical habitat might be affected or is in the vicinity of the Nationwide Permit activity, or if the Nationwide Permit activity is located in designated critical habitat, and thereby trigger the requirement to submit a PCN to the Corps in accordance with General Condition 18. The development of these information packages would occur through coordination between Corps Districts and NMFS Regional Offices.

Corps headquarters will develop a template for use by Corps Districts. Corps headquarters will coordinate that template with NMFS HQ before distributing it to Corps Districts for implementation. The guidance could be provided as a document posted on a District's web site. The document would include an introductory section that explains the requirements of Nationwide Permit General Condition 18, and includes definitions from the Services' section 7 regulations to provide some general guidance for prospective users of the Nationwide Permits to determine whether their proposed activity might affect listed species or critical habitat, or be in the vicinity of listed species or critical habitat, or is in critical habitat, and thus trigger the requirement for submission of a PCN if the Nationwide Permit or its Regional Conditions do not already require a PCN. The Corps would then evaluate the PCN and make an effect determination, and consult with NMFS if a "may affect" determination is made. Corps Districts and NMFS Regional Offices should work together to ensure that the document contains the most up-to-date information, as well as other additional information the Districts and Regional Offices believe would assist in compliance with General Condition 18, such as local guidance documents.

The information document would include the following information:

1. An introductory section that explains the requirements of General Conditions 18 for non-Federal applicants.

2. Applicable definitions from the Services' ESA section 7 regulations that might be of use to potential users of the Nationwide Permits, such as:

(a) Action

(b) Action area

(c) Destruction or adverse modification

(d) Effects of the action

3. General guidance on what constitutes an effect that would trigger the requirement to submit a PCN in accordance with General Condition 18. Applicants need to submit a PCN if there is the slightest potential for an effect to occur, and then the Corps will make the effect determination to

decide whether section 7 consultation is necessary, and whether that consultation can be formal or informal.

4. A list of listed species whose range includes the geographic area of responsibility of the Corps District

5. For each species, provide:

(a) A description of the species (from the NMFS website), including: species description, habitat, distribution, population trends and threats

(b) Map showing the species' range (from the NMFS website)

(c) If applicable, map(s) showing critical habitat (as published in the Federal Register for the final rule designating that critical habitat), including a link to the e-CFR section describing that critical habitat

(d) Other information, as appropriate.

6. Additional instructions for submitting PCNs to the Corps (if applicable).

The following section describes the effects of the Corps' proposed action taking into account the additional protective measures incorporated during the reinitiated consultation to address the RPA in the 2012 Biological Opinion as well as other improvements the Corps has made to the Nationwide Permit Program since 2010.

Summary

The Corps has addressed all elements of the RPA recommended by NMFS so that it can fulfill its obligation under ESA section 7(a)(2) to insure that the activities it authorizes, funds or carries out are not likely to jeopardize the continued existence of any endangered or threatened species under NMFS' jurisdiction or result in the destruction or adverse modification of any critical habitat that has been designated for those species.

By systematically collecting (RPA Element 1) and systematically analyzing (RPA Element 3) the basic information about the activities that would be authorized by Nationwide Permits, the Corps in a position to know or reliably estimate how many activities may affect endangered or threatened species under NMFS' jurisdiction or critical habitat that has been designated for those species, where and when the activities occurred, the magnitude of those activities, and whether a permittee complied with any general conditions of the Nationwide Permits that would apply to those activities.

RPA Element 2 of the 2012 RPA required Corps Districts to formally consult with their counterparts in NMFS Regional Offices on procedures Districts impose to comply with Element 1 of that RPA and any additional conditions those Districts might impose on Nationwide Permits and on measures to avoid or minimize the incremental, aggregate, and interactive impacts of activities that would be authorized by Nationwide Permits on endangered and threatened species under NMFS' jurisdiction and critical habitat that has been designated for such species.

Requiring the Corps to develop policy and guidance that will inform assessment of aggregate impacts of Nationwide Permits for Corps project managers, and determining whether or to what degree project managers adhere to that policy and guidance (RPA Element 7) and providing that information to, and coordinating with and with NMFS Regional Offices (RPA Element 8) allows the Corps to monitor compliance with these obligations, to identify and develop additional protective measures as necessary, and to intervene if those obligations are not met.

By developing and publishing policy and guidance to assist in compliance with General Condition 18 (RPA Element 9), prospective permit applicants will be able to provide accurate information to the Corps so that it will know whether the proposed activities might affect listed species or critical habitat and thus would trigger the requirement for submission of a PCN (if not already required). The Corps would then evaluate the PCN and make an effect determination, and consult with NMFS under section 7 of the ESA if a "may affect" determination is made.

Establishing specific performance triggers (RPA Elements 4, 5, and 6) for the Nationwide Permit Program places the Corps in a position to take timely and effective corrective actions when the consequences of those actions exceed measurable standards and criteria and places the Corps in a position to use its authorities to prevent waters of the United States where listed resources under NMFS' jurisdiction occur from being degraded by the activities that would be authorized by the Nationwide Permits.

5.6 Summary of Effects

As we noted at the beginning of this assessment, analysis of the probable effects of the Nationwide Permits on endangered and threatened species and designated critical habitat under the jurisdiction of NMFS has two components. First, we describe the number and magnitude of activities that have been authorized by the Nationwide Permits and project the number of authorizations expected to occur over the permit term. We then place the spatial and temporal patterns of these impacts and their collective effects in context of the geographic and temporal occurrence of endangered and threatened species and designated critical habitat under the jurisdiction of NMFS, then describe the effectiveness of the control measures that the Corps has included in its program to prevent adverse impacts to those species.

As we discussed in the *Approach to the Assessment* section of this Biological Opinion, we treated the suite of current Nationwide Permits as a "program" that would authorize a wide array of discharges of dredged or fill material. During programmatic consultations we ask whether or to what degree the Corps has structured this program so that the Corps: (1) collects the information necessary to allow it to know how the actions it permits affect the environment, generally, and listed resources specifically; (2) evaluates that information to assess how its actions have affected the environment, generally, and endangered species, threatened species, and designated critical habitat specifically; and (3) when this information suggests that actions authorized by one or more of the Nationwide Permits affecting the environment, generally, and endangered species, threatened species, and designated critical habitat specifically, does the Corps use its authorities to modify or prohibit those actions.

5.6.1 Modifications and Improvements to the Nationwide Permit Program

The Corps has made many modifications to its action during consultation with NMFS, in addition to the improvements that it has already made to the Nationwide Permit Program. These measures will place the Corps in a position to prevent adverse effects to endangered or threatened species under NMFS' jurisdiction or critical habitat that has been designated for such species.

By coordinating with NMFS and consulting under ESA section 7 on any activity that may affect ESA listed resources under NMFS' jurisdiction, and by collecting and effectively evaluating information on its regulatory activities in light of the conditions of the aquatic habitats on concern in order to make correct effect determinations and undergo effective ESA section 7 consultations as necessary (see sections 1.5 and 1.6 in the *Description of the Action* section of this Biological Opinion) the Corps has structured the Nationwide Permit Program so the Corps will employ an analytical methodology that considers:

1. The status and trends of endangered or threatened species or designated critical habitat;
2. The demographic and ecological status of populations and individuals of those species given their exposure to pre-existing stressors in different drainages and watersheds;
3. The direct and indirect pathways by which endangered or threatened species or designated critical habitat might be exposed to discharges of dredged or fill materials into waters of the United States; and
4. The physical, physiological, behavior, sociobiological, and ecological consequences of exposing endangered or threatened species or designated critical habitat to dredged or fill materials at concentrations, intensities, durations, or frequencies that are known or suspected to produce physical, physiological, behavioral, or ecological responses, given their pre-existing demographic and ecological condition.

Because of the modifications the Corps has made to its Nationwide Permit Program mentioned above, the Corps has structured the Nationwide Permit Program so the Corps will be able to prevent endangered or threatened species from being exposed to discharges of dredged or fill materials:

- At concentrations, rates, or frequencies that are potentially harmful to individual organisms, populations, or these species; or
- To ecological consequences that are potentially harmful to individual organisms, populations, or the species.

The Corps will review information on the Nationwide Permit Program with the relevant NMFS Regional Office semi-annually to determine whether additional preventive measures are warranted and how to implement those measures.

The Corps has committed to modify, suspend or revoke Nationwide Permits if the information and coordination procedures described above identify any potential deficiencies of the program to adequately protect threatened or endangered species under NMFS' jurisdiction or any critical habitat hat has been designated for those species. This may include, among other things, adding new or modified Regional Conditions to restrict or prohibit the use of one or more Nationwide Permits if new information (e.g., data that suggest inadequate protection for species or low levels of compliance) becomes available. Modifications may include additional actions or requirements, reopening of the permits, and reinitiation of section 7 consultation on specific activities, regional programmatic consultations or the Nationwide Permit Program.

The Corps has committed to fully implement the changes to its Nationwide Permit Program outlined above as expeditiously as possible. In the interim, it is our opinion that the existing protective measures already in place, including General Condition 18, along with the Corps' renewed commitment to adequately conserve NMFS listed species and designated critical habitat, will allow the Corps to insure that the short term and smaller scale individual effects that these permits may cause are not likely to jeopardize the continued existence of any threatened or endangered species under NMFS' jurisdiction, or destroy or adversely modify any critical habitat that has been designated for those species while the Corps achieves full implementation.

As described above, the Nationwide Permit Program is structured so that the Corps will take the actions that are sufficient to protect ESA listed endangered or threatened species under NMFS' jurisdiction, and critical habitat that has been designated for those species occur, from individual or collective effects of the discharges of dredged or fill materials or other activities that would be authorized by the Nationwide Permits. Further discussion of the Corps' program and its anticipated effects is set forth in the *Integration and Synthesis* section below.

6.0 Cumulative Effects

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this Biological 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. Cumulative effects in the ESA sense are a subset of “aggregate impacts” (see section 2.4 of this Biological Opinion).

The action area for this Biological Opinion was defined as the land and waters of the United States. Any future State tribal, local or private actions that would impact Waters of the United States would require Federal authorization, leaving actions in upland areas to address in our Cumulative Effects analysis.

As noted in the Corps’ Biological Evaluation, activities that do not require federal authorization, such as the alteration or removal of riparian vegetation from non-wetland riparian areas, also cause adverse effects to many listed species under NMFS’ jurisdiction. Landowners may remove vegetation from wetland riparian areas up to the river or stream bank without a section 404 permit if they do not disturb the soil to cause a regulated discharge of dredged material.

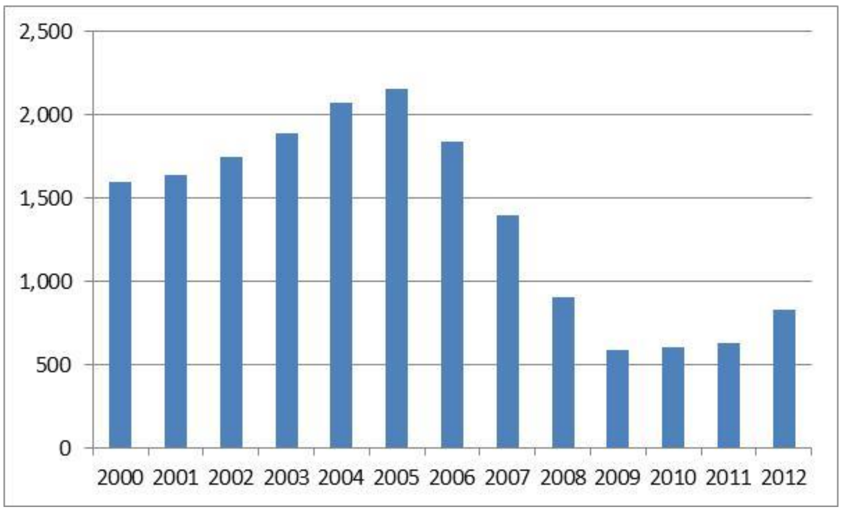
In addition, discharges of pollutants regulated under CWA Section 402 as authorized States with approved programs through National Pollutant Discharge Elimination System (NPDES) permits may also contribute to the degradation of water quality. Non-point sources of pollutants that adversely affect water quality are generally not regulated under the CWA, but they may be addressed through the establishment of total daily maximum loads under CWA Section 303 and administered by delegated States.

In addition, there are thousands of housing construction sites that are less than 1 acre in size, and many of these are likely to be solely in uplands or non-jurisdictional waters and therefore require no Federal authorization for discharges of dredged or fill material into waters of the United States. According to the U.S. Census Bureau’s “American Housing Survey for the United States: 2009” the median acreage of a housing development site is 0.27 acre (U.S. Census Bureau 2012, Table 990). In 2009, 71 percent of the building lots were one acre or less in size and 29 percent were greater than one acre in size (U.S. Census Bureau 2012). The activities contribute to cumulative effects to aquatic ecosystems through indirect effects of changes in upland land use.

While it is not possible to search for and identify all individual activities that may occur, nationwide trends for actions that contribute to impervious area in uplands of the United States, principally construction, should be highlighted. Data from the U.S. Department of Commerce, (2012) clearly illustrate the effects of the recent recession on construction, with a ~20% increase in construction permits issued in 2012 (Figure 6.1). Meanwhile the American Institute of Architects projected a steady increase in construction expenditures of 5 to 10% through 2014 depending on sector (Baker, 2013). Projections for construction activity are not made beyond one or two years.

Given this information, it is reasonable to expect that the nation's improving economy will be accompanied by increases in construction activity, stormwater sediment and ultimately impervious area. The cumulative effects of increased construction in upland areas and increased impervious area within watersheds may be somewhat attenuated by Federal regulation of stormwater from larger construction projects through EPA's Construction General Permit along with more effective Federal regulation of stormwater from existing industrial properties under EPA's renewed Multisector General Permit.

Figure 6.1 Number of Construction Permits in Thousands (data from U.S. Department of Commerce, Census Bureau, 2012[36])



With regard to the host of other future State or private activities that are reasonably certain to occur, the environmental baseline section describes the degraded condition of the action area (waters of the U.S.). Given the improving economy and existing regulatory regimes, the contributions by future State or private activities to this degraded condition are generally expected to continue and therefore to impact NMFS listed species and designated critical habitat consistent with the description in the baseline.

[36] See: http://www.census.gov/construction/xls/permits_cust.xls.

7.0 Integration and Synthesis

The purpose of the Nationwide Permit Program is to provide timely authorizations for the regulated public while protecting the Nation's aquatic resources. The Corps issues Nationwide Permits under the authorities of CWA section 404(e) (33 U.S.C. 1344) and section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

The Corps reissued 46 pre-existing Nationwide Permits, modified and re-issued two pre-existing Nationwide Permits, and issued two new Nationwide Permits. Those Nationwide Permits went into effect on March 19, 2012 and will expire on March 18, 2017. There are also 31 General Conditions that apply to these Nationwide Permits.

On July 27, 2012, NMFS reinitiated ESA section 7 consultation on this Federal action since the Corps proposed additional changes to the original action, that collectively may cause effects to listed species and critical habitat not previously considered in the original Biological Opinion, which is a trigger for reinitiation reflected in the February 2012 Opinion.

As an assessment of a national program of categories of activities and its procedures for administration and implementation, this Biological Opinion does not assess the effects of individual discharges authorized by one or more of these permits to discharge dredged or fill materials into waters of the United States. Instead, this Opinion results from the national-level consultation on the program as a whole, which includes a series of actions affecting many species over all, or a major portion of the United States and its territories, as described in the Interagency Endangered Species Consultation Handbook (U.S. Fish and Wildlife Service and NMFS 1998). As contemplated by the general conditions to the Nationwide Permits, specific activities authorized by the program will be addressed in subsequent consultations between the Corps and NMFS for any activity may affect NMFS listed species or their designated critical habitat as necessary.

After reviewing the current *Status of Species*, and the *Description of the Action*, we determined that threatened and endangered species under NMFS jurisdiction, critical habitat that has been designated for those species, species proposed to be listed as under the ESA and proposed designated critical habitat were likely to be adversely affected by the issuance of the Corps' Nationwide Permit Program. See Table 3 above.

As described in the *Approach to the Assessment* section of this Biological Opinion, our risk analyses began by identifying the probable risks actions pose to ESA listed individuals that are likely to be exposed to an action's effects. As part of our risk analyses, we consider the consequences of exposing endangered or threatened species to the stressors associated with the proposed actions, individually and collectively, given that the individuals in the action areas for this consultation are also exposed to other stressors in the action area and elsewhere in their geographic range. These stressors -or the response of individual animals to these stressors- can produce consequences - or “aggregate impacts”- that would not occur if animals were only exposed to a single stressor.

As we note in the *Environmental Baseline* section of this Biological Opinion, in 2007, the population of the United States increased to more than 300 million people for the first time. That population growth and increase in population density was accompanied by dramatic changes in the landscapes of the United States. Most modern metropolitan areas encompass a mosaic of different land covers and uses. The mosaic of land uses associated with urban and suburban centers has been cited as the primary cause of declining environmental conditions in the United States (Flather *et al*. 1998).

Beginning in the 1960s, a wide variety of programs undertaken by federal, state, and local governments, non-governmental organizations, and private individuals have been established to protect or restore our nation’s forests, grasslands, wetlands, estuaries, rivers, lakes, and streams. Those programs have helped slow and, for many ecosystems, reverse the declining trends that began in the past. However, despite the efforts of agencies at every level of government, non-governmental organizations, and private individuals, rivers, lakes and streams in the United States remain degraded.

The status and trends of freshwater, estuarine and coastal ecosystems of the United States and the effects of land use practices on those ecosystems has had substantial influence on patterns of extinction and endangerment. Our nation’s rivers and streams have been altered by dams, stream channelization, and dredging to stabilize water levels in rivers or lakes eliminates seasonal and episodic flooding that interrupts or eliminates the delivery of nutrients and sediments to wetland ecosystems, which commonly depend on nutrient and sediment pulses as part of their natural ecology (Loucks 1989). Native species of plants and animals continue to decline toward extinction as a result of these land use changes.

The *Status of the Species* section of this opinion provides detailed discussions of the current status of each listed species and designated critical habitat of each species. The status of each varies based on the unique condition of that the species and critical habitat. For most NMFS listed species, their original status reviews or more recent status reviews reflect that the species continue to be threatened by or at risk of extinction due to the particular stressors that have contributed to their at-risk state. Many of those stressors are, or have the potential to be, produced by activities authorized by the Nationwide Permit Program.

The status section also reflects that climate change is already playing a significant role in the status of many NMFS listed species and designated critical habitat. Based on best available science, we anticipate that the impacts of climate change will increase in the years ahead.

In the *Effects of the Action* section of this Biological Opinion, we presented the evidence that leads us to conclude that endangered or threatened species and designated critical habitat under the jurisdiction of NMFS are likely to co-occur with the activities authorized by the Corps’ Nationwide Permit Program. As we discussed in the *Approach to the Assessment* section of this Opinion, the purpose of those analyses was to establish whether or to what degree endangered or threatened species or designated critical habitat are likely to be adversely affected if they are exposed to those activities.

As the above summaries reflect, the status of the species and designated critical habitat, along with anticipated impacts of climate change, the degraded condition of much of the waters of the US and the Corps' historic contribution to that condition, combined with anticipated cumulative effects into the future, establish a context in which it is extremely important the Corps adopt a Nationwide Permits program that is adequately protective of NMFS listed species and their designated critical habitat. The Corps has endeavored to do just that through this reinitiated consultation and our analysis of the effects of this program establishes they have accomplished this objective as described above and summarized here.

Many, but not all, of the activities authorized by the Nationwide Permit Program may adversely affect aquatic organisms. When they are exposed to stressors that we would expect to result from activates authorized by the Nationwide Permit Program, individuals of some species or life stages of species could die as a result of their exposure. Other individuals of aquatic species may experience reductions in developmental patterns, rates of growth, reproductive success as a direct result of the exposure or because of the action's effect on their behavioral patterns. Other direct effects include the disturbance of sediments and riparian areas, which can increase water column turbidity and destruction and adverse modification of aquatic habitat.

Indirect effects--those effects that are caused by the proposed action and are later in time, but still are reasonably certain to occur--are also likely to result from the activities authorized by Nationwide Permits. These effects include local and large-scale modification of aquatic habitat and hydrology. These impacts can affect ESA listed resources individually and collectively.

The CWA prohibits the discharge of any dredged or fill material into waters of the United States, which includes wetlands, without a permit. Discharges of these materials into jurisdictional wetlands and other waters of the United States are regulated by CWA section 404, which is administered by the Corps with oversight by the EPA, The obstruction or alteration of a navigable water of the United States requires a permit under section 10 of the Rivers and Harbors Act of 1899.

In the *Cumulative Effects* section of this Biological Opinion, we note that a host of other future State or private activities that are reasonably certain to occur. Given the improving economy and existing regulatory regimes, the contributions by future State or private activities to this degraded condition are generally expected to continue and therefore to impact NMFS listed species and designated critical habitat consistent with the description in the baseline.

A basic premise of the Corps' permitting program is that no discharges of dredged or fill material into waters of the United States shall be permitted if: (1) a practicable alternative exists that is less damaging to the aquatic environment, or (2) the discharge would cause the nation's waters to be significantly degraded. In order for a project to be permitted, it must be demonstrated that, to the extent practicable: steps have been taken to avoid impacts to wetlands and other aquatic resources, potential impacts have been minimized, and compensation will be provided for any remaining unavoidable impacts.

7.1 Nationwide Permits and Compliance with ESA Section 7(a)(2)

The 2012 programmatic Biological Opinion concluded that the Corps' Nationwide Permit Program jeopardized endangered and threatened species under the jurisdiction of NMFS and resulted in the destruction or adverse modification of critical habitat that has been designated for these species due to a lack of adequate measures to protect such species and critical habitat. Specifically, that Biological Opinion concluded that the evidence available suggested that the Corps had not structured its Nationwide Permit Program so that it was positioned to:

1. Know or reliably estimate the general and particular effects of the activities that would be authorized by the program on the quality of the waters of the United States where ESA listed resources under NMFS' jurisdiction occur and, by extension, be positioned to know or reliably estimate the general and particular effects of those activities on endangered and threatened species.
2. Take actions that are necessary or sufficient to prevent the activities that would be authorized by the Nationwide Permits from individually or cumulatively degrading the quality of the waters of the United States where ESA listed resources under NMFS' jurisdiction occur;
3. Insure that endangered or threatened species and designated critical habitat are not likely to be exposed to the direct or indirect effects of the activities that would be authorized each year of the duration of the Nationwide Permits; or reductions in water quality that are caused by or are associated with those activities; and
4. Insure that endangered or threatened species and designated critical habitat would not suffer adverse consequences if they were exposed to the direct or indirect effects of the activities that would be authorized each year for the duration of the Nationwide Permits; or reductions in water quality that are caused by or are associated with those activities.

In that 2012 Biological Opinion, NMFS identified an RPA that would avoid the likelihood of jeopardizing the continued existence of listed species or result in the destruction or adverse modification of critical habitat under NMFS' jurisdiction. NMFS concluded that this alternative would place the Corps in a position to: (a) monitor the direct, indirect, and aggregate impacts of the activities the Nationwide or General permits would authorize; (b) monitor the condition of those effects on the sub-watersheds or watersheds in which those activities occur, (c) monitor the consequences of those effects for listed resources under NMFS' jurisdiction; and (d) take timely and effective corrective actions if the consequences of those actions were shown to exceed measurable standards and criteria.

As summarized in the *Description of the Proposed Action* section of this Biological Opinion, the Corps agreed to incorporate additional protective measures into their modified proposed action in order to address each of these elements so their modified action would not jeopardize ESA listed or proposed species or designated critical habitat under NMFS' jurisdiction.

7.2 Ability to Protect Listed Resources

As we described in the introduction to in the *Approach to the Assessment*, we analyzed the suite of Nationwide Permits as a "program" that would authorize a wide array of discharges of dredged or fill material for the duration of the permit cycle. Our programmatic assessment focused on whether the actions that the Nationwide Permits program would authorize are not likely to jeopardize the continued existence of any threatened or endangered species under NMFS' jurisdiction or destroy or adversely modify any critical habitat that has been designated for those species.

To answer this question, we asked whether or to what degree the Corps has structured its program so that it:

1. Collects the information necessary to allow it to know how the actions it permits affect the environment, generally, and listed resources under NMFS' jurisdiction specifically;
2. Evaluates that information to assess how its actions have affected the environment, generally, and listed resources under NMFS' jurisdiction specifically; and
3. Uses its authorities to modify or prohibit those actions when this information suggests that actions authorized by one or more of the Nationwide Permits may be adversely affecting the environment, generally, and listed resources under NMFS' jurisdiction specifically.

7.2.1 Information Collection and Oversight

The Corps has added many measures and methodologies to its Nationwide Permit Program so that it will collect information necessary to allow it to know how the actions it permits affect the environment, generally, and listed resources specifically.

Because of the improvements it has made to its data collection and database management efforts program as well as the other improvements it has made to the Nationwide Permit Program to systematically continuously identify, collect, analyze and disseminate data on the activities it authorizes, the Corps is positioned to know or reliably estimate the total number, total volume, rates, timing and location of discharges of dredged or fill material resulting from the Nationwide Permits into waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, and the critical habitat that has been designated for those species occur.

In addition, because of the measures that it has agreed to employ to monitor and insure compliance with the terms and conditions of the Nationwide Permit Program, the Corps has structured the program so that it will know or be able to reliably estimate whether activities that would be authorized by the proposed permits have occurred in concentrations, frequencies, or for durations that exceed the authorization of the proposed permit. In addition, the Corps will know or be able to reliably determine whether or to what degree applicants have complied with the conditions, restrictions, or mitigation measures that the proposed permits require when they discharge dredged or fill material into waters of the United States where ESA listed endangered or threatened, or the critical habitat that has been designated for those species occur.

The Corps will provide its Regulatory Project Managers with additional training and guidance to ensure accurate data entry into the Regulatory Program's automated information system. The Corps will also increase its quality assurance/quality control efforts for the ORM2 data to ensure its accuracy. In addition, the Corps will add species location data to its ORM2 database to verify that applicants make correct determinations as to whether any listed species or designated critical habitat might be affected or is in the vicinity of the Nationwide Permit activity, or if the permit activity is located in designated critical habitat.

Historically, the Corps had not typically reviewed individual requests for authorizations, except when a PCN to the Corps was required or when a prospective permittee asked the Corps to verify that their activity complied with a Nationwide Permit. PCNs are required under some of the Nationwide Permits and for all permits under General Condition 18 when listed resources are present or may be affected.

To facilitate this process, the Corps will establish guidelines for developing information packages to post on Corps District web sites to assist prospective users of the Nationwide Permits to comply with General Condition 18. These information packages will help permittees better assess whether any listed species or designated critical habitat might be affected or is in the vicinity of the Nationwide Permit activity, or if the Nationwide Permit activity is located in designated critical habitat, and thereby trigger the requirement to submit a PCN to the Corps in accordance with General Condition 18.

The Corps will also require prospective applicants to provide information on the location of the activity (including the particular watershed); area affected (estimated area/linear distance); and a narrative explanation of how the applicant satisfied requirements/conditions when they submit PCNs.

The Corps will issue guidance to Corps Districts and Divisions on conducting cumulative effects analyses for the purposes of NEPA, CWA section 404(b)(1) Guidelines, and the ESA. The guidance would be based primarily on NEPA definition of "cumulative impact" as well as the Council on Environmental Quality's 1997 guidance entitled "Considering cumulative effects under the National Environmental Policy Act."

This guidance would explain how Corps Districts are to assess collective impacts for various stages of implementing the Nationwide Permit Program, including:

1. The preparation of biological evaluations to support activity-specific ESA section 7 consultations (under Nationwide Permit General Condition 18) or regional programmatic ESA section 7 consultations;
2. The preparation of supplemental decision documents when Corps Division Engineers approve Regional Conditions for the Nationwide Permits, or suspend or revoke Nationwide Permits in a particular watershed or other geographic area; and
3. District Engineers making minimal effects determinations for case-specific Nationwide Permit PCNs or voluntary requests for Nationwide Permit verifications.

The Corps will provide to NMFS semi-annual reports on Corps (Nationwide Permit and non-Nationwide Permit) regulatory program permitting activities, which will include locations of authorized activities as well as proposed and authorized impacts, required compensatory mitigation, and compliance activities. This will include activity-specific information on acres of permanent impacts, in addition to other authorized impacts such as acres of temporary impacts and linear foot impacts, authorized by all types of Corps permits, including the Nationwide Permits.

7.2.2 Evaluation of Information

The Corps has implemented measures into its Nationwide Permit Program to evaluate information to assess how its actions have affected the environment, generally, listed resources specifically.

The District Project Manager will review every application and all the above information to determine whether it is complete. The District Project Manager will use a general permit decision checklist to ensure that all requirements have been met. Once all requirements/condition have been met, the District Project Manager will verify the permit. If the proposed activity does not satisfy all terms and conditions of the Nationwide Permit, the District Project Manager will notify the applicant that an individual permit is required.

The semiannual reports that the Corps will provide to the relevant NMFS Regional Offices on all Corps Regulatory Program (Nationwide Permit Program and non-Nationwide Permit Program) permitting activities will include locations of authorized activities as well as proposed and authorized impacts, required compensatory mitigation, and compliance. This will include activity-specific information on acres of permanent impacts, in addition to other authorized impacts such as acres of temporary impacts and linear foot impacts, authorized by all types of Corps permits, including the Nationwide Permits.

Within 30 days after each semi-annual report or data submission is provided to the NMFS Regional Office, there will be a mandatory meeting between Corps District staff and NMFS Regional staff to discuss the data and determine whether additional permit conditions, consultations, or other protective measures are necessary to address specific types of activities or stressors that affect listed species or designated critical habitat in the watersheds within the Corps District and NMFS Region.

Because of the new data collection and compliance procedures described above, and an agreement to provide guidance to permittees, the Corps is in a position to know or reliably estimate how the activities authorized by these Nationwide Permits may affect ESA listed resources under NMFS' jurisdiction, where and when the activities occurred, the impact of the activity, and whether a permittee complied with any general conditions of the Nationwide Permits that would apply to their activity. In addition, because the Corps will be quantitatively monitoring these activities and report this information to, and coordinate with NMFS, the Corps is in a position to correctly make "may affect" determinations for individual and aggregate impacts, and would know how those activities may affect endangered or threatened species under NMFS' jurisdiction, and the critical habitat that has been designated for those species.

In order to identify additional conditions Corps Districts might impose on Nationwide Permits and on measures to avoid or minimize the incremental, additive, and interactive impacts of activities that would be authorized by those permits, Corps Districts will work with their NMFS Regional counterparts to refine Regional Conditions and/or to develop new Regional Conditions to reduce potential adverse effects to ESA listed resources under NMFS' jurisdiction.

If Regional Conditions are not available or feasible in a Region, or District, and if the activity may affect ESA listed resources, the Corps is required to request consultation on the relevant portion of the Nationwide Permit Program from the appropriate NMFS Regional Office. Some Regional Programmatic Consultation on the Nationwide Permit Program may also occur to cover categories of activities and streamline ESA section 7 compliance at the Regional level. The Corps will also consult with the appropriate NMFS Region on any individual activity or suite of activities that do not fall under one of the Nationwide Permits identified in this proposed action or do not comply with the general or Regional Conditions as agreed to by the Corps and NMFS.

Some Regional Programmatic Consultations on the Nationwide Permit Program may also occur to cover categories of activities and streamline ESA section 7 compliance at the Regional level. The Corps will also consult with the appropriate NMFS Region under ESA section 7 on any individual activity or suite of activities that do not fall under one of the Nationwide Permits identified in this proposed action, or do not comply with the General or Regional Conditions as agreed to by the Corps and NMFS.

Because of these measures, the Corps will know when an activity authorized by the Nationwide Permit Program may affect ESA listed species under NMFS' jurisdiction and any critical habitat that has been designated for those species, and will consult with NMFS under section 7 of the ESA on those activities if appropriate. As a result, the Corps has structured the Nationwide Permit so that it will know or be able to reliably estimate the impacts effects of the discharges of dredged or fill material that would be authorized by the Nationwide Permits to endangered and threatened species under NMFS' jurisdiction and any critical habitat that has been designated for those species.

Aggregate Impacts

By accurately assessing the aggregate impacts of the activities that the Nationwide Permit Program authorizes -including employing an objective methodology to assess those Nationwide Permits of concern that may increase impervious surface cover- and by sharing that information and coordinating with the relevant NMFS Regional Office on a regular basis, the Corps is in a position to know whether those aggregate impacts may be approaching an unacceptable level and is in a position to take corrective actions before those impacts would jeopardize any listed resource under NMFS' jurisdiction.

To address the question of whether the activities that would be authorized by the Nationwide Permits have direct and indirect effects on the environment that are small both individually and cumulatively, we explicitly considered those impacts of the proposed permits in an *Aggregate Impacts* section of the *Effects of the Action* chapter of this Biological Opinion.

For aggregate impacts, of the 22 Nationwide Permits that NMFS identified as of greatest concern for threatened and endangered species and their designated critical habitat under NMFS' jurisdiction, we determined that the aggregate impacts of 14 of those Nationwide Permits were relatively well known and predictable, and therefore less likely to contribute to changes that correspond to large scale hydrologic phenomena that are critical to the survival and recovery of those species as the remaining eight Nationwide Permits.

The remaining eight Nationwide Permits of concern authorize activities that result in permanent impervious surface cover, and the aggregate impacts of those Nationwide Permits are likely to contribute to changes that correspond to large scale hydrologic phenomena that are critical to the survival and recovery of threatened and endangered species under NMFS' jurisdiction and are critical to the protection of critical habitat that has been designated for those species. The aggregate impacts of these types of activities are not as immediately evident on a case-by-case basis, nor are they as predictable.

As noted, the level of impervious surface cover within hydrologic units remains the most relevant and reliable indicator of the quality of habitat for NMFS listed species in waters that may be affected by activities authorized by the Corps' Nationwide Permits. The amount of impervious surface cover in a watershed is a reliable indicator of a suite of phenomena that influence a watershed's hydrology (Center for Watershed Protection 2003, National Research Council 1992, Schueler 1994, Schueler *et al.* 2009).

The relative influence of the area of total impervious surface cover depends on the spatial scale. It has the strongest influence at the scale of catchment basins, a strong influence at the scale of sub-watersheds, moderate influence at the watershed scale and weaker relative influence at the scale of sub-basins and basins (Coleman *et al.* 2005).

Numerous studies from throughout the United States have demonstrated that development on formerly undeveloped (or less developed) areas increases the area of impervious surface cover and reduces the capacity of porous surfaces remaining in drainages to capture and infiltrate rainfall. As the percentage of these impervious surfaces increases, the fraction of annual rainfall or melt-water that becomes surface runoff (with corresponding reductions in the amount that infiltrates into the soil or recharges groundwater) and runoff reaches stream channels much more efficiently (Bledsoe 2001, Booth 1990, 1991; Hammer 1972, Hollis 1975, MacRae 1992, 1993, 1996).

Because of these changes, peak discharge rates for floods in drainages with high levels of impervious surface cover area are significantly higher (Booth 1990, Hammer 1972, Henshaw and Booth 2000, Leopold 1973). These discharges transport sediment and pollutants more efficiently, which then degrade the quality waters that receive those discharges (Booth 1991, Booth and Jackson 1997, Booth and Reinelt 1993, Booth *et al.* 2002, Burges *et al.* 1998, Cappiella and Brown 2001, Jennings and Jarnagin 2002).

Measurable reductions in biotic integrity correlate to the total area of impervious surface cover in a watershed. Changes in the hydrology of rivers and streams have been noted when the area of total impervious surface in a watershed was between 7 and 12%. Biotic degradation increases when the percentage of impervious surface was between 11 and 25%, and substantial declines in biotic diversity occurred when the percentage exceeded 20 to 30% (Booth 1991, Booth and Jackson 1997, Booth and Reinelt 1993, Booth *et al.* 2002, Burges *et al.* 1998, Cappiella and Brown 2001, Jennings and Jarnagin 2002, Klein 1979, Schueler 1994).

Ephemeral and intermittent streams in the arid regions have been observed to be even more sensitive to increases in the area of total impervious surface cover. For example, response thresholds of about 2 to 3% of the area of total impervious surface cover for such streams in the arid regions of southern California were observed by Coleman *et al.* (2005).

These hydrologic changes have been shown to result in adverse effects to aquatic habitat and species, including endangered and threatened species and their designated critical habitats (Benke *et al.* 1981, Booth and Jackson 1997, Garie and McIntosh 1986, Jones and Clark 1987, and Pedersen and Perkins 1986).

Relevance of Impervious Cover to Nationwide Permits

When analyzed on an individual basis, the eight Nationwide Permits of concern that result in increasing the percent of impervious surface cover in catchment basins, sub-watersheds, and watersheds may have significant adverse effects on endangered or threatened species in limited circumstances (for example, species that only occur in areas affected by those activities). However, as the number of activities authorized by Nationwide Permits accumulates in a watershed or catchment basin, the aggregate impacts of those activities have the potential to adversely affect the watershed and the listed species that occur in the watershed.

Because it not feasible for the Corps to measure actual water quality degradation that occurs as a result of these specific activities on a watershed scale, the Corps needs a scientifically defensible method to make these estimates. To do this, NMFS recommended using estimates of percent impervious surface cover as a conservative surrogate metric of habitat degradation to serve as an indicator to provide insight into the probable, accumulative impacts of the activities that the Nationwide Permits that may add impervious surface cover to watersheds of concern

The reasons for that recommendation were:

- Percent impervious surface cover is additive, so it lends itself to accumulation;
- Procedures for estimating percent impervious surface cover within watersheds, including baseline levels of impervious surface cover, are well-established, publicly available, and readily accessible;
- Models that link changes in percent impervious surface cover and estimates of the level of degradation of a hydrologic unit have been tested over many years by a large number of investigators and are relatively mature; and
- There are no better alternatives, particularly alternatives that have as much support in the literature.

As noted, most relevant studies in the scientific literature demonstrate measurable changes in the hydrology of rivers and streams and a significant degradation in biological integrity when the area of total impervious surface cover was between 2 and 12%. However, there is a high degree of variability in these responses among watersheds.

Because of the variability in these responses, and the fact that such changes can occur when the area of total impervious surface cover in a watershed increases to as little as 2%, NMFS recommended that the Corps use 1% of an increase in the existing total impervious surface cover in a watershed of concern as a result of the activities that it authorizes, to serve as a conservative surrogate metric of the water quality degradation that those activities may cause. If met or exceeded, this conservative surrogate metric would alert the Corps that a problem may be approaching, and would allow them the opportunity to take action before significant impacts occur.

A host of Federal, State, and local agencies and private institutions and individuals are responsible for activities that convert permeable to impervious surfaces. Those activities will be captured as part of the baseline impervious surface cover estimates the Corps will make and provide to NMFS. While the Corps authorizations are generally responsible for only a fraction of this conversion, tracking those contributions in light of the baseline impervious surface cover in watersheds of concern will allow the Corps and NMFS to assess the Corps' contribution of impervious surface cover in the broader context of the total impervious surface cover in those watersheds.

Although the activities that the Corps authorizes may only contribute a small fraction of the total impervious surface cover to a watershed of concern, those contributions when added to the contributions of activities that are not within the Corps' jurisdiction, may collectively rise to a level that degrades aquatic habitat. By employing the methodology that NMFS recommends, the Corps will have the information it needs to take corrective action to prevent its contributions to the total increase in impervious surface cover in a watershed of concern from causing such impacts.

Based on NMFS' recommendation, the Corps will estimate the baseline impervious surface cover as of 2006 (or using the most current data) for each 10-digit HUC watershed inhabited by listed species and designated critical habitat under NMFS' jurisdiction. The Corps will track the total amount of permanent fill from all of the activities it authorizes under CWA section 404 (Nationwide Permit and non-Nationwide Permit) in the identified watersheds relative to the most recent baseline impervious surface cover estimates on a percentage basis every six months, and will report that information to NMFS on a semi-annual basis.

If total permanent fill authorized by the Corps activities (Nationwide Permit and non-Nationwide Permit) causes an increase in existing baseline impervious surface cover of 1% in a given watershed of concern, the Corps will note this in the next semi-annual report to the relevant NMFS Regional Office. The Corps will use this information to make effect determinations on the specific activities that it authorizes, and will consider this information and include it in any biological assessment on such activity that "may affect" endangered or threatened species under NMFS' jurisdiction, or any critical habitat that has been designated for those species. This information would then be addressed as part of the individual consultations occurring at the Regional level. This two-step process would alert the relevant NMFS Regional Office that there might be issues that warrant further attention and would also give the relevant NMFS Regional Office the aggregate impacts information needed to undertake a meaningful section 7 consultation on those activities.

By continually collecting and analyzing information on the amount of impervious surface cover that they authorize by all of their permitting activities (Nationwide Permit and non-Nationwide Permit) in light of the impervious surface cover that already exists in a watershed of concern, and noting when the conservative surrogate metric of 1% has been met or exceeded, the Corps can know whether the activities it authorizes may be contributing to a total increase in impervious surface cover, that when analyzed collectively, may cause deleterious environmental impacts. This information equips the Corps with the objective information to make accurate "may affect" determinations to determine whether ESA section 7 consultations are required on specific activities, and gives NMFS Regions and Corps Districts the information they need to undertake those consultations in a successful and meaningful manner. This information will be useful for all Corps activities subject to section 7 of the ESA, and not just those Nationwide Permits of concern that may contribute to an increase in impervious surface cover.

7.2.3 Corrective Action

If information suggests that actions authorized by one or more of the Nationwide Permits affecting the environment, generally, and listed resources specifically, the Corps will use its authorities to modify or prohibit those actions.

The Corps has three primary mechanisms it can use to prevent these impacts of the Nationwide Permit Program from degrading waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction or the critical habitat that has been designated for those species occur. It can:

- Modify, suspend or revoke a Nationwide Permit. Modifications have commonly entailed PCN or a change in acreage limits. Suspensions or revocations have forced prospective permittees to seek authorizations using the standard permitting process, which receive more review;
- Require prospective permittees to comply with terms and conditions to its authorizations; and
- Require prospective permittees to mitigate the adverse effects of their actions on jurisdictional wetlands and other waters of the United States.

The Corps has used all three of these mechanisms since it established the Nationwide Permits in 1977. For example, the Corps revoked Nationwide Permit 26 (headwaters and isolated wetlands) in 1999 and replaced it with five new permits and, in its current proposal, plans to revoke Nationwide Permit 47 (pipeline safety program designated time sensitive inspections and repairs). However, eliminating these permits did not prevent the activities they authorized from impacting jurisdictional wetlands and other waters of the United States, the activities were either authorized by other Nationwide Permits, General Permits or Standard Permits.

To qualify for Nationwide Permit authorization, the prospective permittee must comply with the General Conditions, as appropriate, in addition to any regional or case-specific conditions imposed by the Division Engineer or District Engineer. Under the requirements of the Nationwide Permit Program, prospective permittees have an obligation to ensure they are in full compliance with all applicable conditions before proceeding under a Nationwide Permit (see sections 1.0 thru 1.2 of this Biological Opinion).

Every person who may wish to obtain permit authorization under one or more Nationwide Permits, or who is currently relying on an existing or prior permit authorization under one or more Nationwide Permits, has been and is on notice that all of the provisions of 33 CFR 330.1 through 330.6 apply to every Nationwide Permit authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any Nationwide Permit authorization. These various provisions will ensure prospective permittees are adequately notified of all applicable conditions and facilitate compliance with those conditions, including general condition 18 (endangered species). Through general condition 18 and the superior notifications the Corps will develop under the current proposed action, any action under a Nationwide Permit that could possibly affect a listed species or designated critical habitat will be subject to a PCN, facilitating review by the Corps. If those actions may affect a listed species or designated critical habitat, the Corps will complete consultation with NMFS on those actions before those actions proceed. If a prospective permittee fails to comply with the applicable conditions and requirements, any activity undertaken would not be authorized under the Nationwide Permit and the prospective permittee would be subject to potential enforcement action under the CWA.

Those conditions and improvements along with the other regulatory provisions built into the Corps' proposed action should prevent activities authorized by Nationwide Permits from:

1. Having more than minimal adverse environmental effects on the aquatic environment when analyzed individually or in aggregate.
2. Substantially disrupting the movements of endangered marine mammals, sea turtles and fish, unless the activity's primary purpose is to impound water (Condition 2. Aquatic Life Movements);
3. Creating impoundments that will adversely affect ESA listed resources under NMFS' jurisdiction (Condition 8. Adverse Effects From Impoundments);
4. Occurring in spawning areas during spawning seasons (Condition 3. Spawning Areas);
5. Disruptions of water flow that will adversely affect ESA listed resources under NMFS' jurisdiction (Condition 9. Management of Water Flows);
6. Occurring within 100-year floodplains without complying with Federal or State floodplain management requirements (Condition 10. Fills Within 100-Year Floodplains);
7. Eroding soils and introducing sediment into waters of the United States where ESA listed resources under NMFS' jurisdiction occur (Condition 12. Soil Erosion and Sediment Controls);
8. Leaving temporary fill associated with a project in place where ESA listed resources under NMFS' jurisdiction occur (Condition 13. Removal of Temporary Fills);
9. Adversely affecting, "taking," or "jeopardizing the continued existence of" endangered or threatened or resulting in the destruction or adverse modification of critical habitat that has been designated for such species without subsequent formal section 7(a)(2) consultation or ESA permitting; or.
10. Causing long-term loss or degradation of habitat where ESA listed resources under NMFS' jurisdiction occur because of the requirement for compensatory mitigation.

In addition, as noted above, the Corps Districts will also work with their NMFS' Regional counterparts to refine Regional Conditions and/or to develop new Regional Conditions to reduce potential adverse effects to ESA listed and proposed species and designated critical habitat under NMFS' jurisdiction. Regional conditions may only further restrict the use of Nationwide Permits. They would not increase any limits of the Nationwide Permits nor would they increase PCN thresholds. Regional conditions would also not replace or remove any of the national Nationwide Permit General Conditions.

Thus, the Corps has structured the Nationwide Permit Program so that it will be able to prevent endangered or threatened species from being exposed to the individual and aggregate impacts of the authorization of discharges of dredged or fill materials at concentrations, rates, or frequencies that are potentially harmful to individual organisms, populations, or the species; to ecological consequences that are potentially harmful to individual organisms, populations, or the species; and can implement preventive measures quickly if such problems are identified.

The measures and agreements described above will provide the Corps the information necessary to know whether the individual or aggregate impacts of the activities it authorizes may affect endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species. By collecting, analyzing and sharing this information with and coordinating with NMFS, the Corps is in a position to make correct effect determinations, and undertake meaningful and effective ESA section 7 consultations with NMFS on those activities that may affect endangered and threatened species under NMFS' jurisdiction and the critical habitat that has been designated for those species.

Corrective actions may include using advanced identification of areas unsuitable for disposal sites; special area management planning; denying any subsequent permits for activities whose effects would exacerbate the aggregate impacts; increasing oversight of compensatory mitigation projects; increasing enforcement actions; and increasing restoration activities.

Because of the Corps' commitments to collect, analyze and report information on their permitting activities and to coordinate with the relevant NMFS Regional Offices to address any potential concerns, the Corps and NMFS will accurately assess the aggregate impacts of those Nationwide Permits in the subsequent required ESA section 7 consultations on the specific activities that it authorizes.

In its semiannual coordination meetings with the Corps, NMFS Regional Offices may determine that the effects of the specific activities would not be an issue in light of that information, or they may determine that those specific activities would need to be modified. This would equip the Corps and NMFS Regions with the information to make those assessments correctly, where previously such information was unavailable. By making these modifications to the Nationwide Permit Program, the Corps is in a position to comprehensively analyze all of the activities that it authorizes, and the contributions those activities may have to the ecological condition of the watersheds of concern, and to the ESA listed resources of concern that inhabit those watersheds.

Mitigation

The Corps has the discretion to require wetland compensatory mitigation if the any Nationwide Permit activity is determined to result in minimal individual and cumulative adverse environmental effects. Such mitigation may be the result of a modification to a specific action when analyzed in light of the information the Corps has agreed to collect as described above, or required as a result of a-specific ESA section 7 consultation for a Nationwide Permit activity, or a regional programmatic ESA section 7 consultation, if the reasonable and prudent measures or RPAs in the Biological Opinions for those consultations require it.

Division Engineers can also impose Regional Conditions to lower the threshold for requiring wetland compensatory mitigation for Nationwide Permit activities. The Corps has agreed to meet with the relevant NMFS Regional Office on a semiannual basis to discuss the information on the activities it authorizes and to determine whether such additional permit conditions, consultations, or other protective measures are necessary.

Mitigation entails the following sequence:

1. Avoiding an impact altogether by not taking a certain action or parts of an action;

2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation;
3. Rectifying the impact by repairing, rehabilitating or restoring the affected environment;
4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;
5. Compensating for the impact by replacing or providing substitute resources or environments

The Corps relies on the CWA section 404(b)(1) guidelines to produce and permit the "least environmentally damaging practicable alternative" then relies on mitigation, particularly compensatory mitigation, to minimize the impacts of these alternatives on waters of the United States. As the Corps defines the term, compensatory mitigation means the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, or preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved (33 CFR 332.2).

Section 314 of the National Defense Authorization Act or Fiscal Year 2004 required the Secretary of the Army, acting through the Chief of Engineers, to issue regulations that establish performance standard and criteria for the use of on-site, off-site, and in-lieu fee mitigation and mitigation banking to compensate for wetland functions lost as a result of activities authorized by the Corps' permits.

On 10 April 2008, the Corps and the Environmental Protection Agency responded to that mandate by finalizing regulations on compensatory mitigation for losses of aquatic resources (*Federal Register* 73(70): 19594-19705, 2008 and 33 CFR 332). These regulations, which are commonly called the "Mitigation Rule" directs District Engineers to establish compensatory mitigation requirements based on the practicability and capacity to compensate aquatic resource functions that would be lost as a result of activities the Corps authorizes (40 CFR 332.3(a)). Specifically, when faced with options, the Mitigation Rule directs District Engineers to consider the option that would be environmentally preferable (40 CFR 332.3(a)).

The Mitigation Rule establishes a goal of achieving a minimum of 1:1 functional replacement (no net loss) of wetland functions with an adequate margin of safety to reflect anticipated success. In the absence of more definitive functional assessments, a minimum of 1:1 acreage replacement may be used as a reasonable surrogate for no net loss of wetland functions. During consultation, the Corps noted that the "no overall net loss" goal for wetlands is a programmatic goal and that compensatory mitigation for unavoidable impacts to jurisdictional wetlands does not have to be required for each individual permit. They note that general permits, such as the Nationwide permits, have never been contemplated as part of achieving the "no overall net loss" goal because of what the Corps considers their minimal impact on aquatic resources, both individually and cumulatively.

Wetland compensation can be accomplished by project-specific compensation or by purchase of credits from a Corps-approved mitigation bank. Three key factors determine the amount of wetland compensatory mitigation required: in advance vs. concurrent in-kind vs. out-of-kind, and in-place vs. not in-place. Compensatory mitigation that is in advance, in-kind and in-place has the greatest likelihood of replacing those wetland functions lost due to authorized projects; therefore, the compensation ratio is the lowest. Out-of-kind, not in-advance or not in-place compensation does not qualify for incentives to lower compensation ratios due to the difference between functions of the impact site and those of the compensation site.

When they evaluate compensatory mitigation options, the Mitigation Rule directs District Engineers to consider environmentally preferable alternatives. They are also directed to assess a proposal's probability of successfully replacing ecological functions, the location of the compensation site relative to the impact site and their significance within the watershed affected by a project, and the costs of the compensatory mitigation project. The Mitigation Rule also requires the EPA and the Corps to consider the consequences of allowing wetland losses to occur in urban and suburban areas with compensatory mitigation occurring in rural areas (called the "migration of wetland services" in the regulation).

General Condition 23 is the counterpart to the mitigation for Nationwide Permits. This General Condition requires District Engineers to consider multiple factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal rule (see section 1.2 of this Biological Opinion).

General Condition 22 is similar to the Mitigation Rule, but does not specify functional replacement and only requires a minimum mitigation ratio of 1:1 for wetland losses that exceed 0.1 acre; compensatory mitigation is not required for wetland losses less than 0.1 acre. General Condition 22 also does not establish a preference for in-kind, on-site mitigation, mitigation that is based on considerations of wetland services, or mitigation that occurs before the impact. This condition potentially would allow activities authorized by Nationwide Permits to result in net loss of wetland function, net loss of wetlands acreage in small increments, conversion of wetland types, and migration of wetland services between watersheds.

Improvements to the Mitigation Process

As noted in the *Environmental Baseline*, historically the Corps' requirement to compensate for the impacts of jurisdictional wetlands and other waters of the United States only partially replaced the hydrologic, chemical and ecological functions of the wetlands they were designed to replace. This outcome resulted from the relatively low rates of historic compliance with the requirement to provide compensatory mitigation and the small percentage of compensatory mitigation projects that replace the hydrologic, chemical and ecological functions of the wetlands they are designed to replace.

To address compensatory mitigation and compliance for the Nationwide Permit Program, the Corps will perform compliance inspections a minimum of:

1. 5% of all Nationwide Permit verifications issued within the most recent fiscal year;
2. 5% of active permittee-responsible mitigations sites each fiscal year; and
3. 20% of active mitigation banks and in-lieu fee programs each fiscal year.

The Corps will analyze compliance rates from the percentage of Nationwide Permits that the District inspected and will extrapolate those data to estimate the actual compliance rates and area impacted. They would include projects that were out of compliance, as well as those that affected less area than proposed and more area than proposed. They will use these data to determine to estimate how much actual area was affected. Inspections must also include checks on impact activity type, area, location and fulfillment of compensatory mitigation requirements (i.e., must show functional replacement has been achieved).

The Corps will reach resolution on non-compliance with permit conditions and/or mitigation requirements on at least 20% of activities determined to be non-compliant at the end of the previous fiscal year and determined to be non-compliant during the current fiscal year. The Corps shall reach resolution on at least 20% of all pending enforcement actions (i.e., unauthorized activities) that are unresolved.

As noted in the Corps' 2009 Regulatory Standard Operating Procedures: "Districts will prioritize compliance inspections and actions to resolve non-compliance based on compensatory mitigation requirements, regional areas of concern, threatened and endangered species, historic properties, navigation concerns, or other controversial issues that the District considers important." The Corps will use the information provided on compliance certification forms submitted as required by General Condition 30, where the authorized activity and (if required) compensatory mitigation has been completed. The performance measures may also be used to prioritize compliance inspections during each quarter of the fiscal year, to ensure that the performance measures are met or exceeded.

The Corps will also use monitoring reports for compensatory mitigation projects, to verify whether the monitoring report is accurate and whether the compensatory mitigation project is achieving its objectives and performance standards. Site visits are normally required to closeout compensatory mitigation projects.

If the Corps added any activity-specific conditions to the Nationwide Permit authorization to minimize adverse environmental effects, including effects to threatened and endangered species and their designated critical habitat, the Corps would prioritize compliance inspections for those Nationwide Permit verifications with activity-specific conditions added by District Engineers.

The Corps will thus know or be able to reliably determine whether or to what degree applicants have complied with the conditions, restrictions, or mitigation measures the proposed permits require when they discharge dredged or fill material into waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur.

Coordination with NMFS to Identify and Correct Potential Problems

The semi-annual reports on Regulatory Program permitting activities that the Corps will provide to NMFS will include information on required compensatory mitigation and compliance activities. This will include activity-specific information on acres of permanent impacts and mitigation, in addition to other authorized impacts such as acres of temporary impacts and linear foot impacts, authorized by all types of Corps permits, including the Nationwide Permits.

There will be a mandatory meeting between Corps District staff and NMFS Regional staff on a semi-annual basis to discuss the data in the semi-annual report and to determine whether additional permit conditions, consultations, or other protective measures are necessary to address specific types of activities or stressors that cause individual or aggregate impacts that affect listed species or designated critical habitat in the watersheds within the Corps District and NMFS Region.

If these discussions indicate that the Corps' mitigation efforts in a watershed of concern are inadequate, or if those mitigation efforts are failing to meet their goals, or if the compliance performance measures are not being met or are shown to be inadequate, the Corps and NMFS will determine whether additional measures are necessary to address specific types of activities or stressors that affect listed species or designated critical habitat in the watersheds within the Corps District and NMFS Region.

During these reviews, the Corps and NMFS will work together to insure that the compensatory mitigation the Corps requires sufficiently replaces not only the acreage that would be destroyed in areas where ESA listed resources under NMFS' jurisdiction occur, but also would replace the hydrologic, geochemical, and ecological functions of the wetlands so that any designated critical habitat in those areas would not be destroyed or adversely modified by the activities the Nationwide Permits would authorize.

The Corps Divisions and Districts would take action to modify, suspend or revoke Nationwide Permits to address any such concerns, which could include, among other things, adding new or modified Regional Conditions to restrict or prohibit the use of one or more Nationwide Permits.

7.3 Summary of the Corps' Ability to Protect Listed Resources

In addition to the improvements that it has already made to the Nationwide Permit Program, the Corps has made many modifications to its action during consultation with NMFS, (see *Section 1.6 Additional Protective Measures Incorporated into the Proposed Action* in this Biological Opinion). These measures will prevent the activities that they authorize under the Nationwide Permit Program from adversely affecting endangered or threatened species under NMFS' jurisdiction or critical habitat that has been designated for such species without subsequent formal section 7(a)(2) consultations, or ESA permitting which itself would be subject to consultation under section 7 of the ESA. The protective measures incorporated into the proposed action are summarized below:

In *Section 2.2 Application of this Approach* in this Biological Opinion, we described the types of specific questions we asked during our consultation to evaluate the Corps' action. The following narratives describe how the Corps has answered those questions.

By providing reliable information on Corps permitting activities, working with NMFS to refine Regional Conditions and to develop new Regional Conditions as needed and by coordinating with NMFS and engaging in ESA section 7 consultations on the specific activities authorized by Corps permitting activities as necessary, the Corps has structured the Nationwide Permit Program so that it can insure that the actions it authorizes, funds or carries out under that program are not likely to jeopardize the continued existence of any ESA listed endangered or threatened species under NMFS' jurisdiction or result in the destruction or adverse modification of critical habitat that has been designated for such species. Specifically:

1. By improving its data collection and reporting methods, and by employing an objective analytical methodology to estimate aggregate impacts, the Corps has structured the Nationwide Permit Program so it will know or be able to reliably estimate the probable

number, timing, location and magnitude of the activities that it would be authorizing by adequately identifying, collecting, and analyzing information about the discharges of dredged or fill material into waters of the United States and structures or work affecting navigable waters of the United States that may expose listed resources to harmful stressors throughout the permit cycle.

a. The Corps is in a position to reliably estimate the physical, chemical or biotic stressors that are likely to be produced as a direct or indirect result of the activities that would be authorized by the Nationwide Permit Program.

b. The Corps has structured the Nationwide Permit Program so it will know or be able to reliably estimate whether or what degree specific endangered or threatened species or designated critical habitat are likely to be exposed to potentially harmful discharges of dredged or fill material into waters of the United States and structures or work affecting navigable waters of the United States that the proposed permit would authorize, and to the ecological consequences of these activities throughout the permit cycle.

2. Through the improvements that the Corps has made to its compliance and enforcement methods, and by sharing information and coordinating with NMFS to analyze the effectiveness of those methods on a semiannual basis, the Corps has a mechanism to reliably determine whether and to what degree operators have complied with the conditions, restrictions, or mitigation measures required of the Nationwide Permit Program.

a. The Nationwide Permit Program structured so that the Corps is positioned to know or reliably estimate geographic and temporal patterns of applicant compliance with the requirements of each of the Nationwide Permits.

b. In those instances in which applicants do not comply with the requirements of the Nationwide Permits, the Nationwide Permit Program is structured so that the Corps is positioned to know or reliably estimate the magnitude of non-compliance with those requirements.

3. By collecting and analyzing the information described above, the Corps has structured its Nationwide Permit Program so it will know or be able to reliably estimate whether those activities have produced stressors that have occurred in concentrations, frequencies, or for durations that may degrade water quality in a watershed of concern or otherwise adversely affect endangered or threatened species under NMFS' jurisdiction or any critical habitat that has been designated for those species, and thus whether General Condition 18 has been satisfied.

4. The Corps will, through coordination with NMFS, continually assess the Nationwide Permit Program to identify specific authorizations that could pose risks to listed species and their designated critical habitat and undertake corrective actions as necessary.

a. By collecting and analyzing the information as described above, the Corps will make accurate effect determinations, and by undertaking ESA section 7 consultations with NMFS on those specific activities that the Nationwide Permit Program authorizes that may affect endangered or threatened species under NMFS' jurisdiction, the Corps is positioned to take the actions that are sufficient to prevent waters of the United States where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur, from being further degraded by the individual or collective effects of the discharges of dredged or fill materials or other activities that would be authorized by the Nationwide Permits on the quality of the waters that would receive those discharges.

b. The Corps has committed to modify, suspend or revoke Nationwide Permits to address any such concerns, which could include, among other things, adding new or modified Regional Conditions to restrict or prohibit the use of one or more Nationwide Permits if new information (e.g., data that suggest inadequate protection for species or low levels of compliance) becomes available. Modifications may include additional actions or requirements, reopening of the permits, and reinitiation of section 7 consultation.

5. Thus, the Corps structured its Nationwide Permit Program so that the Corps is positioned to insure that endangered or threatened species are not likely to be exposed to: (a) the dredged or fill material that would be discharged into waters of the United States or other activities where ESA listed endangered or threatened species under NMFS' jurisdiction, or the critical habitat that has been designated for those species occur, each year of the duration of the proposed permits; or (b) reductions in water quality that are caused by or are associated with such activities. By continuously collecting and evaluating information on its program, and by coordinating with NMFS on a semi-annual basis, the Corps has structured its Nationwide Permit Program so that it can quickly and effectively undertake corrective actions as necessary.

8.0 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities and cumulative effects, it is NMFS' Biological Opinion and Conference Biological Opinion that the Corps' Nationwide Permit Program **is not likely to jeopardize the continued existence** of any listed or proposed endangered or threatened species under the jurisdiction of NMFS and **is not likely to destroy or adversely modify any designated critical habitat or critical habitat proposed for designation**, where "jeopardize the continued existence of" means "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).

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 analysis with respect to critical habitat. Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (Application of the "Destruction or Adverse Modification" Standard Under section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

9.0 Incidental Take Statement

This consultation is programmatic in nature. For purposes of any activity proceeding under a Nationwide Permit that may affect an ESA-listed species, the Corps Nationwide Permit program follows a two-step process. In step one (issuance of the Nationwide Permits), no activity is authorized under any Nationwide Permit which "may affect" a listed species or critical habitat, unless section 7 consultation addressing the effects of the proposed activity has been completed (see General Condition 18). As a result, for any activity that may affect a listed species or is in the vicinity of any listed species or designated critical habitat, the Corps requires a prospective permittee to submit a pre-construction notification to the Corps to allow the Corps to determine if consultation with NMFS is necessary. If that proposed activity may affect a NMFS listed species (or designated critical habitat), the Corps will engage in ESA section 7 consultation with NMFS or ensure a section 7 consultation for the activity has already occurred (step two) and will not authorize that activity to proceed until that consultation is complete or verified.

During step two, any incidental take that is likely to occur will be addressed in that specific consultation and an incidental take statement where appropriate will be issued by NMFS or verified by the Corps that an ITS (or ESA section 10 permit) already exists that addresses the incidental take. If an activity that may affect a listed species were to proceed without a completed consultation, that activity would be in violation of the conditions of the Nationwide Permit program and would not be authorized by any Nationwide Permit. The actor would be subject to potential enforcement action for violation of the CWA and potentially the ESA as well (if the take of a listed species resulted from the activity and was not otherwise exempted). Based on the above, NMFS is not providing an incidental take statement for the Nationwide Permits program itself. NMFS is not exempting any incidental take as a part of this step one consultation on the program, and, any incidental take will be addressed in the subsequent consultations that will occur as part of step two of the program.

While NMFS is not including an incidental take statement with its Biological Opinion, it has identified specific measures that would be anticipated to trigger reinitiation of consultation if exceeded or not followed as set forth in section 11.0 (Reinitiation Notice) below.

10.0 Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act 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 ESA listed species or critical habitat, to help implement recovery plans, or to develop information.

The following conservation recommendations would provide information for future consultations involving the Corps' nationwide Permit program.

1. The Corps should continue to work with stakeholders and applicants to develop their Nationwide Permit Program in a manner that is protective of endangered or threatened species or designated critical habitat and to create monitoring programs that evaluate whether these permits are successful in accomplishing that goal.

In order to keep NMFS informed of actions minimizing or avoiding adverse effects or benefiting ESA listed species or their habitats, the Corps should notify the NMFS Office of Protected Resources Interagency Cooperation Division of any conservation recommendations they implement in their final action.

11.0 Reinitiation Notice

This concludes formal consultation on the U.S. Army Corps of Engineers' issuance of the Nationwide Permits. As provided in 50 CFR 402.16, reinitiation of formal consultation is required for this action where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if:

- New information reveals effects of the agency action that may affect endangered or threatened species under NMFS' jurisdiction or to designated critical habitat in a manner or to an extent not considered in this Biological Opinion;
- The agency action is subsequently modified in a manner that causes an effect to the ESA listed species or critical habitat not considered in this Biological Opinion; or
- A new species is listed or critical habitat designated that may be affected by the action.

The following are measures reflected in the proposed action that if modified are anticipated would require reinitiation of formal consultation:

- If the Corps fails to conclude the development of new Regional Conditions with all NMFS Regional Offices, or in lieu of concluding the development of Regional Conditions, the Corps fails to complete ESA section 7 consultations on the Nationwide Permit Program with all NMFS Regional Offices in areas where new Regional Conditions are not developed, by January 1, 2017.
- If the Corps fails to conduct rulemaking to modify Nationwide Permits 12, 13, 14, and 36 to require a PCN for proposed activities in waters of the United States in watersheds inhabited by listed species and designated critical habitat under NMFS' jurisdiction if those proposed activities are constructed with impervious materials and would thus add to impervious surface cover in a watershed.
- If the Corps fails to gather, review, and analyze data on the activities that it authorizes under CWA section 404 and provide a summary of these results in a semiannual report to the relevant NMFS Regional Office.
- If the Corps fails to include in its semi-annual report: the amount of actual impervious surface cover that will result from the activities authorized by the eight Nationwide Permit as well as other Corps permits for each 10-digit HUC watershed inhabited by listed species and designated critical habitat under NMFS' jurisdiction, the ratio of that additional impervious surface cover to the baseline impervious surface cover for the referenced watersheds, and a notation of those watersheds where the ratio is 1% or greater.
    a. If the total amount of actual impervious surface cover authorized by Nationwide

Permits and other Corps permit activities is greater than 1% of the baseline impervious surface cover in a particular watershed, the Corps fails to consider that information (as well as other pertinent information) when making its ESA section 7 effect determinations for Nationwide Permit pre-construction notifications associated with these eight Nationwide Permits. If section 7 consultation is initiated, the Corps will also consider this information and include it in preparing a biological assessment.

b. If the Corps, when processing other Corps permits in a watershed where the 1% threshold has been reached (as discussed above), fails to consider this information when making its ESA section 7 effect determinations. Or if the Corps fails to consider this information and include it in preparing a biological assessment for any ESA section 7 consultation on activities it authorizes that occur in that watershed.

- If the Corps fails to modify, suspend or revoke Nationwide Permits to address any such concerns if mutually identified by the Corps and NMFS.
- If the Corps fails to:
    a. Provide its Regulatory Project Managers with additional training and guidance to ensure accurate data entry into the Regulatory Program's automated information system.
    b. Increase its quality assurance/quality control efforts for its database; and
    c. Establish guidelines for developing information packages to post on Corps District web sites to assist prospective users of the Nationwide Permits to comply with General Condition 18.
- If the relevant Corps Districts fail to meet with the relevant NMFS Regional Office semiannually to discuss the data in that semiannual reports and determine whether additional permit conditions, consultations, or other protective measures are necessary to address specific types of activities or stressors that affect listed species or designated critical habitat in the watersheds within the Corps District and NMFS Region.
- If the Corps fails to implement additional permit conditions, consultations, or other protective measures are necessary to address specific types of activities or stressors that affect listed species or designated critical habitat in the watersheds within the Corps District if:
    a. The Corps, through coordination with and with the technical assistance of NMFS, finds that these stressors occur at concentrations, durations, or frequencies that are potentially harmful to individual listed organisms, populations, or species; or
    b. The Corps, through coordination with and with the technical assistance of NMFS, identifies that the discharges of dredged or fill material into waters of the United States or other activities under the Nationwide Permit Program lead directly or indirectly to ecological consequences that are potentially harmful to individual listed organisms, populations, species or primary constituent elements of designated critical habitat.

- If the Corps' current compliance and monitoring efforts do not continue to meet its performance measures of:

    a. Compliance inspections on 10% of all individual permits issued and constructed within the preceding fiscal year;

    b. Compliance inspections of 5% of all General Permits (GPs and Nationwide Permits) with reporting requirements issued and constructed within the preceding fiscal year,

    c. Field compliance inspections of 5% of active mitigation sites each fiscal year; (Active mitigation sites are those sites authorized through the permit process and are being monitored as part of the permit process but have not met final approval under the permit special conditions);

    d. Compliance inspections/audits on 20% of active mitigation banks and in lieu fee programs annually;

    e. Reach resolution on non-compliance with permit conditions and/or mitigation requirements on 20% of activities determined to be non-compliant at the end of the previous fiscal year and determined to be non-compliant during the current fiscal year; or

    f. Reach resolution on 20% of all pending enforcement actions (i.e., unauthorized activities) that are unresolved at the end of the previous fiscal year and have been received during the current fiscal year.

    - If rates of compliance with General Conditions 2 (Aquatic Life Movements), 3 (Spawning Areas), 8 (Adverse Effects from Impoundments), 9 (Management of Water Flows), 12 (Soil Erosion and Sediment Controls), or 22 (Mitigation) fall below 95% (with a confidence interval of ±5.0%); or

    - If rates of compliance with General Condition 18 (Endangered Species) fall below 95% (with a confidence interval of ±5.0%).

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Appendix A

A.1 Corps Data used for the Effects Analysis

In January 2013 the Corps provided NMFS with data from its ORM2 database for the purpose of projecting impacts that will occur under the Nationwide Permits. These data include the actions, impacts and mitigation records for activities authorized under the existing Nationwide Permits between 2010 and 2012. Summary statistics reported in an early draft of the Biological Opinion suggested to the Corps that a number of unusually large impact values occurred among these data. The Corps reviewed their data and identified 515 apparently anomalous entries. The Districts that authorized these actions were asked to verify or correct these entries. The Corps provided these data corrections to NMFS in September of 2013, and at NMFS request, reevaluated and resubmitted a subset of the corrected data in November of 2013.

Resolution of Data Anomalies

Many of the anomalies corrected by the Districts were the result of reporting the project area over which impacts occurred rather than the actual physical space occupied by the authorized impacts within the project area. ORM2 impact entries are intended to represent the discrete physical area affected by the authorized action, not the ecologically relevant impact area. For example, when authorizing navigation markers, the Corps records the area occupied by each of the markers whereas a Biological Opinion for the same event would consider the area marked as the impact area. The permits affected by this data entry behavior included Nationwide Permit 1 (Aids to Navigation), Nationwide Permit 10 (Mooring Buoys), Nationwide Permit 11 (Temporary Recreational Structures) and Nationwide Permit 5 (Scientific Measurement Devices).

Anomalous entries for impacts expressed in terms of linear feet were primarily attributed to reporting the entire project extent rather than the extent of the authorized impact. This error affected many of the permits, but occurred most frequently in Nationwide Permits 3, 12 and 13. The Districts also determined that a number of impacts were recorded as square feet rather than acres. Conversion of these errors reduced impact acreage by several orders of magnitude. Corrections made to volumes of substrate were due to identifying materials placed in uplands for Nationwide Permit16 as fill.

As indicated in section 5.1, in response to the discovery the anomalous data in its ORM2 database, the Corps has instituted data entry guidance, integrated warnings and guidance into the database user interface, and instituted a QA/QC process.

A.2 Comparison of original data with corrected data

The following sections include the summary statistics for the 2010-2012 data originally provided by the Corps juxtaposed with summary statistics of the corrected data. Both analyses are provided in this appendix to demonstrate the implications of the data correction and to preview how the data collection and entry improvements described above may affect future impact estimates. It is important to note that ORM2 is a live database which is continually updated, so changes identified below are also partly due to recent updates.

A.2.1 Effect of Data Correction on Estimated Number of Activities Authorized by Nationwide Permits

Comparison of the original analysis of the 2010-2012 ORM2 dataset, with data corrected as described above, indicated only trivial differences (i.e., <1%) in the number of activities authorized (Table A.1). The small increases in these values are primarily due to correcting those data where the impacts of separate and distant activities were lumped into a single impact entry. Table A.1 indicates the proportion of permanent impacts for each year in parentheses to indicate the frequency of actions permanently changing aquatic resources. While the data correction effort reassigned a few authorizations from permanent to temporary impacts, this small number of changes has little influence the proportion of actions classified as permanent.

Table A.1 Summary Data for the Number of Actions, Impacts and Required Mitigation Efforts (all permits, both original and corrected data).

Original 2010-2012 Data				
Year	**Authorizations (projects)**	**Actions with Impacts**	**Impacts (% Permanent)**	**Mitigation**
2010	20,296	32,161	36,195 (60%)	3,913
2011	18,714	28,876	36,887 (64%)	4,616
2012	19,477	33,913	42,901 (56%)	6,305
Average	19,496	31,650	38,661 (60%)	4,945
Year-to-year variation	4%	8%	10%	25%
Annual Projection	18765-20227	25,298-38,002[a,b]	34,488-42,834	3,554-6,336
Corrected 2010-2012 Data				
2010	17,873	32,173	36,231 (60%)	3,925
2011	18,707	28,986	37,005 (64%)	4,633
2012	19,544	34,075	43,106 (56%)	6,357
Average	18,708	31,745	38,781 (60%)	4,972
Year-to-year variation	4%	8%	10%	25%
Annual Projection	17,936-19,480	29,369-34,121	35,302-42,260	3,816-6,128

[a] 95% Confidence Interval
[b] The annual projected range in number of actions authorized in the 2012 Biological Opinion was 30,250-35,968.

Table A.2. Projected number of authorizations for Nationwide Permits using corrected ORM2 2010-2012 data with original data in parentheses where changes occurred.

Permit	Number of Actions 2010-2012	Year to year variation	Annual projection
1. Aids to navigation [a,b,e,g]	251 (formerly 253)	0.45 (formerly 0.46)	41-127 (formerly 40-128)
2. Structures in artificial canals [a,e,g]	350 (formerly 349)	0.77	15-219 (formerly 15-217)
3. Maintenance [b,e]	15819 (formerly 15788)	0.07	4850-5696 (formerly 4841-5685)
4. F&W harvesting, enhancement & attraction devices [a,b,g]	343 (formerly 344)	0.49 (formerly 0.5)	51-177 (formerly 50-180)
5. Scientific measurement devices [a]	431	0.06	135-153
6. Survey [a]	769	0.24	186-326
7. Outfall structures & associated intake structures [b]	1050 (formerly 1043)	0.13 (formerly 0.14)	297-403 (formerly 295-401)
8. Oil & gas structures on the Outer Continental Shelf [b,]	8	0.33	2-4
9. Structures in fleeting & anchorage areas [a,]	71	0.79	2-46
10. Mooring buoys [a]	262	0.34	53-121
11. Temporary recreational structures [a]	283	0.18	75-113
12. Utility line [b]	26695 (formerly 26575)	0.09	8006-9790 (formerly 7926-9790)
13. Bank stabilization [b,e]	10608 (formerly 10589)	0.02	3471-3601 (formerly 3467-3593)
14. Linear transportation projects [b,]	17260 (formerly 17221)	0.32	3672-7834 (formerly 3661-7819)
15. U.S. Coast Guard approved bridges [a,e]	70	0.04	22-24
16. Return water from upland contained disposal areas [a]	210	0.04	67-73

Permit	Number of Actions 2010-2012	Year to year variation	Annual projection
17. Hydropower projects [b]	22	0.43	4-20
18. Minor discharges	2783 (formerly 2776)	0.1	820-1036 (formerly 816-1034)
19. Minor dredging [a]	417 (formerly 411)	0.11 (formerly 0.12)	122-156 (formerly 119-155)
20. Response operations for oil & hazardous substances [a]	21	0.14	6-8
21. Surface coal mining[e]	105 (formerly 103)	0.2 (formerly 0.24)	27-43 (formerly 25-43)
22. Removal of vessels[e]	77	0.5	11-41
23. Approved categorical exclusions	2145 (formerly 2135)	0.22 (formerly 0.21)	541-889 (formerly 539-885)
24. Tribe or State administered CWA section 404 programs[a,c]	4	Single year	0
25. Structural discharges [a]	127	0.12	36-48
27. Aquatic habitat [b,e]	4489 (formerly 4474)	0.07	1385-1607 (formerly 1379-1603)
28. Modifications of existing marinas [a,b,e]	136	0.27 (formerly 24%)	31-59 (formerly 33-57)
29. Residential developments [b]	1744 (formerly 1737)	0.13	493-669 (formerly 491-667)
30. Moist soil management for wildlife [a]	8	0.67	1-5
31. Maintenance of existing flood control facilities [b]	205 (formerly 204)	0.79	7-129
32. Completed enforcement actions [a,f]	159 (formerly 158)	0.28 (formerly 0.3)	36-70 (formerly 35-71)
33. Temporary construction, access & dewatering [b]	1642 (formerly 1636)	0.14	460-634 (formerly 457-633)
35. Maintenance dredging of existing basins [a,b,e]	520 (formerly 514)	0.35	105-241 (formerly 103-239)
36. Boat ramps [a,b]	950	0.09	283-351

Permit	Number of Actions 2010-2012	Year to year variation	Annual projection
37. Emergency watershed protection & rehabilitation	436	0.44	73-217
38. Cleanup of hazardous & toxic waste[e]	282 (formerly 280)	0.18 (formerly 0.19)	75-113 (formerly 73-113)
39. Commercial & institutional developments [b]	1939 (formerly 1932)	0.05	608-684 (formerly 606-682)
40. Agricultural [b,e]	243 (formerly 242)	0.22	61-101
41. Reshaping existing drainage ditches	172	0.18	46-68
42. Recreational facilities[e]	677 (formerly 678)	0.05	212-240
43. Stormwater management facilities [a,b]	617 (formerly 616)	0.03	199-213 (formerly 198-212)
44. Mining [a]	192	0.2	49-79
45. Repair of uplands damaged by discrete events[e]	201	0.36	40-94
46. Discharges into ditches [b,e]	80 (formerly 82)	0.22 (formerly 0.26)	20-34 (formerly 19-35)
47. Reserved [47][a,d]	2	Single year	0
48. Existing commercial shellfish aquaculture [b,,g]	263 (formerly 262)	1.68 (formerly 1.7)	up to 255 (formerly up to 254)
49. Coal remining [a,g]	42 (formerly 43)	0.5	41447
50. Underground coal mining[g]	54 (formerly 53)	0.28 (formerly 0.22)	41632 (formerly 13-23)

A.3 Effect of Data Correction on Estimated Impacts Authorized by Nationwide Permits

The ORM2 database provides information on the extent, permanence and mitigation requirements for permit-authorized impacts in terms of acres or linear feet affected or cubic feet of substrate removed. Table A.4 includes summary statistics for both the original data provided by the Corps in January 2014 and the corrected data provided in September and November of 2013. Data were summarized in this reinitiation Biological Opinion using arithmetic means and 95% confidence intervals in order to retain comparability with the Biological Opinion from the original consultation. The proportion of permanent impacts in terms of spatial extent are provided in parentheses.

Based on the January 2013 data, impacts for all three metrics increased markedly in 2012 (Table

A.5.). Impacts in terms of linear feet were higher in 2012 relative to 2010 and 2011, at 8.6 million feet versus 5.8 and 5 million feet of impacts to aquatic resources. Cubic feet of substrate removed was also higher in 2012, at 56 million ft^3 versus 40-49 ft^3 in 2010 and 2011. There were no obvious aberrations contributing to higher 2012 impacts among these data for linear feet or volume substrate.

Data errors for impacts expressed in terms of linear feet were primarily attributed to reporting the entire project extent rather than the extent of the authorized impact. This error affected many of the permits, but occurred most frequently in NWPs 3, 12 and 13. The Corps also determined that a number of impacts were recorded as square feet rather than acres. Conversion of these errors reduced impact acreage by a factor of 43,560. Corrections made to volumes of substrate were due to identifying materials placed in uplands for NWP16 as fill. Changes made to the ORM2 data entry interface will prevent future errors of this type.

This data correction effort reduced the 2010 to 2012 acreage impacts estimate to about 47 thousand acres, giving an annual average impact of just under 16 thousand acres per year and 0.5 acres per impact. The data correction did not appreciably change the proportion of permanent impacts expressed in terms of linear feet or volume substrate. Permanent impacts did increase among impacts expressed in terms of acres.

Table A.3 Summary of original and corrected data estimates of annual impacts.

	Acres (% permanent)	Linear Feet (% permanent)	Volume of Substrate (% permanent)
Original Data			
2010	56,504.58 (43%)	5,762,017.38 (59%)	48,726,048.70 (66%)
2011	245,071.08 (14%) 47,386.95 (2%)[a]	4,939,423.20 (66%)	40,229,795.20 (77%)
2012	994,940.83 (1%) 355,616.4 (3%)[a]	8,605,354.62 (47%)	56,642,678.61 (48%)
Annual Average	432,172.17 54,826.84[a]	6,435,598.40	48,532,840.84
Year-to-Year Variation	77% 17%[a]	115%	17%
Annual Projection	432,172.17[b] 47,178-62,475[a]	1,657,233.86-11,213,962.94	28,142,672.54-68,923,009.13
Corrected Data			
2010	11,162 (63%)	5,490,120 (58%)	28,361,853 (41%)
2011	15,926 (69%)	4,264,610 (72%)	38,484,059 (66%)
2012	20,002 (28%)	5,867,746 (59%)	58,008,583 (44%)
Annual Average	15,697	5,207,492	41,618,165
Year-to-Year Variation	28%	16%	36%
Annual Projection	10,689-20,708	4,259,104-6,155,880	24,565,385-58,670,945

[a] Value with aberration permit impacts removed.
[b] Based on annual average of 2010-2012 data

The average impact varied broadly among the different Nationwide Permits (Table A.4) Comparison of the original January 2013 data with the corrected data indicate that data correction reduced linear foot impacts by 80% or more for NWPs 1, 5, 6, 7, 11, 16, and 46. Corrections reduced acreage impacts by 80% or greater for 18 permits. Among these, impact acreage was reduced by greater than 99% for NWPs 1, 2, 5, 10, 11, 19 and 46. Finally, data correction reduced impact volumes by 80% or greater for NWPs 7, 16, 22, 28 and 32. Comparison of the September 2013 data from the 2012 Biological Opinion that the newer data reflect larger impact areas for 32 permits, similar impact areas (+/-50%) for 9 permits, and decreased average impact areas for the remaining 5 permits.

Table A.4. Per permit comparison of average impact size in original and corrected data (% permanent impacts in parentheses)

Permit	Original Date			Corrected Data		
	Linear Feet	Acres	Volume Substrate	Linear Feet	Acres	Volume Substrate
1. Aids to navigation [a,b,e,g]	348 (81%)	1.1 (88%)	140 (<1%)	14.8 (98%)	0.006 (26%)	
2. Structures in artificial canals [a,e,g]	114 (86%)	1.9 (100%)	350 (96%)	73 (79%)	0.013 (82%)	
3. Maintenance [b,e]	290 (57%)	5.8 (40%)	86910 (64%)	214 (66%)	0.146 (49%)	93364 (31%)
4. F&W harvesting, enhancement & attraction devices [a,b,g]	9018 (98%)	0.1 (57%)	108675 (42%)	9086 (98%)	0.057 (57%)	126900
5. Scientific measurement devices [a]	13410 (<1%)	3.8 (18%)		62 (47%)	0.026 (19%)	
6. Survey [a]	2890 (2%)	0.3 (<1%)	212 (48%)	517 (9%)	0.17 (8%)	211 (48%)
7. Outfall structures & associated intake structures [b]	1640 (11%)	0.3 (65%)	16796 (100%)	85.4 (66%)	0.038 (83%)	3001 (56%)
8. Oil & gas structures on the Outer Continental Shelf [b,]	8560 (100%)	0.1 (46%)		8560 (100%)	0.074 (46%)	
9. Structures in fleeting & anchorage areas [a,]	238 (86%)	2.7 (100%)		287 (35%)	0.179 (26%)	
10. Mooring buoys [a]	64.1 (39%)	1.1 (100%)		31.8 (76%)	0.008 (98%)	
11. Temporary recreational structures [a]	3489 (<1%)	238.3 (<1%)		217 (8%)	0.092 (2%)	
12. Utility line [b]	288 (26%)	0.5 (16%)	61992 (<1%)	264 (24%)	0.242 (16%)	61992 (0%)

Permit	Original Date			Corrected Data		
	Linear Feet	Acres	Volume Substrate	Linear Feet	Acres	Volume Substrate
13. Bank stabilization [b,e]	263 (94%)	0.7 (98%)	18216 (93%)	215 (93%)	0.075 (71%)	4365 (76%)
14. Linear transportation projects [b,]	142 (70%)	0.1 (85%)	11641 (100%)	134 (68%)	0.064 (66%)	11362 (100%)
15. U.S. Coast Guard approved bridges [a,e]	241 (62%)	0.1 (64%)	24300 (100%)	240 (62%)	0.104 (64%)	24300 (100%)
16. Return water from upland contained disposal areas [a]	1233 (15%)	1.6 (25%)	1132758 (96%)	136 (51%)	0.136 (50%)	129420 (1%)
17. Hydropower projects [b]	141 (95%)	0.3 (93%)		141 (95%)	0.262 (93%)	
18. Minor discharges	92 (84%)	0.2 (20%)	1256 (14%)	80.6 (84%)	0.034 (77%)	319 (70%)
19. Minor dredging [a]	108 (81%)	3.8 (100%)	456 (79%)	106 (81%)	0.019 (60%)	386 (78%)
20. Response operations for oil & hazardous substances [a]	1012 (49%)	1 (12%)		1012 (49%)	1 (12%)	
21. Surface coal mining[e]	3028 (81%)	4.8 (72%)		3007 (81%)	4.8 (73%)	
22. Removal of vessels[e]	196 (6%)	0.6 (87%)	73575 (<1%)	167 (8%)	0.081 (6%)	12150
23. Approved categorical exclusions	177 (86%)	0.3 (80%)	138520 (100%)	177 (86%)	0.272 (79%)	146150 (100%)
24. Tribe or State administered CWA section 404 programs[a,c]		0.4 (5%)			0.425 (5%)	
25. Structural discharges [a]	287 (100%)	0.1 (35%)		287 (100%)	0.13 ?5%)	
27. Aquatic habitat [b,e]	1694 (72%)	12 (14%)	438244 (50%)	1696 (70%)	6.9 (75%)	438244 (50%)
28. Modifications of	170 (88%)	2.4 (96%)	112988 (100%)	173 (88%)	0.13 (80%)	16010 (100%)

Permit	Original Date			Corrected Data		
	Linear Feet	Acres	Volume Substrate	Linear Feet	Acres	Volume Substrate
existing marinas [a,b,e]						
29. Residential developments [b]	193 (95%)	0.1 (96%)		193 (95%)	0.11 (95%)	
30. Moist soil management for wildlife [a]	20 (100%)	12 (1%)		20 (100%)	11.9 (1%)	
31. Maintenance of existing flood control facilities [b]	5691 (11%)	5.7 (16%)	443837 (48%)	5691 (11%)	5.4 (8%)	456980 (46%)
32. Completed enforcement actions [a,f]	446 (73%)	0.7 (87%)	325498 (95%)	446 (73%)	0.71 (85%)	29997
33. Temporary construction, access & dewatering [b]	192 (20%)	10.7 (1%)	32544 (64%)	190 (20%)	0.26 (18%)	12776(1%)
35. Maintenance dredging of existing basins [a,b,e]	552 (54%)	5.1 (92%)	152942 (81%)	583 (51%)	1.6 (35%)	144232 (74%)
36. Boat ramps [a,b]	47.6 (92%)	0.6 (100%)	1659 (100%)	40.6 (93%)	0.03 (95%)	749 (64%)
37. Emergency watershed protection & rehabilitation	627 (71%)	8.2 (100%)	3186 (<1%)	627 (71%)	0.16 (92%)	3186
38. Cleanup of hazardous & toxic waste[e]	772 (56%)	1.9 (79%)	979451 (26%)	772 (56%)	1.9 (80%)	942782 (26%)
39. Commercial & institutional developments [b]	276 (75%)	0.2 (88%)		271 (74%)	0.13 (90%)	
40. Agricultural [b,e]	973 (97%)	0.2 (53%)		508 (80%)	0.13 (78%)	
41. Reshaping existing drainage ditches	2173 (74%)	0.9 (44%)	432000 (100%)	2171 (72%)	0.87 (43%)	432000 (100%)
42. Recreational facilities[e]	149 (90%)	0.1 (59%)		149 (90%)	0.08 (88%)	

Permit	Original Date			Corrected Data		
	Linear Feet	Acres	Volume Substrate	Linear Feet	Acres	Volume Substrate
43. Stormwater management facilities [a,b]	301 (77%)	0.3 (74%)	21645 (75%)	300 (76%)	0.17 (59%)	21645 (75%)
44. Mining [a]	468 (97%)	0.2 (78%)	218646 (<1%)	468 (97%)	0.16 (78%)	218646
45. Repair of uplands damaged by discrete events[e]	365 (44%)	0.5 (49%)	11,853	367 (82%)	0.43 (41%)	11853 (34%)
46. Discharges into ditches [b,e]	1532 (100%)	0.5 (11%)		1.8 (91%)	0.001 (88%)	25214
47. Reserved [47][a,d]	(66%)	0.2 (88%)			0.15 (95%)	
48. Existing commercial shellfish aquaculture [b,g]	884 (69%)	34.9 (100%)		883 (100%)	35.1 (11%)	
49. Coal remining [a,g]	462	0.7		460 (66%)	0.31 (75%)	
50. Underground coal mining[g]	446	9.6		447 (68%)	0.24 (96%)	

[a] Preconstruction notice not required
[b] Permits not included in this group are expected to have very low impact. Permits of special concern
[c] Four Permits authorized in 2012
[d] Two permits authorized in 2010
[e] Possible increasing trend in annual authorizations
[f] Possible decreasing trend in annual authorizations
[g] 2012 authorizations greater than twice the number authorized in 2010 and 2011

Data on Geographic Distribution of Activities and Impacts

In keeping with the 2012 Biological Opinion analysis, the geographic analysis of the 2010-2012 data evaluated the 19 Districts that overlap the distribution of endangered or threatened species under NMFS' jurisdiction or critical habitat that has been designated for those species. Table A.5 describes the annual average number of actions and impacts for the 21 permits of special concern along with the percentage of impacts with required mitigation. The data in this table are based on data provided in September of 2013. The January 2014 data are provided in parentheses in cases where they differ from the corrected data by more than 10%.

Table A.5 Impacts among the Corps Districts based on corrected 2010 – 2012 data (Fall 2013). Values for prior data (January 2013) are provided where they differ from corrected data by greater than 10%.

Corps District	Number of Actions	Acres		Linear Feet		Annual Average Volume Substrate
		Annual Average Impact	Proportion Mitigation Required	Annual Average Impact	Proportion Mitigation Required	
Alaska	372	457,869.98 (formerly 627,800.4)	3% (formerly 2%)	281.17	4%	219,932.32
Baltimore	66	45,018.97	8% (formerly 9%)	214.42	1%	900
Charleston	474	35,332.40	24%	56.62 (formerly 90.36)	>100%	1,807.00
Galveston	1126	271,792.30		2,446.52 (formerly 8,192.58)	13% (formerly 4%)	2,902,995
Honolulu	98	19,421.79 (formerly 36,871.12)		6.29 (formerly 4,832.83)		249,954.31
Jacksonville	1630	232,256.02 (formerly 317,443.9)	2%	1,417.43 (formerly 10,439)	>100%	6,827,092
Los Angeles	3123	226,713.16 (formerly 287,585.6)	12% (formerly 9%)	642.69	21% (formerly 19%)	238,750.83
Mobile	532	190,658.71	3%	1,047 (formerly 1,717.84)	5% (formerly 3%)	26,373.60
New Orleans	139	41,304.32 (formerly 70,181.77)	2% (formerly 1%)	137.97	5%	
New York	831	93,200.02	10%	98.42 (formerly 1,374.23)	>100% (formerly 27%)	495,748.3 (formerly 590,880)

Corps District	Number of Actions	Acres		Linear Feet		Annual Average Volume Substrate
		Annual Average Impact	Proportion Mitigation Required	Annual Average Impact	Proportion Mitigation Required	
Norfolk	981	100,501.42	3%	46.71 (formerly 168.37)	83% (formerly 23%)	933,957.74
Philadelphia	121	12,197.87		22.26 (formerly 26.83)	>100%	31,638.16
Portland	614	117,833.95 (formerly 135,024.4)	1%	238.7 (formerly 361.2)	1% (formerly 7%)	890,000.94
Sacramento	2373	147,549.73	20%	767.48 (formerly 4503.62)	15% (formerly 3%)	317,923.31
San Francisco	331	56,352.49	1% (formerly 9%)	87.97 (formerly 144.84)	77% (formerly 48%)	699,038.29 (formerly 612,371.6)
Savannah	863	96,424.32	9%	96.62 (formerly 327.96)	5% (formerly 1%)	688,936.72 (formerly 472,171.4)
Seattle	812	154,006.4	4%	3629.6	2%	67,699.66
Walla Walla	541	127,583.1	4%	40.03	9%	27,429 (formerly 32,143.66)
Wilmington	1577	194,411.42 (formerly 274,654.5)	15% (formerly 11%)	405.29 (formerly 634.73)	66% (formerly 43%)	2,132,296
Estimated total per year	16,604	2,620,428 (formerly 3,102,092)		11,683 (formerly 38,133.45)		219,932.32 (formerly 17,143,261)