NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT SECTION 7
BIOLOGICAL OPINION

Title:	Biological Opinion on Reissuance of the Construction General Permit by the EPA
Consultation Conducted By:	Endangered Species Act Interagency Cooperation Division, Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce
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Action Agency: Environmental Protection Agency

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Approved: Donna S Wieting

Donna S. Wieting
Director, Office of Protected Resources

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1 Introduction

Section 7 (a)(2) of the Endangered Species Act (ESA) requires Federal agencies to insure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitat. When a Federal agency's action "may affect" a protected species, that agency is required to consult formally with the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) or the United States (U.S.) Fish and Wildlife Service (USFWS), together, the Services, depending upon the endangered species, threatened species, or designated critical habitat that may be affected by the action (50 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 concurs with that conclusion (50 CFR §402.14 (b)).

Section 7 (b)(3) of the ESA requires that at the conclusion of consultation, NMFS and/or USFWS provide a biological opinion (opinion) stating how the Federal agencies' actions will affect ESA-listed species and their designated critical habitat under their jurisdiction. If the analyses conclude that the action will jeopardize an ESA-listed species or adversely modify designated critical habitat, section 7 (b)(3) of the ESA directs the consulting agency to provide reasonable and prudent alternatives (RPAs) that the action agency can implement to avoid jeopardy or adverse modification or indicate whether there are no RPAs. If an incidental take is expected, section 7 (b)(4) of the ESA requires the consulting agency to provide an incidental take statement that specifies the impact of any incidental taking and includes reasonable and prudent measures (RPMs) to minimize such impacts.

This document represents NMFS' opinion on the U.S. Environmental Protection Agency's (EPA) reissuance of its Construction General Permit (CGP) authorizing discharges of stormwater to waters of the U.S. and the implications of these discharges for threatened and endangered species and their designated critical habitat under NMFS' jurisdiction. The EPA uses general permits issued under section 402, the National Discharge Elimination System (NPDES) of the Clean Water Act (33 U.S.C. 1342 et seq.; CWA), to authorize routine discharges by multiple dischargers. Coverage for discharges under a general permit is granted to applicants after they submit a notice of intent to discharge (NOI[1]). Once the NOI is submitted and any review period specified under the CGP has closed, the applicant is authorized to discharge under the terms of the general permit.

The opinion and incidental take statement were prepared by NMFS' ESA Interagency Cooperation Division in accordance with section 7 (b) of the ESA and implementing regulations at 50 CFR §402. A complete record of this consultation is on file at NMFS' Office of Protected Resources in Silver Spring, Maryland.

1.1 Background

On June 20, 2003, NMFS' Office of Protected Resources issued a concurrence on EPA's 2003 CWA CGP, but did not complete consultation on the 2008 CGP or the 2012 CGP that followed. The EPA issued its current CGP on February 16, 2012. That permit expires February 16, 2017.

[1] There are many types of NOIs, throughout this document NOI refers to the notice of intent to discharge into waters of the U.S. in the action area.

1.2 Consultation History

Below we summarize meetings and communications on the ESA section 7 consultation process on a proposed new CGP. Pre-consultation discussions began in 2015. Formal consultation was initiated on December 5, 2016.

On September 23, 2015, EPA requested species lists from USFWS, and NMFS and indicated its intent to initiate discussions on the ESA and the CGP. NMFS provided a species list that identified the applicable regulatory documentation (i.e., listing, critical habitat designations, recovery plans) and the essential elements of critical habitat designated for those species.

On a conference call held October 27, 2015, the EPA, USFWS, and NMFS discussed the schedule for issuance of the 2017 GCP and EPA's proposed approach to writing their biological evaluation that would be the basis for the ESA section 7 consultation with the services.

On October 27, 2015, NMFS transmitted concerns regarding harmful effects of sediment discharges from construction activities on seagrass and coral communities identified by the NMFS South East Regional Office.

On April 22, 2016, EPA responded to NMFS concerns regarding construction activities in Puerto Rico.

On May 11, 2016, EPA transmitted a request for formal consultation and a biological evaluation to USFWS and NMFS.

On May 12, 2016, EPA transmitted responses to the seven questions NMFS uses to evaluate whether a permitting program like the EPA's CGP is structured to allow the action agency to identify and prevent or minimize harm resulting from activities proposed to be authorized under the program.

On a conference call held May 25, 2016, EPA and NMFS discussed priorities for ESA section 7 consultations, including the schedule for the CGP consultation.

On June 9 2016, NMFS responded to EPA's request for formal consultation indicating that NMFS will initiate formal consultation after review of the biological evaluation and identification of any additional information needs.

On October 19, 2016, the EPA provided documentation regarding ESA section 7 activities for the CGP versions issued in 2003 and 2012.

On October 25, 2016, the EPA provided a detailed spreadsheet of NOI submitted under the 2012 CGP.

On October 26, 2016, EPA transmitted its 2012 ESA Stormwater Pollution Prevention Plan (SWPPP) study conducted to assess operator compliance with the ESA eligibility requirements in EPA's 2012 CGP.

On a conference call held October 27, 2016, NMFS and EPA reviewed concerns regarding CGP, its biological evaluation and the NOI submitted under the 2012 CGP. The agencies discussed approaches to improve implementation of the permit.

On October 31, 2016, NMFS transmitted a document reviewing the CGP biological evaluation and the 2012 CGP NOI to the EPA.

On November 2, 2016, NMFS transmitted edits to the 2017 CGP NOI form.

On November 2, 2016, EPA requested verification of/updates to the e-mail addresses used by their eReporting system to transmit NOI submissions for the CGP to NMFS Regions for review at the beginning of the 14-day hold period.

On a conference call held November 8, 2016, EPA, NMFS, and USFWS discussed the changes made to the 2017 CGP NOI form, timeline for completion of the consultation in the form of a signed opinion, and strategies to address additional concerns, including, but not limited to, climate change, long term projects, and NOI review.

On November 14, 2016, NMFS transmitted a draft of two sections of the opinion (Description of the Action and Action Area) for comment review by EPA. The USFWS was copied on this transmittal.

On November 30, 2016, EPA transmitted a draft flowchart guidance to assist permit applicants in selecting ESA Eligibility Criteria to USFWS and NMFS for review.

On December 1, 2016, EPA transmitted to USFWS and NMFS a final 2017 CGP NOI form and edits to the draft Description of the Action and Action Area.

On December 5, 2016, NMFS transmitted to EPA a formal initiation letter indicating that formal consultation on the 2017 CGP NOI would begin upon receiving EPA's climate change analysis for the CGP.

Between December 12, 2016 and January 5, 2017, NMFS and EPA collaborated on the development of measures to minimize take.

On January 13, 2017 NMFS transmitted its final, signed opinion to EPA.

2 THE ASSESSMENT FRAMEWORK

Section 7(a)(2) of the ESA requires Federal agencies, in consultation with NMFS, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species; or adversely modify or destroy their designated critical habitat.

"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 an ESA-listed species in the wild by reducing the reproduction, numbers, or distribution of that species." 50 CFR 402.02.

"Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of designated critical habitat for the conservation of an ESA-listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features (50 CFR 402.02). An ESA section 7 assessment involves the following steps:

Description of the Proposed Action (Section 3), *Interrelated and Interdependent Actions* (Section 4), and *Action Area* (Section 5)*:* We describe the proposed action and those aspects (or stressors) of the proposed action that may have direct or indirect effects on the physical, chemical, and biotic environment, we identify any interrelated and interdependent actions, and describe the action area with the spatial extent of those stressors.

*Status of Species and Designated Critical Habitat (*Section 6): We identify the ESA-listed species and designated critical habitat that are likely to co-occur with those stressors in space and time and evaluate the status of those species and habitat. In this Section, we also identify those *Species and Designated Critical Habitat Not Considered Further in the Opinion* (Section 6.1), because these resources will either not be affected or are not likely to be adversely affected.

*Environmental Baseline (*Section 7): We describe the environmental baseline in the action area including: past and present impacts of Federal, state, or private actions and other human activities in the action area; anticipated impacts of proposed Federal projects that have already undergone formal or early section 7 consultation, impacts of state or private actions that are contemporaneous with the consultation in process.

*Effects of the Action (*Section 8)*: Risk Analysis (*Section 8.1) and *Programmatic Analysis* (Section 8.2): To determine the effects of the action, we conduct two separate analyses: a Risk Analysis and a Programmatic Analysis. In the *Risk Analysis*, we evaluate the potential adverse effects of stormwater discharges on ESA-listed species and designated critical habitat under NMFS' jurisdiction, without consideration of the protective measures of the CGP (i.e., the ESA eligibility criteria described in Section 3.7). To do this, we begin with problem formulation that identifies and integrates the stressors of the action with the species status (Section 6) and the Environmental Baseline (Section 7) and formulate risk hypotheses. The risk hypotheses identify assessment endpoints of concern for ESA-listed species and designated critical habitat. To evaluate the risk hypotheses, we consider the potential exposure of individual members of ESA-listed species (exposure analysis) and essential features of designated critical habitat, and what expected responses might be (response analysis). If the assessment endpoints of the individuals or the essential features indicate adverse effects, we evaluate whether those responses would affect populations or subpopulations of species or the designated critical habitat (risk characterization). Second, since we conclude that population level effects to species and adverse effects to essential features of designated critical habitat could occur as a result of construction stormwater discharges, we conduct a Programmatic Analysis. In this analysis, we evaluate whether the process and the protective measures in the CGP are sufficient to allow EPA to ensure that its action is not likely to jeopardize ESA-listed species or destroy or adversely modify designated critical habitat. To do so, we consider seven questions focused on EPA's knowledge and ability to respond.

*Integration and Synthesis (*Section 9): In this section we integrate the analyses in the opinion to summarize the consequences to ESA-listed species and designated critical habitat under NMFS' jurisdiction.

*Cumulative Effects (*Section 10): Cumulative effects are the effects to ESA-listed species and designated critical habitat of future state or private activities that are reasonably certain to occur within the action area. 50 CFR 402.02. Effects from future Federal actions that are unrelated to the proposed action are not considered because they require separate ESA section 7 compliance.

*Conclusion (*Section 11); With full consideration of the status of the species and the designated critical habitat, we consider the effects of the action within the action area on populations or subpopulations and on essential habitat features when added to the environmental baseline and the cumulative effects to determine whether the action could reasonably be expected to:

- Reduce appreciably the likelihood of survival and recovery of ESA-listed species in the wild by reducing its numbers, reproduction, or distribution, and state our conclusion as to whether the action is likely to jeopardize the continued existence of such species; or
- Appreciably diminish the value of designated critical habitat for the conservation of an ESA-listed species, and state our conclusion as to whether the action is likely to destroy or adversely modify designated critical habitat.

If, in completing the last step in the analysis, we determine that the action under consultation is likely to jeopardize the continued existence of ESA-listed species or destroy or adversely modify designated critical habitat, then we must identify RPA(s) to the action, if any, or indicate that to the best of our knowledge there are no RPAs. See 50 C.F.R. § 402.14.

In addition, we include an incidental take statement (ITS) that specifies the impact of the take, RPMs to minimize the impact of the take, and Terms and Conditions to implement the RPMs. ESA section 7 (b)(4); 50 CFR 402.14 (i). We also provide discretionary conservation recommendations that may be implemented by EPA. 50 CFR 402.14 (j). Finally, we identify the circumstances in which reinitiation of consultation is required. 50 CFR 402.16.

To comply with our obligation to use the best scientific and commercial data available, we collected information identified through searches of ISI Web of Science, Medline, scientific publisher databases (e.g., Elsevier), government databases (e.g., EPA's National Service Center for Environmental Publications), and literature cited sections of peer reviewed articles, species listing documentation, and reports published by government and private entities. This opinion is based on our review and analysis of various information sources, including:

- EPA' s biological evaluation for the CGP;
- the CGP and its fact sheet;

- NOI submitted under the 2012 CGP;
- NPDES program compliance and enforcement data;
- section 7 consultation documentation and NOI from the 2012 CGP;
- status reviews, recovery plans, and listing notices for ESA-listed species and designated critical habitat;
- reports on the status and trends of water quality; and
- best available commercial and scientific information, including peer reviewed research.

These resources were used to identify information relevant to the potential stressors and responses of ESA-listed species and designated critical habitat under NMFS' jurisdiction that may be affected by the proposed action to draw conclusions on risks the action may pose to the continued existence of these species and the value of designated critical habitat for the conservation of ESA-listed species.

3 Description of the Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies. The EPA proposes to re-issue the NPDES CGP to authorize the discharge of pollutants from construction activities. EPA's existing 2012 CGP became effective on February 16, 2012 (see 77 FR 12286) and will expire on February 16, 2017. The proposed 2017 CGP will replace the 2012 CGP. Eligibility for permit coverage will be available to operators of new sites, operators of existing sites, new operators of permitted sites, and operators of emergency-related projects.

3.1 Authorized Discharges

The 2017 CGP authorizes the discharge of stormwater from construction sites that will disturb more than one acre, or will disturb less than one acre but are part of a common plan of development or sale that will ultimately disturb one acre or more, in areas where EPA is the permitting authority (see Section 4 Action Area for details).

The following discharges are authorized under this permit provided that appropriate stormwater controls are designed, installed, and maintained:

- Stormwater discharges, including stormwater runoff, snowmelt runoff, and surface runoff and drainage, associated with construction activity under 40 CFR 122.26(b)(14)(x)(i.e., industrial activity)[2] or 122.26(b)(15)(i)(i.e., small construction, <5 acres);
- Stormwater discharges designated by EPA as needing a permit under 40 CFR 122.26(a)(1)(v)(i.e., contributing to violation of a water quality standard or is a significant contributor of pollutants) or 122.26(b)(15)(ii)(i.e., having the potential to contribute to a violation of a water quality standard or contribute significant pollutants);
- Stormwater discharges from construction support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) provided that:
  - The support activity is directly related to the construction site required to have permit coverage for stormwater discharges;
  - The support activity is not a commercial operation, nor does it serve multiple unrelated construction sites;
  - The support activity does not continue to operate beyond the completion of the construction activity at the site it supports; and
  - Stormwater controls are implemented in accordance with the 2017 CGP Part 2 and, if applicable, 2017 CGP Part 3, for discharges from the support activity areas.

In addition to stormwater discharges, the 2017 CGP proposes to authorize the following non-stormwater discharges associated with construction activity provided that, with the exception of water used to control dust and to irrigate vegetation in stabilized areas, these discharges are not routed to areas of exposed soil on the site and the operator complies with any applicable requirements:

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[2] Under 40 CFR 122.26(b)(14)(x): Construction activity including clearing, grading and excavation, except operations that result in the disturbance of more than five acres of total land area. Construction activity also includes the disturbance of less than five acres of total land area that is a part of a larger common plan of development or sale if the larger common plan will ultimately disturb five acres or more.

- Discharges from emergency fire-fighting activities;
- Fire hydrant flushings;
- Landscape irrigation;
- Water used to wash vehicles and equipment, provided that there is no discharge of soaps, solvents, or detergents used for such purposes;
- Water used to control dust;
- Potable water including uncontaminated water line flushings;
- External building washdown, provided soaps, solvents, and detergents are not used, and external surfaces do not contain hazardous substances (e.g., paint or caulk containing PCBs);
- Pavement wash waters provided spills or leaks of toxic or hazardous substances have not occurred (unless all spill material has been removed) and where soaps, solvents, and detergents are not used. Operators are prohibited from directing pavement wash waters directly into any water of the U.S., storm drain inlet, or stormwater conveyance, unless the conveyance is connected to a sediment basin, sediment trap, or similarly effective control;
- Uncontaminated air conditioning or compressor condensate;
- Uncontaminated, non-turbid discharges of ground water or spring water;
- Foundation or footing drains where flows are not contaminated with process materials such as solvents or contaminated ground water; and
- Construction dewatering water discharged in accordance with the permit.

Also authorized under this permit are stormwater and non-stormwater discharges (listed above), commingled with a discharge authorized by a different NPDES permit and/or a discharge that does not require NPDES permit authorization.

The 2017 CGP proposes to provide immediate authorization on a case-by-case basis for construction projects responding to public emergencies (e.g., natural disaster, disruption in essential public services) to enable work necessary to avoid imminent endangerment to human health, public safety, or the environment, or to reestablish essential public services on the condition that a complete and accurate NOI is submitted within 30 days after commencing construction activities. The 2017 CGP also requires operators to provide documentation in their NOI and SWPPP to substantiate the occurrence of a public emergency.

3.2 Notice of Intent to Discharge Requirements

All operators who seek coverage under the CGP and meet the specified eligibility requirements are required to submit to EPA a complete and accurate NOI prior to commencing construction activities (Note: exception for construction in response to a public emergency as discussed above). Operators will use EPA's NPDES eReporting Tool (NeT) to electronically prepare and submit their NOIs. Operators of new sites (i.e., sites where construction activities commence on or after February 16, 2017) must submit an NOI at least 14 calendar days prior to commencing construction activities. Operators of existing sites (i.e., sites with 2012 CGP coverage where construction activities commenced prior to February 16, 2017) must submit an NOI no later than 90 calendar days after the permit effective date. New operators (i.e., operators that through transfer of ownership and/or operation replace the operator of an already permitted construction site) must submit an NOI at least 14 calendar days before the date the transfer to the new operator will take place.

3.3 Technology-based Effluent Limitations

The 2017 CGP proposes to require operators at eligible construction and development sites to comply with the applicable final effluent limitation guidelines and new source performance standards (40 CFR Part 450). Technology-based effluent limits are structured to require operators to first prevent the discharges of sediment and other pollutants through the use of effective planning and erosion control measures; and second, to control discharges that do occur through the use of effective sediment control measures. The effluent limits will also require the permittee to implement a range of pollution prevention measures to limit or prevent discharges of other types of non-sediment discharges. The 2017 CGP identifies four basic categories of technology-based effluent limit controls:

- General stormwater control design, installation, and maintenance requirements;
- Erosion and sediment control;
- Pollution prevention requirements; and
- Construction dewatering requirements.

The CGP does not dictate that any specific technology-based effluent stormwater control(s) be installed on a site. Rather, construction site operators will have the discretion to choose the control(s) that meet the requirements of the permit and of their project. Stormwater controls used to minimize the discharge of pollutants from construction activities include construction site planning and management, erosion controls, runoff controls, sediment controls, and good housekeeping/materials management. Technology-based requirements of the CGP, along with available control measures for meeting these requirements are summarized below.

3.3.1 General Stormwater Control Design, Installation, and Maintenance Requirements

The 2017 CGP requires that the operator design, install, and maintain stormwater controls to minimize the discharge of pollutants in construction stormwater. In order to accomplish this, operators must take the following actions:

- Account for minimum factors in designing stormwater controls, for instance expected amount, frequency, intensity, and duration of precipitation, the nature of stormwater runoff at the site, and the soil type and range of soil particle sizes expected at the site;
- Design and install stormwater controls consistent with good engineering practices[3], including applicable design specifications;
- Complete installation of stormwater controls by the time each phase of construction begins; and
- Ensure that all stormwater controls are maintained in effective operating condition and protected from activities that reduce their effectiveness.

[3] Good engineering practices are defined by the International Society for Pharmaceutical Engineering as: "Established engineering methods and standards that are applied throughout the project lifecycle to deliver appropriate and cost-effective solutions." The term generally refers to any manufacturing process that involves engineering.

Construction site planning and management controls emphasize the importance of construction sequencing in the specified work schedule to coordinate the timing of land-disturbance and the installation of erosion and sediment control measures. Construction site planning and management also includes self-inspection and maintenance protocols to ensure that any installed stormwater controls are functioning properly to reduce or eliminate pollution discharges.

The 2017 CGP will require operators to assemble a stormwater team to carry out the permit requirements. Training will be required for all members of the stormwater team prior to the commencement of construction activities to ensure that they understand the permit requirements and their specific responsibilities with respect to those requirements.

3.3.2 Erosion and Sediment Control Requirements

The 2017 CGP requires operators to implement erosion and sediment controls to minimize the discharge of pollutants in construction stormwater. Specific erosion and sediment control requirements in the CGP include:

- On sites with waters of the U.S. located on or immediately adjacent to the property, provide and maintain a naturally vegetated buffer between the area of earth disturbance and any water of the U.S. and/or install controls that achieve an equivalent sediment reduction of a 50-foot buffer of undisturbed natural vegetation. Appendix G of the 2017 CGP provides technical guidance for achieving equivalent sediment reduction of a 50-foot buffer of undisturbed natural vegetation
- Direct stormwater to vegetated areas on the site.
- Install sediment controls around perimeter areas of the site that will receive stormwater from earth disturbing activities; sediment must be removed before it has accumulated to a height of one-third of perimeter controls.
- Implement effective exit point control measures (e.g., stabilization, elimination of track-out, and wheel wash down requirements), and restrict vehicle use to designated exit points.
- Manage sediment appropriately as specified (e.g., do not wash sediment into stormwater conveyances, storm sewer inlets, or waters of the U.S.; locate all soil or sediment piles outside of any buffer areas, and surround piles with a sediment barrier; minimize generating and offsite tracking of dust; minimize soil compaction).
- Minimize the disturbance of steep slopes, and preserve native topsoil, unless infeasible.
- Use erosion controls and velocity dissipation devices within and along the length of any stormwater conveyance channel at any outlet to minimize erosion.
- Establish controls to remove sediment before entering any storm drain inlets on the site.
- For sediment basins situated outside of any water of the U.S. or any natural buffers, avoid collecting water from wetlands, and abide by certain minimum design requirements.
- If using treatment chemicals, use conventional erosion and sediment controls both prior to and after chemical application. Select appropriate chemicals that are suited to the type of soil that will be exposed during construction. Store all chemicals in leak-proof containers that are kept under storm-resistant cover and surrounded by secondary

containment. Comply with additional requirements imposed by EPA for the use of cationic chemicals[4] (if applicable).

3.3.2.1 Stabilization Requirements

Stabilization refers to covering ground exposed through the construction process to reduce erosion and sedimentation and can be achieved through the use of vegetative or non-vegetative cover methods (e.g., hydromulch, erosion control blankets, riprap). Temporary stabilization refers to covering exposed soil in areas until final stabilization can be achieved or until the area is disturbed again in the future. Final stabilization refers to using practices to provide permanent cover of exposed portions of the site and qualifies the site for permit coverage termination. The draft 2017 CGP proposes to continue the stabilization requirements contained in the 2012 CGP. These include:

- Provide uniform vegetation that covers 70 percent or more of the area that was covered by native vegetation prior to the commencing of construction activities, for both temporary and final vegetative stabilization.
- For final stabilization, vegetative cover must be perennial.
- Non-vegetative cover used for temporary and final stabilization must provide effective stabilization of exposed portions of the site.
- The 2017 CGP modified the stabilization deadlines specified in the 2012 CGP, which is based on the concept of phasing construction disturbances. Sites that disturb five (5) acres or less must complete stabilization within a 14-day timeframe, which is the same timeframe that applied to sites in the 2012 CGP. For sites that disturb more than five (5) acres over the course of a construction project, operators can choose between completing stabilization within a 14-day timeframe if they limit disturbances to five (5) acres or less at any one time, or within a 7-day timeframe if they do not limit disturbances to five (5) acres or less at any one time. The intent of this approach is to provide an incentive to disturb less land at any given period of time by providing longer stabilization timeframes if the disturbance is kept below a threshold level. The deadline for sites discharging to sensitive waters remains unchanged from the 2012 CGP (within 7 days), and the exceptions for sites in arid, semi-arid, and drought-stricken areas and for operators affected by circumstances beyond their control also remain unchanged (see Part 2.2.14 for the 2017 CGP).

Erosion controls include physical and chemical measures that can be implemented on a site to control erosion. Specific erosions control measures include: compost blankets, sodding, dust control, soil retention, geotextiles, soil roughening, gradient terraces, temporary slope drain, mulching, temporary stream crossings, riprap, wind and sand fences, seeding, and chemical stabilization. Runoff controls include implementation of rock check dams, grass-lined channels, slope diversion channels, and temporary diversion dikes to control runoff and thereby reduce the discharge of sediment through erosion. Part 2.2.11 of the 2017 CGP requires construction

[4] Section 1.1.9 of the CGP requires any operator planning to add cationic treatment chemicals to stormwater and/or authorized non-stormwater prior to discharge to obtain authorization for coverage from the appropriate EPA Regional Office, prior to submitting an NOI, to ensure that the use of cationic treatment chemicals will not lead to discharges that cause an exceedance of water quality standards.

operators to use erosion controls and velocity dissipation devices within and along the length of any stormwater conveyance channel and at any outlet to slow down runoff and minimize erosion.

Sediment controls minimize the impacts to the quality of the discharge by controlling sediment on construction sites. Specific physical measures and devices in this control category include: brush barrier, sediment filters and sediment chambers, compost filter berms, sediment traps, compost filter socks, silt fences, construction entrances, storm drain inlet protection, fiber rolls, straw or hay bales, filter berms, vegetated buffers, sediment basins and rock dams. The 2017 CGP requires the installation of sediment controls along any perimeter areas of the site that receive pollutant discharges (Part 2.2.3), at points on the site that exit onto paved roads to minimize sediment track-out (Part 2.2.4), around any stockpiles or land clear debris piles composed of sediment and/or soil (as well as providing cover or appropriate stabilization for these piles, Part 2.2.5).

3.3.3 Pollution Prevention Requirements

The 2017 CGP contains pollution prevention standards that prohibit the following pollutants from being discharged from construction and development sites: wastewater from concrete washout; fuels and oils; soaps/solvents used in vehicle washing; and toxic or hazardous substances from a spill. The 2017 CGP proposes to restrict the following types of pollutant-generating activities as follows:

- Equipment and vehicle fueling and maintenance - If an operator will conduct fueling and/or maintenance of equipment or vehicles at the site, an effective means will be required to eliminate the discharge of spilled or leaked chemicals from the area designated for this activity. This includes immediate cleanup of contaminated surfaces and elimination of the source of the spill using adequate supplies to handle spills, leaks, and disposal of liquids. Proposed requirements also include using dry clean up measures where possible and not cleaning surfaces by hosing the area down.
- Washdown of vehicles, equipment or buildings - Operators will be required to provide an effective means of minimizing the discharge of pollutants from equipment and vehicle washing and eliminate the discharge of soaps, detergents, or solvents used in vehicle and equipment washing.
- Storage, handling, and disposal of building products, materials, and waste - Exposure of products, materials, or wastes stored at the site to stormwater, except for those that are either not a source of contamination to stormwater or are designed to be exposed to stormwater, will be required to be minimized. Operators will be required to provide secondary containment structures or similarly effective means to prevent discharges. Additional proposed requirements will be implemented for storage of particular products, materials or wastes such as pesticides, fuel, oil, hydraulic fluids, hazardous waste and domestic waste. These products will be required to be stored in sealed, watertight containers away from exposure to stormwater, and permitees will be required to use dry methods of cleanup where possible in conjunction with proper disposal.
- Washing of applicators and containers used for stucco, paint, concrete, form release oils, curing compounds, and other materials - Where paint, concrete, stucco and other washout activities are conducted on site, operators will be required to provide an effective means of eliminating the discharge of water from these activities. Washout or cleanout activities

will be required to be located as far away as possible from waters of the U.S. and stormwater inlets or conveyance and all washwater will be required to be directed into a leak-proof container or leak-proof pit. The container or pit will be required to be designed so that no overflows can occur due to inadequate sizing or precipitation. Additionally, all washout or cleanout wastes will be prohibited from being dumped in storm sewers and hardened concrete wastes will be required to be removed and disposed of consistent with construction waste provisions.

- Fertilizer application – Restrictions on fertilizers containing nitrogen or phosphorus except for compost, manure, or other natural fertilizers.
- Toxic or hazardous substances from an emergency spill or other release – The 2017 CGP requires inspections, immediate cleanups of spills, emergency spill notification and reporting requirements for toxic or hazardous substance spills.

Good housekeeping/materials management addresses concrete washout, building materials/site waste, spill prevention/control plans, and vehicle maintenance/washing activities. Concrete washout controls are used to contain concrete and liquids when the mixers and hoppers of concrete pumps are rinsed out after delivery. The washout facilities consolidate solids for easier disposal and prevent runoff of liquids. Spill prevention and control plans clearly state measures to stop the source of a spill, contain the spill, clean up the spill, dispose of contaminated materials, and train personnel to prevent and control future spills. Similar to the 2012 CGP, the 2017 CGP (Parts 1.3.5 and 2.3.3), prohibits the discharge of toxic or hazardous substances from a spill or other release, and includes specific requirements regarding spill control for pesticides and fertilizers; diesel fuel, oil, hydraulic fluids, other petroleum products, and other chemicals; and hazardous or toxic wastes.

3.3.4 Construction Dewatering Requirements

The 2017 CGP includes requirements for construction dewatering controls intended to minimize pollutant discharges in ground water or accumulated stormwater that is removed from excavations, trenches, foundations, vaults, or other similar points of accumulation. Construction dewatering requirements include:

- Do not discharge visible floating solids or foam.
- Use an oil-water separator or suitable filtration device (such as a cartridge filter) that is designed to remove oil, grease, or other products if dewatering water is found to contain these materials.
- To the extent feasible, use vegetated, upland areas of the site to infiltrate dewatering water before discharge. In no case will waters of the U.S. be considered part of the treatment area.
- At points of discharge, comply with the velocity dissipation requirements elsewhere in the permit (Part 2.2.11).
- With backwash water, either haul it away for disposal or return it to the beginning of the treatment process.

3.4 Water Quality-Based Effluent Limitations

In addition to the technology-based requirements in the CGP (discussed in Section 1.3 above), the 2017 CGP also includes proposed provisions for meeting applicable state or tribal water quality standards. These proposed requirements, which are retained from the 2012 CGP, fall into in four categories: (1) general effluent limitations to meet applicable water quality standards, (2) discharge limitations for "impaired waters" (i.e., those waters identified on the CWA Section 303(d) list or waters with an EPA-approved or established Total Maximum Daily Load or TMDL), (3) discharge requirements for waters identified as Tier 3 (outstanding national resource waters) or Tier 2/2.5 waters (high quality waters) for the purpose of antidegradation protection, and (4) additional terms, limitations, and conditions established by the State or Tribe using their CWA section 401 authority.

3.4.1 General Water Quality-Based Effluent Limitations

The 2017 CGP retains the requirements that discharges must be controlled as necessary to meet applicable water quality standards. Additionally, the standard conditions in the 2017 CGP will provide EPA the authority to take additional actions if there is evidence indicating that the stormwater discharges authorized by the CGP cause, have the reasonable potential to cause, or contribute to an excursion above any applicable water quality standard (See Part I.16.2 of the 2017 CGP).

3.4.2 Water Quality-based Discharge Limitations for Impaired Waters

In the 2017 CGP, a construction site will be considered to discharge to an impaired water if the first water of the U.S. to which it discharges is identified by a state, tribe, or EPA pursuant to Section 303(d) of the CWA as not meeting an applicable water quality standard, or is included in an EPA-approved or established TMDL. For discharges that enter a storm sewer system prior to discharge, the first water of the U.S. to which the site discharges is the waterbody that receives the stormwater discharge from the storm sewer system. For operators that determine they have a discharge to an impaired water, the 2017 CGP requires that the operator provide in their NOI a list of all impaired waters, pollutant(s) for impairment, and the status of the TMDL.

An operator must comply with specific stormwater controls if discharges are to water that is impaired for sediment or a sediment-related parameter, such as total suspended solids (TSS), the major contributor to turbidity[5], and/or nutrients, including impairments for nitrogen and/or phosphorus. The CGP proposes to require sites discharging to sediment or nutrient-impaired waters to undergo more frequent inspections, stricter stabilization timeframes and comply with any additional state or tribal impairment-related requirements.

If the operator discharges to an impaired water that is impaired for a parameter other than a sediment-related parameter or nutrients, EPA will inform the permittee if any additional limits or controls are necessary for the discharge to be consistent with the assumptions of any available wasteload allocation in the TMDL, or if coverage under an individual permit is necessary.

[5] Turbidity refers to the degree of water clarity and may be expressed in terms of the mass of TSS in a fixed volume of water, maximum water depth at which a Secci disc is visible, or the amount of light scattered as it passes through a water sample over a fixed distance.

3.4.3 Water Quality-based Discharge Limitations for Tier 2, 2.5, or 3 Waters

Discharges from a construction and development site to Tier 2, Tier 2.5, or Tier 3 waters is determined by the status of the first water-body receiving the discharge, or if discharging to a storm sewer system, by the status of the first water-body receiving the discharge from the storm sewer system. Under the 2017 CGP, operators of construction and development sites discharging to Tier 2, Tier 2.5, or 3 waters must provide a list of all such waters to which the site discharges stormwater, and will be required to undergo more frequent inspections, stricter stabilization timeframes, and comply with any additional Sate or Tribal impairment-related requirements.

3.4.4 Conditions provided under Section 401 of the Clean Water Act

Section 401 of the CWA requires the permit issuing authority, in this case EPA, to submit the 2017 CGP to any State, Territory, or Native American Tribe with water quality standards authority, to provide any additional terms, limitations or conditions, necessary to comply with its law. Based on the responses received, EPA will include them within the 2017 CGP for dischargers within the State, Territory, or Native American Tribe.

3.5 Site Inspections and Corrective Actions

The 2017 CGP will include the provisions of the 2012 CGP for site inspections and corrective actions. Inspections must be conducted by a "qualified person," defined as someone: (1) who is knowledgeable in the principles and practice of erosion and sediment controls, and pollution prevention; (2) who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality ; (3) with the appropriate skills and training to assess the effectiveness of any stormwater control measures selected to control the quality of stormwater discharges from the construction activity. Inspectors may include authorized representatives of the EPA, or other Federal, State, local or Tribal agency, within their jurisdiction. The 2017 CGP requires a minimum inspection frequency of between 7 to 14 calendar days, and within 24 hours of the occurrence of a storm event (0.25 inches of rainfall) or the occurrence of snowmelt runoff. More frequent inspections are required for sites that discharge to sediment or nutrient-impaired waters or to waters identified as Tier 2, Tier 2.5, or Tier 3 for antidegradation purposes. Less frequent inspections are required for certain arid and semi-arid areas and frozen conditions. The 2017 CGP specifies the proposed areas and activities required to be inspected, and includes the requirement for an inspection report to be completed within 24 hours of any site inspection.

If a problem is found during an inspection (e.g., a stormwater control was never installed or it was installed incorrectly, or a discharge is causing an exceedance of an applicable water quality standard), operators must immediately take any reasonable steps necessary to minimize or prevent the discharge of pollutants until a permanent solution is installed and made operational. corrective action can include, but is not limited to, an order to cease discharge. Within 7 days of discovery, operators must install any new or modified controls and make them operational or complete necessary repairs followed by a corrective action report and progress update within one week of implementing the corrective action. Operators will be required to comply with any corrective actions required by EPA as a result of a permit violation during inspection.

3.6 Stormwater Pollution Prevention Plan Requirements

As in the 2012 CGP, the proposed 2017 CGP includes the requirement that in order to gain coverage under the CGP, operators must develop a SWPPP prior to submitting their NOI. The

SWPPP must include a description of the following: (1) nature and location of the construction activities, (2) the physical attributes of the site, (3) list of pollutants and pollutant-generating activities occurring on the site, (4) particular characteristics of the stormwater discharge, (5) the people responsible for implementation activities under this permit, (6) the selection, design, installation, and maintenance of stormwater control measures used to satisfy the effluent limitations in the permit, and (7) documentation of compliance with other federal requirements including the ESA. The SWPPP will be required to be available on site or at an easily accessible location so that is can be made available during site inspections and upon request.

3.7 CGP Eligibility Criteria and Procedures Relating to the Endangered Species Act

Appendix D of the 2017 CGP provides the eligibility criteria and procedures related to protection of ESA threatened and endangered species and designated critical habitat. An operator will be required to meet one or more of the following six criteria for the entire term of coverage under the permit:

<u>Criterion A: No species or critical habitat.</u> No Federally-listed threatened or endangered species or their designated critical habitat(s) are likely to occur in the site's "action area."

<u>Criterion B: Eligibility requirements met by another operator.</u> The construction site's discharges and discharge-related activities were already addressed in another operator's valid certification of eligibility for the action area under eligibility Criterion A, C, D, E, or F and there is no reason to believe that Federally-listed species or federally designated critical habitat not considered in the prior certification may be present or located in the "action area." To certify eligibility under this criterion, there must be no lapse of NPDES permit coverage in the other operator's certification. By certifying eligibility under this criterion, the operator agrees to comply with any conditions upon which the other operator's certification was based.

<u>Criterion C: Discharges not likely to adversely affect species or habitat.</u> Federally-listed threatened or endangered species or their designated critical habitat(s) are likely to occur in or near the site's "action area" as described in Appendix A of the 2017 CGP, and the site's discharges and discharge-related activities are not likely to adversely affect listed threatened or endangered species or critical habitat. This determination may include consideration of any stormwater controls and/or management practices that will be adopted to ensure that discharges and discharge-related activities are not likely to adversely affect ESA-listed species and designated critical habitat. To make this certification, operators must include the following in their NOI: 1) any Federally-listed species and/or designated habitat located in the "action area" and 2) the distance between the site and the ESA-listed species or designated critical habitat (in miles).

<u>Criterion D: Coordination with Services has successfully concluded.</u> Coordination between the operator and USFWS and NMFS has concluded. The coordination must have addressed the effects of the construction and development site's discharges and discharge-related activities on Federally-listed threatened or endangered species and federally designated critical habitat, and resulted in a written concurrence from the relevant Service(s) that the site's discharges and discharge-related activities are not likely to adversely affect ESA-listed species or critical habitat. Copies of the correspondence with USFWS and NMFS must be included in the SWPPP and the NOI.

Criterion E: Section 7 consultation has successfully concluded. Consultation between a Federal Agency and USFWS and NMFS under section 7 of the ESA has concluded. The consultation must have addressed the effects of the construction site's discharges and discharge-related activities on Federally-listed threatened or endangered species and federally designated critical habitat. The result of this consultation must be either:

(1) a biological opinion that concludes that the action in question (taking into account the effects of the construction and development site's discharges and discharge-related activities) is not likely to jeopardize the continued existence of ESA-listed species, nor the destruction or adverse modification of designated critical habitat; or

(2) written concurrence from the applicable Service(s) with a finding that the site's discharges and discharge-related activities are not likely to adversely affect Federally-listed species or federally designated habitat.

Criterion F: Issuance of section 10 permit. The construction activities are authorized through the issuance of a permit under section 10 of the ESA, and this authorization addresses the effects of the site's discharges and discharge-related activities on federally ESA-listed species and federally designated critical habitat.

3.8 Standard Permit Conditions

The 2017 CGP incorporates standard permit conditions consistent with the general permit provisions required under 40 CFR 122.41: Conditions applicable to all permits. (see appendix I of the 2017 CGP). These conditions establish obligations of permittees, including the obligation to comply with the permit, that failure to comply with the permit constitutes a violation of the CWA, and specifies the penalties for failures to comply with the permit. The conditions include reporting requirements for any noncompliance which may endanger health or the environment which may result from a bypass (i.e., intentional diversion of a discharge not consistent with the permit) or upset (i.e., exceptional incident leading to unintentional discharge exceeding permit limits).

3.9 Implementation: Incorporation of NMFS' expertise

The 2017 CGP specifies the eligibility requirements for an operator's discharges to be authorized under the general permit. As part of the measures for EPA to insure that their authorization of individual CGP discharges is not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitat, the CGP incorporates NMFS expertise during the CGP's 14-day review period prior to authorization. General permit NOI, and any supporting documentation submitted with the NOI, are automatically transmitted to NMFS for review once the applicant completes their submission (see History of the Consultation, November 2, 2016 request by EPA for verified e-mail addresses). If during the 14-day review period, NMFS informs EPA that ESA eligibility may not have been correctly certified, EPA has the authority to place a hold on authorization, require an operator to submit additional information, or require an operator to obtain an individual permit in order to discharge.

4 ACTION AREA

Action area means all areas affected directly, or indirectly, by the Federal action, and not just the immediate area involved in the action (50 CFR 402.02). The action area for this consultation consists of all waters of the U.S. in states, territories, and possessions receiving discharges authorized by EPA under the CGP. Because NMFS only has jurisdiction over marine, estuarine, and anadromous endangered and threatened species and designated critical habitat for those species, this consultation addresses the potential effects of CGP-authorized discharges to waters of the U.S. occurring in coastal areas and inland waters used by ESA-listed marine, estuarine, and anadromous species under NMFS' jurisdiction where EPA has permitting authority. This includes the entire states of Massachusetts, New Hampshire, and Idaho, the District of Columbia, Puerto Rico, the Pacific territories, federally operated facilities in Washington and Delaware, and Indian country lands[6] nationwide (Table 1, Figures 1 through 3). At this time, waters of the U.S. are defined as (40 CFR 122.2).

- All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide and all interstate waters, including interstate "wetlands."
- 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 would affect or could affect interstate or foreign commerce including any such waters:
    - Which are or could be used by interstate or foreign travelers for recreational or other purposes;
    - From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
    - Which are used or could be used for industrial purposes by industries in interstate commerce.
- All impoundments of waters otherwise defined as waters of the U.S. under this definition.
- Tributaries of those waters described above.
- The territorial sea.
- "Wetlands" adjacent to waters (other than waters that are themselves wetlands).
- 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.

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[6] The term "Indian country," defined at 40 CFR §122.2, means: (a) all land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation; (b) all dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of a state; and(c) all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same (18 USC 1151).

Table 1. Extent of the action area for which the U.S. Environmental Protection Agency has permitting authority for under the construction general permit and where threatened or endangered species and designated critical habitat under NMFS' jurisdiction occur.

	All Watersheds			Coastal Watersheds		
State or Territory	# Sub-watersheds	Acres	km^2	# Sub-watersheds	Acres	km^2
East Coast						
Connecticut Indian Country Lands	2	35,363	143	1	17,182	70
Rhode Island Indian Country Lands	3	68,090	276	1	18,017	73
District of Columbia	6	161,124	652			
Delaware Federally Operated Facilities	9	185,536	751	5	119,489	484
Massachusetts	226	5,205,997	21,079	26	544,455	2,204
Maine Indian Country Lands	13	329,342	1,333	2	87,435	354
New Hampshire	334	7,390,815	29,910	9	241,779	978
Caribbean						
Puerto Rico	219	2,206,073	8,928	52	433,246	1,753
West Coast						
Alaska Indian Country Lands	7	317,423	1,285	6	307,605	1,245
California Indian Country Lands	201	6,349,845	25,697	11	478,323	1,936
Idaho	2,573	56,696,234	229,446	5	89,294	361
Oregon Indian Country Lands	77	1,695,526	6,862	1	6,816	28
Washington Indian Country Lands and Federally Operated Facilities	246	8,162,553	33,033	27	576,597	2,331
Pacific Territories						
American Samoa	4	317,694	1,286	2	48,393	196
Guam	10	364,856	1,477	9	134,470	544
Northern Marianas	5	152,049	615	4	29,451	119

While EPA has permitting authority on Federal and Indian lands in certain states, some of these areas were excluded from designated critical habitat designations for reasons of national defense or in support of U.S.-tribal relationships. Effects within these areas are included in the Action Area for this opinion with respect to jeopardy determinations (i.e., effects to the species), but cannot be considered in adverse modification determinations for designated critical habitat. However, the effects of discharges originating from excluded areas on adjacent designated critical habitat are considered in adverse modification determinations. For example, EPA has NPDES permitting authority for Indian country lands in California. Designated critical habitat for the southern Distinct Population Segment (DPS) of Pacific eulachon occurs on the Klamath River in California (76 FR 65323, October 20, 2011). The portion of the Klamath River which flows through the Yurok Reservation is excluded from the designated critical habitat. Accordingly, jeopardy determinations would consider effects of CGP discharges to the species over the extent of the Klamath River while adverse modification determinations would only consider effects to designated critical habitat elements essential to the conservation of the species on that portion of the Klamath River designated as critical habitat (i.e., not within the Yurok Reservation).

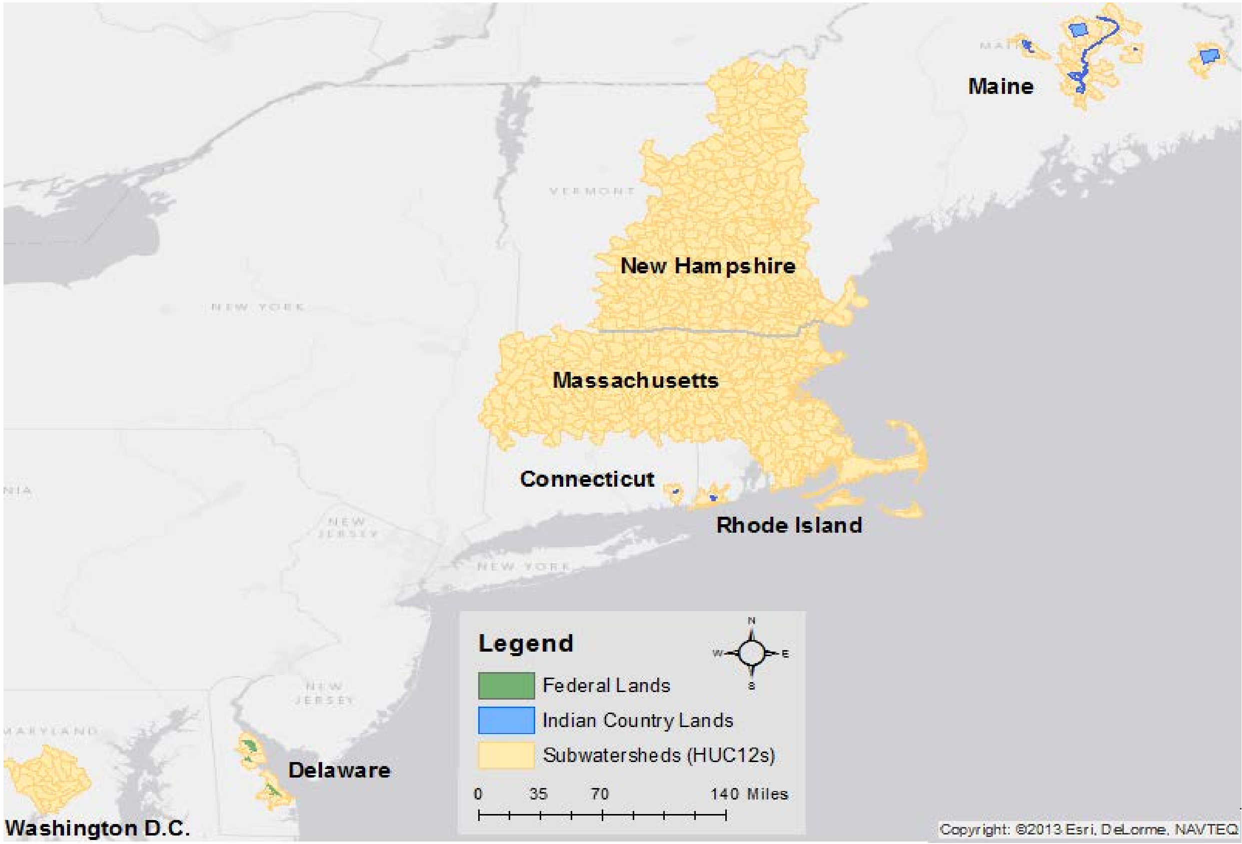

Figure 1. Map of east coast lands and sub-watersheds subject to CGP-authorized discharges in the states of Massachusetts and New Hampshire, the District of Columbia, Federal Facilities in Delaware, and Indian Country Lands in Maine, Connecticut, and Rhode Island.

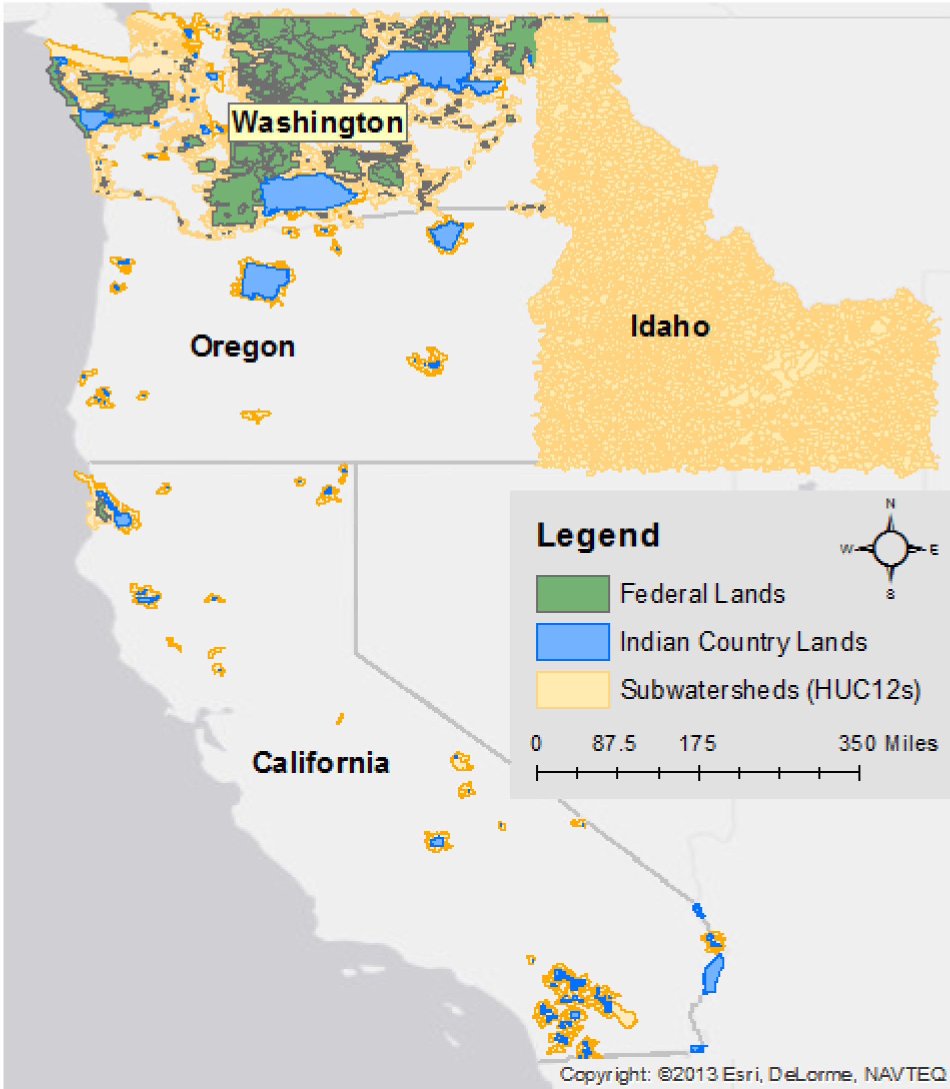

Figure 2. Map of West Coast lands and sub-watersheds subject to CGP-authorized discharges within the State of Idaho and Indian Country Lands in California, Oregon, or Washington, or Located on Federal lands in Washington.

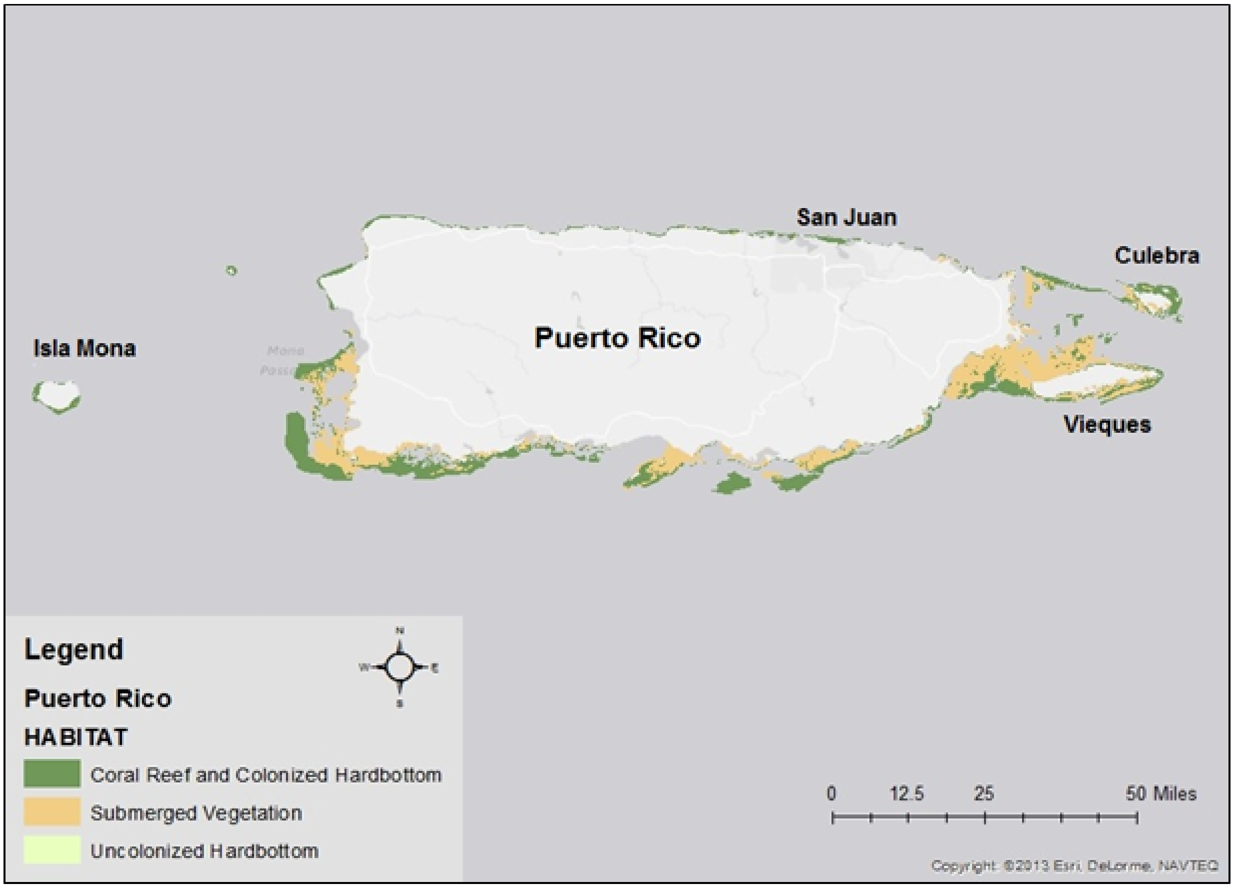

Figure 3. Map of coastal waters of Puerto Rico subject to CGP-authorized discharges where ESA-listed species under NMFS' jurisdiction may occur.

5 INTERRELATED AND INTERDEPENDENT ACTIONS

Interrelated actions are those that are part of a larger action and depend on that action for their justification. *Interdependent* actions are those that do not have independent utility, apart from the action under consideration. An activity should be considered an interrelated or interdependent activity and analyzed with the effects of the action when it would not occur "but for" the proposed action under consultation. See FWS and NMFS, Endangered Species Consultation Handbook (1998), 4-27. NMFS has determined that the creation of impervious surface by CGP-authorizated construction activities that convert previously undeveloped land into a built environment should be treated as interrelated or interdependent activities.

6 STATUS OF THE SPECIES AND DESIGNATED CRITICAL HABITAT

As described in Section 0, during the consultation we identify those endangered or threatened species or designated critical habitat that may be affected by the proposed action. For a proposed action to be determined to not likely adversely affect ESA-listed species or designated critical habitat, all the effects of that action must be expected to be discountable, insignificant, or completely beneficial. Discountable effects are those that are extremely unlikely to occur. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or designated critical habitat.

6.1 Species and Critical Habitat Not Likely to be Adversely Affected

For this opinion, we determined that exposures to construction stormwater discharges authorized under the CGP would be extremely unlikely for those species that do not frequent near coastal waters where EPA has permitting authority (i.e., effects would be discountable). Therefore, the CGP is not likely to adversely affect the following species:

- blue whale (*Balaenoptera musculus*, endangered)
- false killer whale (*Pseudorca crassidens*, endangered)
- fin whale (*Balaenoptera physalus,* endangered)
- sei whale (*Balaenoptera borealis*, endangered)
- sperm whale (*Physeter macrocephalus*, endangered)
- Humpback Whale (*Megaptera novaeangliae*, endangered)
- North Atlantic Right Whale (*Eubalaena glacialis*) and designated critical habitat (endangered)
- Scalloped Hammerhead (*Sphyrna lewini*) Eastern Pacific DPS (endangered)
- Scalloped Hammerhead (*Sphyrna lewini*) Central and Southwest Atlantic DPS (endangered)
- Bocaccio (*Sebastes paucispinis)*
- Yelloweye Rockfish (*Sebastes ruberrimus*)
- Canary Rockfish (*Sebastes pinniger*)

The EPA is the permitting authority on Indian Country lands within range of Gulf sturgeon (threatened) and smalltooth sawfish (endangered), but these lands are inland. While these species may be exposed to CGP-authorized discharges, such exposures are expected to be insignificant given the large distance between any anticipated construction sites and the listed resources, and the resulting dilution and settling that would occur before reaching the waters they occupy. EPA does not have permitting authority in waters where white and black abalone (both endangered) occur or where the Carolina DPS and south Atlantic DPS of Atlantic sturgeon (both endangered) occur. For these species, exposures to stormwater discharges authorized under the CGP are extremely unlikely (i.e., effects would be discountable), therefore EPA's CGP is not likely to adversely affect these species.

6.2 Species and Designated Critical Habitat Considered in this Consultation

The ESA-listed species and designated critical habitats which occur within the action area that fall under NMFS' jurisdiction and may be exposed to the construction stormwater discharges and experience direct or indirect effects of those exposures are identified in

Table 2 and Table 3.

Table 2. Endangered and threatened species and designated critical habitat under NMFS' jurisdiction considered in this opinion.

Species	ESA Status	Designated Critical Habitat	Recovery Plan
Marine Mammals – Cetaceans			
Southern Resident Killer Whale *(Orcinus orca)*	E – 70 FR 69903	71 FR 69054	73 FR 4176
Salmonids			
Chinook salmon (*Oncorhynchus tshawytscha*)			
California Coastal DPS	T – 64 FR 50393	70 FR 52488	– –
Central Valley Spring-run DPS	T – 64 FR 50393	70 FR 52488	79 FR 42504
Lower Columbia River DPS	T – 64 FR 14308	70 FR 52630	78 FR 41911
Upper Columbia River Spring-run DPS	E – 64 FR 14308	70 FR 52630	72 FR 57303
Puget Sound DPS	T – 64 FR 14308	70 FR 52630	72 FR 2493
Sacramento River Winter-run DPS	E – 59 FR 440	58 FR 33212	79 FR 42504
Snake River Fall-run DPS	T – 59 FR 42529	58 FR 68543	– –
Snake River Spring/summer-run DPS	T – 59 FR 42529	64 FR 57399	– –
Upper Willamette River DPS	T – 64 FR 14308	70 FR 52630	76 FR 52317b
Chum salmon (*Oncorhynchus keta*)			
Columbia River DPS	T – 64 FR 14507	70 FR 52630	78 FR 41911
Hood Canal Summer-run DPS	T – 64 FR 14507	70 FR 52630	72 FR 29121
Coho salmon (*Oncorhynchus kisutch*)			
Central California Coast DPS	E – 61 FR 56138	65 FR 7764	– –
Oregon Coast DPS	T – 63 FR 42587	73 FR 7816	78 FR 41911

Species	ESA Status	Designated Critical Habitat	Recovery Plan
Southern Oregon & Northern California Coasts DPS	T – 62 FR 24588	64 FR 24049	– –
Lower Columbia River DPS	T – 70 FR 37160	81 FR 9251	78 FR 41911
Sockeye Salmon (*Oncorhynchus nerka*)			
Ozette Lake DPS	T – 64 FR 14528	70 FR 52630	74 FR 24706
Snake River DPS	E – 56 FR 58619	58 FR 68543	– –
Steelhead Trout (*Oncorhynchus mykiss*)			
California Central Valley DPS	T – 71 FR 834	70 FR 52488	79 FR 42504
Central California Coast DPS	T – 71 FR 834	70 FR 52488	– –
South-Central California Coast DPS	T – 71 FR 834	70 FR 52488	– –
Southern California DPS	E – 71 FR 834	70 FR 52488	– –
Northern California DPS	T – 71 FR 834	70 FR 52488	– –
Lower Columbia River DPS	T – 71 FR 834	70 FR 52630	74 FR 50165
Middle Columbia River DPS	T – 71 FR 834	70 FR 52630	– –
Upper Columbia River DPS	T – 74 FR 42605	70 FR 52630	72 FR 57303
Upper Willamette River DPS	T – 71 FR 834	70 FR 52630	76 FR 52317b
Snake River Basin DPS	T – 71 FR 834	70 FR 52630	– –
Puget Sound DPS	T – 72 FR 26722	81 FR 9251	– –
Atlantic Salmon (*Salmo salar*)	E – 74 FR 29344	74 FR 29300	70 R 75473
Gulf of Maine DPS			
Non-Salmonid Anadromous Species			
Eulachon (*Thaleichthys pacificus*)	T – 75 FR 13012	76 FR 65323	– –
Shortnose Sturgeon (*Acipenser brevirostrum*)	E – 32 FR 4001	– –	63 FR 69613
Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)			
Gulf of Maine DPS	T – 77 FR 5880	81 FR 35701 (Proposed)	– –

Species	ESA Status	Designated Critical Habitat	Recovery Plan
New York Bight DPS	E - 77 FR 5880		
Chesapeake Bay DPS			
Green Sturgeon, (*Acipenser medirostris*)	T – 71 FR 17757	74 FR 52300	– –
Southern DPS			
Marine Fish			
Nassau grouper (*Epinephelus striatus*)	T – 79 FR 51929		
Sea Turtles			
Green Turtle *(Chelonia mydas)* North Atlantic DPS	E – 43 FR 32800	63 FR 46693	63 FR 28359
Hawksbill Turtle *(Eretmochelys imbricata*)	E – 35 FR 8491	63 FR 46693	57 FR 38818
Kemp's Ridley Turtle *(Lepidochelys kempii)*	E – 35 FR 18319	– –	75 FR 2496
Olive Ridley Turtle (*Lepidochelys olivacea*)			
Pacific Coast of Mexico breeding populations	E – 43 FR 32800	– –	63 FR 28359
all other populations	T – 43 FR 32800		
Leatherback Turtle (*Dermochelys coriacea*)	E – 35 FR 8491	44 FR 17710	63 FR 28359
Loggerhead Turtle (*Caretta carettaCaretta caretta*)			
Northwest Atlantic and North Pacific DPS	E – 76 FR 58868	79 FR 39856	63 FR 28359
Corals			
Elkhorn Coral (*Acropora palmata*)	T – 71 FR 26852	73 FR 72210	80 FR 12146
Staghorn Coral (*Acropora cervicornis*)			

Species	ESA Status	Designated Critical Habitat	Recovery Plan
Coral Species *Mycetophyllia ferox* The *Orbicella:* *O.faveolata* O. franksi *O. annularis* Pillar *(Dendrogyra cylindrus)* *The Acropora* *A. globiceps, A. jacquelineae* *A. lokani, A. pharaonis* *A. retusa, A. rudis* *A. speciose, A. tenella* *Anacropora spinosa* *Euphyllia paradivisa* *Isopora crateriformis* *Montipora australiensis* *Pavona diffluens* *Porites napopora* *Seriatopora aculeata*	T – 79 FR 54122	– –	– –

Table 3. Physical and biological features of designated critical habitat that are essential to the conservation of the species (DPS or Evolutionarily Significant Units – ESUs). Water quality and biological features which may be affected by stormwater are in boldface.

Species DPS or ESU	Physical or Biological Features Essential for the Conservation of the Species
Invertebrates	
Elkhorn Coral & Staghorn Coral	**Substrate of suitable quality** and availability to support successful larval settlement and recruitment, and reattachment and recruitment of fragments
Reptiles	
Green Turtle Florida & Mexico Pacific coast breeding colonies; all other areas	Activities requiring special management considerations include: • Vessel traffic • Coastal construction • Point and non-point source pollution • Fishing activities • Dredge and fill activities • Habitat restoration
Hawksbill Turtle	
Leatherback Turtle	• Activities identified as modifying CH include: recreational boating ◦ swimming, ◦ sandmining (see 77 FR 32909 for the 6/4/2012 determination on Sierra Club's petition to revise the CH) • **Forage species, primarily Scyphomedusae (*Chrysaora*, *Aurelia*, *Phacellophora*, and *Cyanea*) of sufficient condition, distribution, diversity, and abundance to support individual as well as population growth, reproduction, and development** • Migratory pathway conditions to allow for safe and timely passage and access to/from/within high use foraging areas
Marine Mammals	
Killer Whale - Southern Resident	• **Water quality to support growth and development**; • **Forage species of sufficient quantity, quality and availability to support individual growth, reproduction and development, as well as overall population growth**; and • Passage conditions to allow for migration, resting, and foraging.
Marine and anadromous fish other than Pacific salmonids	
Green Sturgeon - Southern	Freshwater areas: • **Abundant prey items for larval, juvenile, subadult, and adult life stages.** • **Substrate type or size (i.e., structural features of substrates)** • 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. • **Water quality, including temperature, salinity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages.** • A migratory pathway necessary for the safe and timely passage of Southern DPS fish within riverine habitats and between riverine and estuarine habitats (e.g., an unobstructed river or dammed river that still allows for safe and timely passage). • **Deep (≥5 m) holding pools for both upstream and downstream holding of adult**

Species DPS or ESU	Physical or Biological Features Essential for the Conservation of the Species
	or subadult fish, with adequate water quality and flow to maintain the physiological needs of the holding adult or subadult fish. • Sediment quality (i.e., chemical characteristics) necessary for normal behavior, growth, and viability of all life stages. Estuarine areas: • Abundant prey items within estuarine habitats and substrates for juvenile, subadult, and adult life stages. • Within bays and estuaries adjacent to the Sacramento River (i.e., the Sacramento-San Joaquin Delta and the Suisun, San Pablo, and San Francisco bays), sufficient flow into the bay and estuary to allow adults to successfully orient to the incoming flow and migrate upstream to spawning grounds. • Water quality, including temperature, salinity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages. • A migratory pathway necessary for the safe and timely passage of Southern DPS fish within estuarine habitats and between estuarine and riverine or marine habitats. • A diversity of water depths necessary for shelter, foraging, and migration of juvenile, subadult, and adult life stages. • Sediment quality (i.e., chemical characteristics) necessary for normal behavior, growth, and viability of all life stages. This includes sediments free of elevated levels of contaminants Coastal Marine Areas: • A migratory pathway necessary for the safe and timely passage of Southern DPS fish within marine and between estuarine and marine habitats. • Coastal marine waters with adequate dissolved oxygen levels and acceptably low levels of contaminants (e.g., pesticides, PAHs, heavy metals that may disrupt the normal behavior, growth, and viability of subadult and adult green sturgeon). • Abundant prey items for subadults and adults, which may include benthic invertebrates and fish.
Atlantic sturgeon (proposed) - Gulf of Maine - New York Bight - Chesapeake Bay	• Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0 to 0.5 parts per thousand range) for settlement of fertilized eggs, refuge, growth, and development of early life stages • Aquatic habitat with a gradual downstream salinity gradient of 0.5 to 30 parts per thousand and soft substrate (e.g., sand, mud) downstream of spawning sites for juvenile foraging and physiological development • Water of appropriate depth and absent physical barriers to passage (e.g., locks, dams, reservoirs, gear, etc.) between the river mouth and spawning sites necessary to support: (1) Unimpeded movement of adults to and from spawning sites; (2) seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and (3) staging, resting, or holding of subadults or spawning condition adults. Water depths in main river channels **must also be deep enough (e.g., ≥1.2 m) to ensure continuous flow in the main** channel at all times when any sturgeon life stage would be in the river • Water, especially in the bottom meter of the water column, with the temperature, salinity, and oxygen values that, combined, support: (1) Spawning; (2) annual and interannual adult, subadult, larval, and juvenile survival; and (3) larval, juvenile, and subadult growth, development, and recruitment (e.g., 13 °C to 26 °C for spawning habitat and no more than 30° C for juvenile rearing habitat, and 6 mg/L dissolved

Species DPS or ESU	Physical or Biological Features Essential for the Conservation of the Species
	oxygen for juvenile rearing habitat)
Eulachon - Southern	• Freshwater spawning and incubation sites with water flow, quality, and temperature conditions and substrate supporting spawning and incubation, and with migratory access for adults and juveniles. • A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of freshwater discharge over time) that supports spawning, and survival of all life stages. • Water quality suitable for spawning and viability of all eulachon life stages. Sublethal concentrations of contaminants affect the survival of aquatic species by increasing stress, predisposing organisms to disease, delaying development, and disrupting physiological processes, including reproduction. • Suitable water temperatures, within natural ranges, in eulachon spawning reaches. • Spawning substrates for eulachon egg deposition and development. • Freshwater and estuarine migration corridors associated with spawning and incubation sites that are 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. • Safe and unobstructed migratory pathways for eulachon adults to pass from the ocean through estuarine areas to riverine habitats in order to spawn, and for larval eulachon to access rearing habitats within the estuaries and juvenile and adults to access habitats in the ocean. • A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of freshwater discharge over time) that supports spawning migration and outmigration of larval eulachon from spawning sites. • Water quality suitable for survival and migration of spawning adults and larval eulachon. • Water temperature suitable for survival and migration. • Prey resources to support larval eulachon survival. • Nearshore and offshore marine foraging habitat with water quality and available prey, supporting juveniles and adult survival. • Prey items, in a concentration that supports foraging leading to adequate growth and reproductive development for juveniles and adults in the marine environment. • Water quality suitable for adequate growth and reproductive development.
Pacific Salmonids	

Chum Salmon
- Columbia River
- Hood Canal summer run
Sockeye
- Lake Ozette
Chinook Salmon
- Puget Sound
- Lower Columbia River
- Upper Willamette River
	• Freshwater spawning sites with water quantity and quality conditions and substrate supporting 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 and mobility;
	  ◦ Water quality and forage supporting juvenile development;
	  ◦ 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.
	  ◦ Freshwater migration corridors free of obstruction and excessive predation 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;
	• Estuarine areas free of obstruction and excessive predation with:

Species DPS or ESU	Physical or Biological Features Essential for the Conservation of the Species
Steelhead - Upper Columbia River - Snake River - Middle Columbia River - Upper Willamette River - Lower Columbia River - Puget Sound Coho Salmon - Lower Columbia River	◦ Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh & saltwater; ◦ Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; ◦ Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation. • Nearshore marine areas free of obstruction and excessive predation 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. • Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.
Coho Salmon - Central California Coast - Southern Oregon/Northern California Coast	Within the range of both ESUs, the species' life cycle can be separated into 5 essential habitat types: • juvenile summer and winter rearing areas; • juvenile migration corridors; • areas for growth and development to adulthood; • adult migration corridors; and • spawning areas. Essential features of coho designated critical habitat include adequate: Substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, safe passage
Steelhead - Puget Sound Coho Salmon - Lower Columbia River	• Freshwater spawning sites with water quantity and quality conditions and substrate supporting 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 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. • 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. • 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. • 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. • Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.
Coho Salmon	• Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.

Species DPS or ESU	Physical or Biological Features Essential for the Conservation of the Species
- Oregon Coast	• 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. • 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. • 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. • 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. • Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.
Chinook Salmon - Snake River fall-run - Snake River spring/summer run	juvenile rearing areas include adequate: spawning gravel, water quality, water quantity , water temperature, cover/shelter, food, riparian vegetation, space **juvenile and adult migration corridors are the same as for Snake River sockeye salmon
Sockeye Salmon - Snake River	spawning and juvenile rearing areas: spawning gravel, water quality, water quantity, water temperature, food, riparian vegetation, access, juvenile migration corridors:substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, safe passage conditions **adult migration corridor has the same essential features, excluding “food”**

The following sections describe the status of species that occur in the action area and the threats to those species and where applicable, their designated critical habitat. A comprehensive description of these species, their life history, population dynamics and threats is available in Appendix A of this opinion.

6.3 Southern Resident Killer Whale

Status. We used information available in the final rule, the 2012 Status Review (NMFS 2013b) and the 2011 Stock Assessment Report (NMFS 2014) to summarize the status of this species. The Southern Resident killer whale DPS was listed as endangered in 2005 in response to the population decline from 1996 to 2001, small population size, and reproductive limitations (i.e., few reproductive males and delayed calving). This species occurs in the inland waterways of Puget Sound, Strait of Juan de Fuca, and Southern Georgia Strait during the spring, summer and fall. During the winter, they move to coastal waters primarily off Oregon, Washington, California, and British Columbia.

The most recent abundance estimate for the Southern Resident DPS is 87 whales in 2012. This represents an average increase of 0.4 percent annually since 1982 when there were 78 whales. Population abundance has fluctuated during this time with a maximum of approximately 100 whales in 1995 (NMFS 2013b). As compared to stable or growing populations, the DPS reflects a smaller percentage of juveniles and lower fecundity (NMFS 2014) and has demonstrated weak growth in recent decades.

Threats. Current threats to its survival and recovery include: contaminants, vessel traffic, and reduction in prey availability. Chinook salmon populations have declined due to degradation of habitat, hydrology issues, harvest, and hatchery introgression; such reductions may require an increase in foraging effort. In addition, these prey contain environmental pollutants (e.g., flame retardants; PCBs and DDT). These contaminants become concentrated at higher trophic levels and may lead to immune suppression or reproductive impairment.

The inland waters of Washington and British Columbia support a large whale watch industry, commercial shipping, and recreational boating; these activities generate underwater noise, which may mask whales' communication or interrupt foraging. The factors that originally endangered the species persist throughout its habitat: contaminants, vessel traffic, and reduced prey. The DPS's resilience to future perturbation is reduced as a result 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. NMFS is currently conducting a status review prompted by a petition to delist the DPS based on new information, which indicates that there may be more paternal gene flow among populations than originally detected (Pilot et al. 2010).

Designated critical habitat. The designated critical habitat consists of approximately 6,630 km^2 in three areas: The Summer Core Area in Haro Strait and waters around the San Juan Islands; Puget Sound; and the Strait of Juan de Fuca. It provides the following physical and biological features: water quality to support growth and development; forage species of sufficient quantity, quality and availability to support individual growth, reproduction and development, as well as overall population growth; and inter-area passage conditions to allow for migration, resting, and foraging.

6.4 Pacific Salmonids

In May 2016, NOAA Fisheries' West Coast Region completed a five-year status review of all 28 West Coast salmon and steelhead species listed under the ESA (Table 4). The Pacific salmonid species have similar life histories, habitat needs, and threats. Some species, such Oregon Coast coho salmon, mid-Columbia steelhead and Hood Canal chum, rebounded from the lows of past decades. Highly endangered Snake River sockeye have benefitted from a captive broodstock program while Snake River steelhead populations are steady. The California drought and unusually high ocean and stream temperatures over the 5-year period hit many populations hard. In the case of Sacramento River winter-run Chinook salmon, for example, drought conditions and high stream temperatures reduced the 2015 survival of juvenile fish in the first stretch of river to just three percent.

Table 4. Summary of current ESA listing status, recent trends and summary of conclusions for the most recent five-year review for Pacific salmonids (Northwest Fisheries Science Center 2015, Williams et al. 2016).

Species	ESU/DPS	Five-Year Review Risk Trend	ESA Listing Status
Chinook	Upper Columbia spring	Stable	Endangered
	Snake River spring/summer	Stable	Threatened
	Snake River fall	Improving	Threatened
	Upper Willamette spring	Declining	Threatened
	Lower Columbia	Stable/Improving	Threatened
	Puget Sound	Stable/Declining	Threatened
	California Coastal	Mixed	Threatened
	Central Valley Spring	Decreased risk of extinction	Threatened
	Sacramento River winter	Increased risk of extinction	Endangered
Coho	Lower Columbia	Stable/Improving	Threatened
	Oregon Coast	Improving	Threatened
	Southern Oregon/Northern California	Mixed	Threatened
	Central California Coast	Mixed	Endangered
Sockeye	Snake River	Improving	Endangered
	Lake Ozette	Stable	Threatened
Chum	Hood Canal summer	Improving	Threatened
	Columbia River	Stable	Threatened
Steelhead	Upper Columbia	Improving	Threatened
	Snake River	Stable/Improving	Threatened
	Middle Columbia	Stable/Improving	Threatened
	Upper Willamette	Declining	Threatened
	Lower Columbia	Stable	Threatened
	Puget Sound	Stable	Threatened
	Northern California	Mixed	Threatened
	Central California Coast	Uncertain	Threatened
	South Central California	Declining	Threatened
	Southern California	Uncertain	Endangered

Threats. During all freshwater life stages, salmonids require cool water that is free of contaminants. Water free of contaminants supports survival, growth, and maturation of salmon and the abundance of their prey. In addition to affecting survival, growth, and fecundity, contaminants can disrupt normal behavior necessary for successful migration, spawning, and juvenile rearing. Sufficient forage is necessary for juveniles to maintain growth that reduces freshwater predation mortality, increases overwintering success, initiates smoltification, and increases ocean survival. Natural riparian cover such as submerged and overhanging large wood and aquatic vegetation provides shelter from predators, shades freshwater to prevent increase in water temperature, provides nutrients from leaf litter, supports production of insect prey, and creates important side channels. Riparian vegetation stabilizes bank soils and captures fine sediment in runoff, which maintains functional channel bottom substrate for development of eggs and alevins.

The process of smoltification enables salmon to adapt to the ocean environment. Environmental factors such as exposure to chemicals including heavy metals and elevated water temperatures can affect the smoltification process, not only at the interface between fresh water and saltwater, but higher in the watershed as the process of transformation begins long before fish enter saltwater (Wedemeyer et al. 1980).

The three major threats to Atlantic salmon identified in the listing rule also threaten Pacific salmonids: dams, regulatory mechanisms related to dams, and low marine survival. In addition, a number of secondary threats were identified, including threats to habitat quality and accessibility, commercial and recreational fisheries, disease and predation, inadequacy of regulatory mechanisms related to water withdrawal and water quality, aquaculture, artificial propagation, climate change, competition, and depleted fish communities.

The action area for this consultation overlaps with designated critical habitat for all Pacific salmonids. NMFS has identified features of designated critical habitat that are essential to the conservation of the species. Many of these features specific to each life stage (e.g., migration, spawning, rearing, and estuary, see Table 5). The following sections describe the designated critical habitat for Pacific salmonids.

6.4.1 Chinook Salmon Designated Critical Habitat

Designated critical habitat for the Puget Sound, Lower Columbia River, and Upper Willamette River ESUs for Chinook salmon identify features essential to the conservation of the species and sites necessary to support one or more Chinook salmon life stage (s). These features essential to the conservation of the species are detailed in Table 5 and include biological elements that are vulnerable to the stressors of the action. These include water quality conditions that support spawning and incubation, larval and juvenile development, and physiological transitions between fresh and saltwater. The features essential to the conservation of the species also include aquatic invertebrate and fish forage species and water quality to support juvenile and adult development, growth, and maturation, and natural cover of riparian and nearshore vegetation and aquatic vegetation. Designated critical habitat for the Snake River fall-run and Snake River spring/summer run Chinook salmon generically designates water quality, food, and riparian vegetation Features essential to the conservation of the species.

6.4.2 Chum Salmon Designated Critical Habitat

Areas designated as critical habitat are important for the species’ overall conservation by protecting quality growth, reproduction, and feeding. features essential to the conservation of the species for both chum salmon ESUs include freshwater spawning, rearing, and migration areas; estuarine and 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.

6.4.3 Coho Salmon Designated Critical Habitat

The essential features of designated critical habitat for the Central California Coast and Southern Oregon/Northern California Coast coho salmon ESUs that are vulnerable to the stressors of the action are generically identified as water quality, food, and riparian vegetation. The essential features of designated critical habitat for the Lower Columbia River and Oregon Coast ESUs are more detailed. They include water quality conditions supporting spawning, incubation and larval development, water quality and forage supporting juvenile development; and natural cover of riparian and aquatic vegetation, water quality conditions supporting juvenile and adult physiological transitions between fresh- and saltwater, and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation (Table 5).

6.4.4 Sockeye Salmon Designated Critical Habitat

The essential features of designated critical habitat for Lake Ozette sockeye ESU that are potentially affected by the stressors of the action include water quality conditions and forage species supporting spawning, incubation, development, growth, maturation, physiological transitions between fresh and saltwater, and natural cover of riparian and nearshore vegetation and aquatic vegetation. The essential features of designated critical habitat for Snake River sockeye potentially affected by the stressors of the action are identified generically as water quality, food, and riparian vegetation (Table 5).

6.4.5 Steelhead Trout Designated Critical Habitat

Designated critical habitat. The essential features of designated critical habitat for all steelhead DPSs that are potentially affected by the stressors of the action include water quality conditions and/or forage species supporting spawning, incubation, development, growth, maturation, physiological transitions between fresh and saltwater, and natural cover of riparian and nearshore vegetation and aquatic vegetation (Table 5).

6.5 Atlantic Salmon, Gulf of Maine Distinct Population Segment

Status. The Gulf of Maine DPS of Atlantic salmon was first listed as endangered in response to population decline caused by many factors, including overexploitation, degradation of water quality, and damming of rivers, all of which remain persistent threats. The species' listing currently include all anadromous Atlantic salmon whose freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, and wherever these fish occur in the estuarine and marine environment. The USFWS has jurisdiction over this species in freshwater, so the NMFS' jurisdiction is limited to potential CGP-authorized discharges from the coastal lands belonging to the Passamoquoddy Tribe at Pleasant Point. The most recent status review for Atlantic salmon was published in 2006 (Fay et al. 2006). This review stated that fewer than 1,500 adults have returned to spawn each year since 1998. The Population Viability Analysis estimates of the probability of extinction for the Gulf of Mexico DPS of Atlantic Salmon ranges from 19 percent to 75 percent within the next 100 years, even with the continuation of current levels of hatchery supplementation. The abundance was estimated at 1,014 individuals in 2007, the most recent year for which abundance records are available.

In 2015, NMFS announced a new program to focus and redouble its efforts to protect some of the species that are currently among the most at risk of extinction in the near future with the goal of reversing their declining trend so that the species will become a candidate for recovery in the future. Atlantic salmon is one of the eight species identified for this initiative(NMFS 2015c). These species were identified as among the most at-risk of extinction based on three criteria (1) endangered listing, (2) declining populations, and (3) are considered a recovery priority #1. A priority #1 species is one whose extinction is almost certain in the immediate future because of a rapid population decline or habitat destruction, whose limiting factors and threats are well understood and the needed management actions are known and have a high probability of success, and is a species that is in conflict with construction or other developmental projects or other forms of economic activity.

Designated critical habitat. The designated critical habitat includes all anadromous Atlantic salmon streams whose freshwater range occurs in watersheds from the Androscoggin River northward along the Maine coast northeastward to the Dennys River, and wherever these fish occur in the estuarine and marine environment. The features essential to the conservation of the species identified within freshwater and estuarine habitats of the occupied range of the Gulf of Maine DPS include sites for spawning and incubation, juvenile rearing, and migration. Designated critical habitat and features essential to the conservation of the species were not designated within marine environments because of the limited of the physical and biological features that the species uses during the marine phase of its life.

6.6 Southern Pacific Eulachon

Status. Eulachon are small smelt native to eastern North Pacific waters from the Bering Sea to Monterey Bay, California, or from 61º N to 31º N (Hart and McHugh 1944, Eschmeyer et al. 1983, Minckley et al. 1986, Hay and McCarter 2000). Eulachon that spawn in rivers south of the Nass River of British Columbia to the Mad River of California comprise the southern population of Pacific eulachon. This species status is classified as “at moderate risk of extinction throughout all of its range” (Gustafson 2010) based upon timing of runs and genetic distinctions (Hart and McHugh 1944, McLean et al. 1999, Hay and McCarter 2000, McLean and Taylor 2001, Beacham et al. 2005). Based on a number of data sources, the 2016 Status Review Update for eulachon reports that the spawning population has increased between 2011 and 2015 and that of the size of some sub-populations is larger than originally estimated in 2010 (Gustafson et al. 2016). The status update does not recommend a change in status because it is too early to tell whether recent improvements in the southern DPS of eulachon will persist. Recent poor ocean conditions taken with given variability inherent in wild populations suggest that population declines may again become widespread in the upcoming return years.

Threats. The Biological Review Team 2010 assessment of the status of the southern DPS of eulachon ranked climate change impacts on ocean conditions as the most serious threat to the persistence of eulachon in all four subareas of the DPS: Klamath River, Columbia River, Fraser River, and British Columbia coastal rivers south of the Nass River. Climate change impacts on freshwater habitat and eulachon bycatch in offshore shrimp fisheries were also ranked in the top four threats in all subareas of the DPS. Dams and water diversions in the Klamath and Columbia rivers and predation in the Fraser and British Columbia coastal rivers filled out the last of the top four threats (Gustafson 2010).

Designated critical habitat. The designated critical habitat for the southern population of Pacific eulachon includes freshwater creeks and rivers and their associated estuaries, comprising approximately 539 km (335 mi) of habitat. The physical or biological features potentially affected by the stressors of the action include water quality conditions supporting spawning and incubation, larval and adult mobility, and abundant prey items supporting larval feeding after the yolk sac is depleted, and nearshore and offshore marine foraging habitat with water quality and available prey, supporting juveniles and adult survival. Eulachon prey on a wide variety of species including crustaceans such as copepods and euphausiids (Hay and McCarter 2000, WDFW and ODFW 2001), unidentified malacostracans (Sturdevant et al. 1999), cumaceans (Smith and Saalfeld 1955) mysids, barnacle larvae, and worm larvae (WDFW and ODFW 2001).

6.7 Shortnose Sturgeon

Status. We used information available in the Shortnose Sturgeon Recovery Plan (NMFS 1998), the 2010 NMFS Biological Assessment (SSSRT 2010), and the listing document to summarize the status of the species. Shortnose sturgeon were listed as endangered throughout its range on March 11, 1967 pursuant to the Endangered Species Preservation Act of 1966. Shortnose sturgeon remained on the list as endangered with enactment of the ESA in 1973. Shortnose sturgeon occur along the Atlantic Coast of North America, from the Saint John River in Canada to the Saint Johns River in Florida. The Shortnose Sturgeon Recovery Plan describes 19 shortnose sturgeon populations that are managed separately in the wild. Two additional geographically separated populations occur behind dams 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). While shortnose sturgeon spawning has been documented in several rivers across its range (including but not limited to: Kennebec River, Maine, Connecticut River, Hudson River, Delaware River, Pee Dee River, South Carolina, Savannah, Ogeechee, and Altamaha rivers, Georgia), status for many other rivers remain unknown.

Threats. The viability of sturgeon populations is highly sensitive to juvenile mortality resulting in lower numbers of sub-adults recruiting into the adult breeding population. The 1998 recovery plan for shortnose sturgeon (NMFS 1998) identify Habitat degradation or loss (resulting, for example, from dams, bridge construction, channel dredging, and pollutant discharges), and mortality (for example, from impingement on cooling water intake screens, dredging, and incidental capture in other fisheries) as principal threats to the species' survival. Introductions and transfers of indigenous and nonindigenous sturgeon, intentional or accidental, may threaten wild shortnose sturgeon populations by imposing genetic threats, increasing competition for food or habitat, or spreading diseases. Sturgeon species are susceptible to viruses enzootic to the west coast and fish introductions could further spread these diseases. Shortnose sturgeon populations are at risk from incidental bycatch, loss of habitat, dams, dredging and pollution. These threats are likely to continue into the future. We conclude that the shortnose sturgeon’s resilience to further perturbation is low.

Designated critical habitat. No critical habitat has been designated for shortnose sturgeon.

6.8 Atlantic Sturgeon

Status. The range of Atlantic sturgeon includes the St. John River in Canada, to St. Johns River in Florida. EPA has NPDES permitting authority throughout New Hampshire, Massachusetts, the District of Columbia, Federally operated facilities in Delaware and Tribal lands in Connecticut, Rhode Island, New York, North Carolina, and 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). The Gulf of Maine, New York Bight, and Chesapeake Bay DPSs are those potentially affected by the 2016 CGP.

Threats. Of the stressors evaluated in the 2007 status review (ASSRT 2007), bycatch mortality, water quality, lack of adequate state and/or Federal regulatory mechanisms, and dredging activities were most often identified as the most significant threats to the viability of Atlantic sturgeon populations. Additionally, some populations were affected by unique stressors, such as habitat impediments (e.g., Cape Fear and Santee-Cooper rivers) and apparent ship strikes (e.g., Delaware and James rivers).

Designated critical habitat. The proposed designated critical habitat for Atlantic sturgeon includes tidally-affected accessible waters of coastal estuaries where the species occurs. The essential features of the proposed designated critical habitat for the Atlantic sturgeon DPSs within these rivers do not include plant or animal life that may be affected by the stressors of the action. From north to south, the rivers and waterways that make up the spatial extent of designated critical habitat are detailed in Table 5.

Table 5. River systems in the action area that are included in proposed designated critical habitat for Atlantic sturgeon.

Distinct Population Segment	River/Waterway		
Gulf of Maine	Penobscot Piscataqua	Kennebec Merrimack	Androscoggin
New York Bight	Connecticut Housatonic Delaware	Housatonic	Hudson
Chesapeake Bay	Susquehanna York James	Potomac Mattaponi	Rappahannock Pamunkey

6.9 Green Sturgeon

Status. We used information available in the 2002 Status Review and Status Review Updates (Adams et al. 2002, BRT 2005, NMFS 2015b), and the proposed and final listing rules to summarize the status of the species. The Southern DPS of green sturgeon is listed as threatened. On June 2, 2010, NMFS issued a 4 (d) Rule for the Southern DPS, applying certain take prohibitions. The most recent 5-year status review was published in August of 2015. 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, coastal and Central Valley populations, and the spawning population in the Sacramento River, California (Adams et al. 2007).

The 2015 status update indicates that DPS structure of the North American green sturgeon has not changed and that many of the principle factors considered when listing Southern DPS green sturgeon as threatened are relatively unchanged. Loss of spawning habitat and bycatch in the white sturgeon commercial fishery are two major causes for the species decline. Spawning in the Feather River is encouraging and the decommissioning of Red Bluff Diversion Dam and breach of Shanghai Bench makes spawning conditions more favorable. The prohibition of retention in commercial and recreational fisheries has eliminated a known threat and likely had a very positive effect on the overall population, although recruitment indices are not presently available.

Threats. The 2015 status review (NMFS 2015b) for the southern DPS of green sturgeon indicates that many of the principle factors considered when listing Southern DPS green sturgeon as threatened are relatively unchanged. Current threats to the Southern DPS include entrainment by water projects, contaminants, incidental bycatch and poaching. Given the small population size, the species' life history traits (e.g., slow to reach sexual maturity), and that the threats to the population are likely to continue into the future, the Southern DPS is not resilient to further perturbations. The spawning area for the species is still small, as the species still encounters impassible barriers in the Sacramento, Feather and other rivers that limit their spawning range. Entrainment threat includes stranding in flood diversions during high water events.

Designated critical habitat. Designated critical habitat for the Southern DPS of green sturgeon was designated includes coastal U.S. marine waters within 60 fathoms deep from Monterey Bay, California to Cape Flattery, Washington, including the Strait of Juan de Fuca, and numerous coastal rivers and estuaries: see the Final Rule for a complete description. Essential features identified in this designation include acceptably low levels of contaminants (e.g., pesticides, PAHs, heavy metals that may disrupt the normal behavior, growth, and viability of subadult and adult green sturgeon) and abundant prey items (benthic invertebrates and fish) for subadults and adults.

6.10 Nassau Grouper

Status. 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 not known from the Gulf of Mexico except at Campeche Bank off the coast of the Yucatan Peninsula, at Tortugas, and off Key West. Adults are generally found near coral reefs and rocky bottoms while juveniles are found in shallower waters in and around coral clumps covered with macroalgae and over seagrass beds. Their diet is mostly fishes and crabs, with diet varying by age/size. Juveniles feed mostly on crustaceans, while adults (>30 cm; 11.8 in) forage mainly on fish. The Nassau grouper usually forages alone and is not a specialized forager.

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."

Designated critical habitat. Critical habitat has not been designated for this species.

6.11 Sea Turtles

Sea turtles share the common threats described below.

Habitat Disturbance: Sea turtle nesting and marine environments are facing increasing impacts through structural modifications, sand nourishment, and sand extraction to support widespread development and tourism (Lutcavage et al. 1997, Bouchard et al. 1998, Hamann et al. 2006, Maison 2006, Hernandez et al. 2007, Santidrián Tomillo et al. 2007, Patino-Martinez 2013). These factors decrease the amount of nesting area available to nesting females, and may evoke a change in the natural behaviors of adults and hatchlings through direct loss of and indirect (e.g., altered temperatures, erosion) mechanisms (Ackerman 1997, Witherington et al. 2003, Witherington et al. 2007). Lights from developments alter nesting adult behavior and are often fatal to emerging hatchlings as they are drawn to light sources and away from the sea

(Witherington and Bjorndal 1991, Witherington 1992, Cowan et al. 2002, Deem et al. 2007, Bourgeois et al. 2009).

Beach nourishment also affects the incubation environment and nest success. Although the placement of sand on beaches may provide a greater quantity of nesting habitat, the quality of that habitat may be less suitable than pre-existing natural beaches. Constructed beaches tend to differ from natural beaches in several important ways. They are typically wider, flatter, more compact, and the sediments are more moist than those on natural beaches (Nelson et al. 1987) (Ackerman 1997, Ernest and Martin 1999). Nesting success typically declines for the first year or two following construction, even when more nesting area is available for turtles (Trindell et al. 1998) (Ernest and Martin 1999, Herren 1999). Likely causes of reduced nesting success on constructed beaches include increased sand compaction, escarpment formation, and changes in beach profile (Nelson et al. 1987, Grain et al. 1995, Lutcavage et al. 1997, Steinitz et al. 1998, Ernest and Martin 1999, Rumbold et al. 2001). Compaction can inhibit nest construction or increase the amount of time it takes for turtles to construct nests, while escarpments often cause female turtles to return to the ocean without nesting or to deposit their nests seaward of the escarpment where they are more susceptible to frequent and prolonged tidal inundation. In short, sub-optimal nesting habitat may cause decreased nesting success, place an increased energy burden on nesting females, result in abnormal nest construction, and reduce the survivorship of eggs and hatchlings. In addition, sand used to nourish beaches may have a different composition than the original beach; thus introducing lighter or darker sand, consequently affecting the relative nest temperatures (Ackerman 1997, Milton et al. 1997).

In addition to effects on sea turtle nesting habitat, anthropogenic disturbances also threaten coastal foraging habitats, particularly areas rich in seagrass and marine algae. Coastal habitats are degraded by pollutants from coastal runoff, marina and dock construction, dredging, aquaculture, oil and gas exploration and extraction, increased under water noise and boat traffic, as well as structural degradation from excessive boat anchoring and dredging (Francour et al. 1999, Lee Long et al. 2000, Waycott et al. 2005).

Climate Change and Sea Turtle Nesting Habitat. While impacts to sea turtle nesting habitat is under the jurisdiction of the USFWS, nesting impacts affect the size and structure of the breeding populations that occur in the sea, where NMFS has jurisdiction of the protection of sea turtle species. The Conant et al. 2009 review describes unique impact of climate change on sea turtle nesting habitat. Rising sea level is one of the most certain consequences of climate change (Titus and Narayanan 1995), and will result in increased erosion rates along nesting beaches. This could particularly affect areas with low-lying beaches where sand depth is a limiting factor, as the sea will inundate nesting sites and decrease available nesting habitat (Fish et al. 2005, Baker et al. 2006). The loss of habitat because of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Baker et al. 2006). On some undeveloped beaches, shoreline migration will have limited effects on the suitability of nesting habitat. The Bruun rule specifies that during a sea level rise, a typical beach profile will maintain its configuration but will be translated landward and upward (Rosati et al. 2013). However, along developed coastlines, and especially in areas where erosion control structures have been constructed to limit shoreline movement, rising sea levels will cause severe effects on nesting females and their eggs. Erosion control structures can result in the permanent loss of dry nesting beach or deter nesting females from reaching suitable nesting sites (Council 1990). Nesting females may deposit eggs seaward of the erosion control structures potentially subjecting them to repeated tidal inundation. Non-native vegetation often out competes native species, is usually less stabilizing, and can lead to increased erosion and degradation of suitable nesting habitat. Exotic vegetation may also form impenetrable root mats that can prevent proper nest cavity excavation, invade and desiccate eggs, or trap hatchlings. Leatherback Sea Turtle

Status. 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 global population of adult females has declined over 70 percent in less than one generation, from an estimated 115,000 adult females in 1980 to 34,500 adult females in 1995 (Pritchard 1982, Spotila et al. 1996). There may be as many as 34,000 – 94,000 adult leather backs in the North Atlantic, alone (TEWG 2007), but dramatic reductions (> 80 percent) have occurred in several populations in the Pacific, which was once considered the stronghold of the species (Sarti Martinez 2000). The 2013 five year review (NMFS and USFWS 2013b) reports that the East Pacific and Malaysia leatherback populations have collapsed, yet Atlantic populations generally appear to be stable or increasing. Many explanations have been provided to explain the disparate population trends, including fecundity and foraging differences seen in the Pacific, Atlantic, and Indian Oceans. Since the last 5-year review, studies indicate that high reproductive output and consistent and high quality foraging areas in the Atlantic Ocean have contributed to the stable or recovering populations; whereas prey abundance and distribution may be more patchy in the Pacific Ocean, making it difficult for leatherbacks to meet their energetic demands and lowering their reproductive output. Both natural and anthropogenic threats to nesting and marine habitats continue to affect leatherback populations, including the 2004 tsunami in the Indian Ocean, 2010 oil spill in the U.S. Gulf of Mexico, logging practices, development, and tourism impacts on nesting beaches in several countries.

In 2015, NMFS announced a new program to focus and redouble its efforts to protect some of the species that are currently among the most at risk of extinction in the near future with the goal of reversing their declining trend so that the species will become a candidate for recovery in the future. The leatherback sea turtle is one of the eight species identified for this initiative (NMFS 2015c). These species were identified as among the most at-risk of extinction based on three criteria (1) endangered listing, (2) declining populations, and (3) are considered a recovery priority #1. A priority #1 species is one whose extinction is almost certain in the immediate future because of a rapid population decline or habitat destruction, whose limiting factors and threats are well understood and the needed management actions are known and have a high probability of success, and is a species that is in conflict with construction or other developmental projects or other forms of economic activity.

Designated critical habitat. On March 23, 1979, leatherback designated critical habitat was identified adjacent to Sandy Point, St. Croix, U.S. Virgin Islands from the 183 m isobath to mean high tide level between 17° 42’12” N and 65°50’00” W. 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 support significant designated critical habitat deterioration. On January 20, 2012, NMFS issued a final rule to designate additional designated critical habitat for the leatherback sea turtle. This designation includes approximately 43,798 km2 stretching along the California coast from Point

Arena to Point Arguello east of the 3000 m depth contour; and 64,760 km^2 stretching from Cape Flattery, Washington to Cape Blanco, Oregon east of the 2,000 m depth contour. The designated areas comprise approximately 108558 km2 of marine habitat and include waters from the ocean surface down to a maximum depth of 80 m. They were designated specifically because of the occurrence of forage species, primarily jellyfish, of sufficient condition, distribution, diversity, abundance and density necessary to support individual as well as population growth, reproduction, and development of leatherbacks.

6.11.1 Hawksbill Sea Turtle

Status. The hawksbill sea turtle has a sharp, curved, beak-like mouth. It has a circumglobal distribution throughout tropical and, to a lesser extent, subtropical oceans. The hawksbill turtle was once abundant in tropical and subtropical regions throughout the world. Over the last century, this species has declined in most areas and stands at only a fraction of its historical abundance. According to the 2013 status review (NMFS and USFWS 2013a), nesting populations in the eastern Pacific, and the Nicaragua nesting population in the western Caribbean appears to have improved. However, the trends and distribution of the species throughout the globe largely is unchanged. Although greatly depleted from historical levels, nesting populations in the Atlantic in general are doing better than in the Indian and Pacific Oceans. In the Atlantic, more population increases have been recorded in the insular Caribbean than along the western Caribbean mainland or the eastern Atlantic. In general, hawksbills are doing better in the Indian Ocean (especially the southwestern and northwestern Indian Ocean) than in the Pacific Ocean. The situation for hawksbills in the Pacific Ocean is particularly dire, despite the fact that it still has more nesting hawksbills than in either the Atlantic or Indian Oceans.

Designated critical habitat. On September 2, 1998, NMFS established designated critical habitat for hawksbill sea turtles around Mona and Monito Islands, Puerto Rico. 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.

6.11.2 Kemp’s Ridley Sea Turtle

Status. The Kemp’s ridley is the smallest of all sea turtle species and considered to be the most endangered sea turtle, internationally (Groombridge 1982, TEWG 2000). The species was first listed under the Endangered Species Conservation Act and listed as endangered under the ESA since 1973. According to the 2015 status review (NMFS and USFWS 2013a), population growth rate (as measured by numbers of nests) stopped abruptly after 2009. Given the recent lower nest numbers, the population is not projected to grow at former rates. An unprecedented mortality in subadult and adult females post-2009 nesting season may have altered the 2009 age structure and momentum of the population, which had a carryover impact on annual nest numbers in 2011-2014. The results indicate the population is not recovering and cannot meet recovery goals unless survival rates improve. The Deep Water Horizon oil spill that occurred at the onset of the 2010 nesting season and exposed Kemp’s ridleys to oil in nearshore and offshore habitats may have been a factor in fewer females nesting in subsequent years, however this is still under evaluation. The long-term impacts from the Deep Water Horizon oil spill and response to the spill (e.g., dispersants) to sea turtles are not yet known. Given the Gulf of Mexico is an area of high-density offshore oil exploration and extraction, future oil spills are highly probable and Kemp’s ridleys and their habitat may be exposed and injured. Commercial and recreational fisheries continue to pose a substantial threat to the Kemp's ridley despite measures to reduce bycatch. Kemp's ridleys have the highest rate of interaction with fisheries operating in the Gulf of Mexico and Atlantic Ocean than any other species of turtle.

Designated critical habitat. Critical habitat has not been designated for this species.

6.11.3 Olive Ridley Sea Turtle

Status. 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. 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). The status review (NMFS and USFWS 2014), indicates that, based on the current number of olive ridleys nesting in Mexico, three populations appear to be stable (Mismaloya, Tlacoyunque, and Moro Ayuta), two increasing (Ixtapilla, La Escobilla) and one decreasing (Chacahua). Elsewhere in the eastern Pacific, the large scale synchronized nesting populations (i.e., arribada) have declined since the 1970s. Nesting at some arribada beaches continues to decline (e.g., Nancite in Costa Rica) and is stable or increasing at others (e.g., Ostional in Costa Rica). There are too few data available from solitary nesting beaches to confirm the declining trend that has been described for numerous countries throughout the region including El Salvador, Guatemala, Costa Rica, and Panama. Recent at-sea estimates of density and abundance of the olive ridley in the Pacific show a yearly estimate of 1.39 million (Confidence Interval: 1.15 to 1.62 million), which is consistent with the increases seen on nesting beaches as a result of protection programs that began in the 1990s.

Western Atlantic arribada nesting populations are currently very small. The Suriname olive ridley population is currently small and has declined by more than 90 percent since the late 1960s. However, nesting is reported to be increasing in French Guiana. The other nesting population in Brazil, for which no long-term data are available, is small, but increasing. In the eastern Atlantic, long-term data are not available and thus the abundance and trends of this population cannot be assessed at this time. In the northern Indian Ocean, arribada nesting populations are still large, but trend data are ambiguous and major threats continue. Declines of solitary nesting olive ridleys have been reported in Bangladesh, Myanmar, Malaysia, Pakistan, and southwest India.

Designated critical habitat. Critical habitat has not been designated for this species.

6.11.4 Loggerhead Sea Turtle

Status. Based on the 2009 status review (Conant et al. 2009), for three of five DPSs with sufficient data (Northwest Atlantic Ocean, South Pacific Ocean, and North Pacific Ocean), analyses indicate a high likelihood of quasi-extinction. Similarly, threat matrix analysis indicated that all other DPSs have the potential for a severe decline in the future.

Northwest Atlantic Ocean loggerhead sea turtle DPS designated critical habitat. The final designated critical habitat for the Northwest Atlantic Ocean loggerhead DPS within the Atlantic Ocean and the Gulf of Mexico includes 36 occupied marine areas within the range of the Northwest Atlantic Ocean DPS. These areas contain one or a combination of nearshore reproductive habitat, winter area, breeding areas, and migratory corridors.

6.11.5 Green Sea Turtle

Status. The green sea turtle was separated into two listing designations: endangered for breeding populations in Florida and the Pacific coast of Mexico, and threatened in all other areas throughout its range. On August 1, 2012, NMFS found that a petition to identify the Hawaiian population of green turtle as a DPS, and to delist the DPS, may be warranted. In April 2016, we removed the range-wide and breeding population listings of the green sea turtle, and in their place, listed eight DPSs as threatened and 3 DPSs as endangered. Among these, only the North Atlantic DPS occurs in waters where EPA has permitting authority.

Once abundant in tropical and subtropical waters, globally, green sea turtles exist at a fraction of their historical abundance, as a result of over-exploitation. The North Atlantic DPS is characterized by geographically widespread nesting with eight sites having high levels of abundance (i.e., <1,000 nesters). Nesting is reported in 16 countries and/or U.S. Territories at 73 sites. This region is data rich and has some of the longest running studies on nesting and foraging turtles anywhere in the world. All major nesting populations demonstrate long-term increases in abundance. The prevalence of FP has reached epidemic proportions in some parts of the North Atlantic DPS. The extent to which this will affect the long-term outlook for green turtles in the North Atlantic DPS is unknown and remains a concern, although nesting trends across the DPS continue to increase despite the high incidence of the disease. There are still concerns about future risks, including habitat degradation (particularly coastal development), bycatch in fishing gear, continued turtle and egg harvesting, and climate change.

Designated critical habitat. On September 2, 1998, NMFS designated critical habitat for green sea turtles, which include coastal waters surrounding Culebra Island, Puerto Rico. Seagrass beds surrounding Culebra provide important foraging resources for juvenile, subadult, and adult green sea turtles. Additionally, coral reefs surrounding the island provide resting shelter and protection from predators. This area provides important developmental habitat for the species.

6.12 Corals

Status. There are currently 22 coral species listed as threatened under the ESA, 16 of which occur in the action area (Table 6). Information from the listings and status reports (ABRT 2005) were used to summarize the status of these species.

Table 6: Threatened coral species occurring in the CGP action area.

Caribbean Waters: Puerto Rico				
*Acropora cervicornis (*Staghorn), A. palmata (Elkhorn) *and designated critical habitat* *Mycetophyllia ferox, Dendrogyra cylindrus, Orbicella annularis, O. faveolata, O. franksi*				
Pacific Waters				
	Guam	**Northern Mariana Islands**	**Pacific Remote Island Areas**	**American Samoa**
Acropora globiceps	X	X	X	X
Acropora jacquelineae				X
Acropora retusa	X		X	X
Acropora rudis				X
Acropora speciosa			X	X
Euphyllia paradivisa				X
Isopora crateriformis				X
Pavona diffluens	X	X		X
Seriatopora aculeata	X			

Threats. Massive mortality events from disease conditions of corals and the keystone grazing urchin *Diadema antillarum* have precipitated widespread and dramatic changes in reef community structure. Large-scale coral bleaching reduces population viability. Coral growth rates in many areas have been declining over decades. Such reductions prevent successful recruitment as a result of reduced density. In addition, continuing coral mortality from periodic acute events such as hurricanes, disease outbreaks, and bleaching events from ocean warming have added to the poor state of coral populations and yielded a remnant coral community with increased dominance by weedy brooding species, decreased overall coral cover, and increased macroalgal cover. Iron enrichment may predispose the basin to algal growth. Finally, climate change is likely to result in the endangerment of many species as a result of temperature increases (and resultant bleaching), sea level rises, and ocean acidification (van Dam et al. 2012, Gittings et al. 2013).

Designated critical habitat. On November 26, 2008, NMFS designated critical habitat for elkhorn and 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

7 ENVIRONMENTAL BASELINE

The *Environmental Baseline* is defined as: "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). The key purpose of the environmental baseline is to describe the natural and anthropogenic factors influencing the status and condition of ESA-listed species and designated critical habitat in the action area. Since this is a consultation on what is primarily a continuing permitting program with a large geographic scope, this environmental baseline focuses more generally on the status and trends of the aquatic ecosystems in the U.S. and the consequences of that status for listed resources. The action considered in this opinion is the CWA CGP authorization of discharge of stormwater to waters where ESA-listed species and designated critical habitat under NMFS' jurisdiction occur and non-stormwater construction related discharges that result from construction activities specified in part 1.2.2 of the 2017 CGP. For this reason, the discussion of the baseline conditions for this opinion focuses on water quality, erosive flow, along with suspended and bedded sediments. A more comprehensive discussion of the baseline condition of these species is provided in Appendix B, which includes consideration of impacts to the environmental baseline of factors such as by-catch and vessel-strikes, etc.

Activities that negatively impact water quality also threaten aquatic species. The deterioration of water quality is a contributing factor that has led to the endangerment of some aquatic species under NMFS' jurisdiction. Declines in populations of ESA-listed species leave them vulnerable to a multitude of threats. Due to the cumulative effects of reduced abundance, low or highly variable growth capacity, and the loss of essential habitat, these species are less resilient to additional disturbances. In larger populations, stressors that affect only a limited number of individuals could once be tolerated by the species without resulting in population level impacts; in smaller populations, the same stressors are more likely to reduce the likelihood of survival. It is with this understanding of the *Environmental Baseline* that we consider the effects of the proposed action, including the likely effect that the 2017 CGP will have on endangered and threatened species and their designated critical habitat. Areas adjacent to or downstream from these jurisdictional areas may be indirectly affected by activities authorized under the CGP. As noted in Section 4, we also analyze effects from the interdependent or interrelated activities of the action that do not fall into the category of stormwater. In this case, increased impervious area. Based on the *Action Area*, as defined in Section 4 above, we identified the following regions and states for inclusion in the *Environmental Baseline* section of this opinion: Pacific Coast (Washington, Idaho, Oregon, and California); New England (Maine, New Hampshire, Vermont, and Massachusetts); Mid-Atlantic (District of Columbia, Delaware, and Virginia); U.S. Caribbean (Puerto Rico) and U.S. Pacific Islands (excluding Hawaii). These regions/states cover the vast majority of the proposed action area. At the regional level, our baseline assessment focused on the natural and anthropogenic threats affecting the ESA-listed species (and their habitats) within the action area for each particular region: Pacific Coast – all listed ESUs and DPSs of Pacific salmon and steelhead, eulachon, Southern DPS green sturgeon, and Southern Resident killer whale; New England – Atlantic salmon, Atlantic sturgeon (5 listed DPSs); Mid-Atlantic - Atlantic sturgeon (5 listed DPSs); Caribbean – Nassau grouper, elkhorn coral, staghorn coral, lobed star coral, boulder star coral, mountainous star coral, pillar coral, and rough cactus coral; Pacific Islands – all listed Pacific Islands coral species.

While there are some Tribal lands and federal facilities in regions or states not mentioned above, in general these areas are either very small, far removed from ESA-listed species or habitat, or not affected by the proposed action. For example, any discharges on Tribal lands in Florida would have to be transported through Everglades or Big Cypress National Parks, where they would be degraded by exposure to sunlight, microbial action and chemical processes. While all areas of overlap between ESA-listed species (and their designated critical habitat) and the CGP coverage area are evaluated in this opinion, the environmental baseline will focus specifically on the aquatic ecosystems in the regions/states (listed above) where the anticipated effects of the proposed action are considered more likely to adversely affect ESA-listed species.

The action area for this consultation covers a very large number of individual watersheds and an even larger number of specific water bodies (e.g., lakes, rivers, streams, estuaries). It is, therefore, not practicable to describe the environmental baseline and assess risk for each particular area where the CGP may authorize discharges and activities. Accordingly, this opinion approaches the environmental baseline more generally by describing the activities, conditions and stressors which adversely affect ESA-listed species and designated critical habitat. These include natural threats (e.g., parasites and disease, predation and competition, wildland fires), water quality, hydromodification projects, land use changes, dredging, mining, artificial propagation, non-native species, fisheries, vessel traffic, and climate changes. For each of these threats we start with a general overview of the problem, followed by a more focused analysis at the regional and state level for the species listed above, as appropriate and where such data are available.

Our summary of the environmental baseline complements the information provided in the Status of Listed Resources section of this opinion, and provides the background necessary to evaluate and interpret information presented in the Effects of the Proposed Action and Cumulative Effects sections to follow. We then evaluate the consequences of EPA's proposed action in combination with the status of the species, environmental baseline and the cumulative effects to determine whether EPA can insure that the likelihood of jeopardy or adverse modification of designated critical habitat will be avoided.

The quality of the biophysical components within aquatic ecosystems is affected by human activities conducted within and around coastal waters, estuarine and riparian zones, as well as those conducted more remotely in the upland portion of the watershed. Industrial activities can result in discharge of pollutants, changes in water temperature and levels of dissolved oxygen, and the addition of nutrients. In addition, forestry and agricultural practices can result in erosion, run-off of fertilizers, herbicides, insecticides or other chemicals, nutrient enrichment and alteration of water flow.

7.1.1 Land Use

In 2013, the U.S. Census Bureau estimated the U.S. population to be more than 315 million people. Increases in population growth and density over the last 100 years have resulted in dramatic changes to the natural landscape of the U.S. Most modern metropolitan areas encompass many different land covers and uses (Hart 1991), Land-use changes due to human activities represent a major factor in terms of habitat and water quality changes that, in turn, influence plant and animal abundance and distribution (Mac et al. 1998). Flather C.H. et al.

(1998) identified habitat loss and alien species as the two most widespread threats to endangered species, affecting more than 95 percent and 35 percent of ESA-listed species, respectively. Localized anthropogenic effects within small watersheds may lead to cumulative changes which influence estuarine and coastal waters. For example, nutrient runoff from farmland and input by wastewater treatment plants to a large river system could influence the natural dissolved oxygen regime in an entire estuary. Changes in land use over the past few centuries have increased the occurrence and significance of water quality problems, particularly stormwater runoff from non-point source pollution and hydrological modification.

Between the 1780s and 1980s, 30 percent of the nation's wetlands had been destroyed (Dahl 1990), and, declines have continued. From 1982 to 1987, the wetland area throughout the conterminous U.S. declined by 1.1 percent, with approximately 13,800 acres of wetlands were lost per year between 2006 and 2009 (Dahl 2011). While this loss is significantly less than that experienced in the previous decades (Figure 4), based on historical estimates, about 72 percent of U.S wetlands have already been lost (Dahl 2011).

In estuaries of the Pacific northwest for example, diking and filling activities likely have reduced estuaries' salmon-rearing capacity. Historical changes in population structure and salmon life histories may prevent salmon from making full use of improved productive capacity of estuarine habitats resulting from recent restoration efforts (LCFRB 2004, Bottom et al. 2005, Fresh et al. 2005, NMFS 2006).

Many of our nation's rivers and streams have also been altered by dams, stream channelization, and dredging to stabilize water levels in rivers or lakes. When examining the impacts of large dams alone, it is estimated that 75,000 large dams have modified at least 600,000 miles of rivers across the country (IWSRCC 2017). Wetland habitats have been drained to make land available for agriculture, filled to make land available for residential housing, commerce, and industry, diked to control mosquitoes, or flooded for water supply. The net effect of human-altered hydrology (1) creates conditions which increase stormwater runoff, transporting land based pollutants into surface waters (2) reduces the filtration of stormwater runoff through wetlands prior to reaching surface waters (3) has reduced the spatial extent and quality of available habitat and (3) has reduced the connectivity among rivers and streams which is necessary for anadromous species to complete their migratory lifecycles.

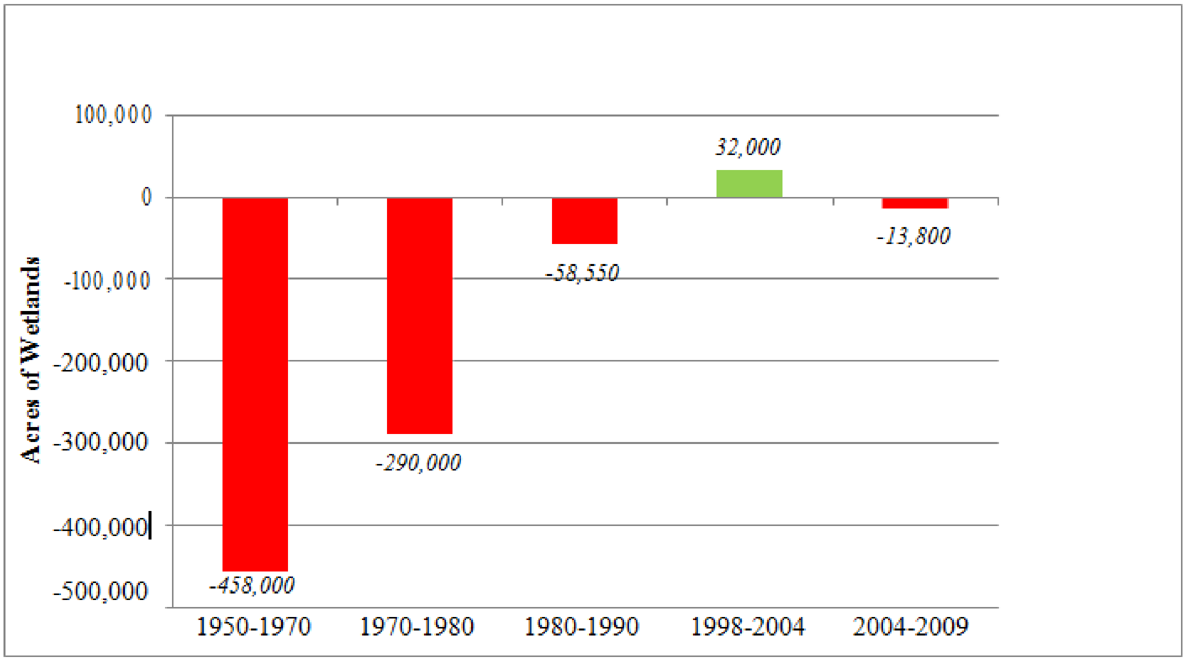

Figure 4 Average annual net wetland acreage loss and gain estimates for the conterminous U.S. (Taken from Dahl 2011)

Efforts to create and restore wetlands and other aquatic habitats by agencies of Federal, State, and local governments, non- governmental organizations, and private individuals have reduced the rate at which these ecosystems have been destroyed or degraded, but many aquatic habitats continue to be lost each year. The expansion of urban/suburban metropolitan areas accounted for 48 percent of wetland decline (Brady and Flather 1994). Urban land use increased from 1.3 percent (29 million acres) in 1964 to 2.9 percent (66 million acres) in 1997 (Lubowski et al. 2006). The type of land use in a stream catchment and along the stream margins substantially influences that waterbody's physical, chemical, and biological quality (Diana et al. 2006). Urban land use adversely affects stream and water quality, especially when present in critical amounts and close to the stream channel (Diana et al. 2006). Increased impervious surface area increases surface runoff, one of the major concerns of urban land use, and commonly causes degradation in channel morphology (Konrad et al. 2005), water quality, macroinvertebrates, and fish (Deacon et al. 2005, Kennen et al. 2005, Walters et al. 2005, Stranko et al. 2008). In fact, many studies have identified impervious surface as a quantifiable attribute of land use that is clearly linked to (i.e., actually causes) water quality, aquatic habitat degradation, and adverse impacts to biota (Stranko et al. 2008, Magee 2009). As of January 2017, some 208 river segments comprising 12,734 miles have been afforded protection in the National Wild and Scenic Rivers System under the Wild and Scenic Rivers Act (IWSRCC 2017).

In addition to the impacts resulting from increased impervious surfaces, urban and suburban development also often result in direct waterbody modification, including channelization, channel armoring, creating dams and impoundments, and stream piping and burial. Additionally, removing vegetated riparian buffers leads to increased sediment, increased water temperature, increased nitrogen, and changes in channel morphology. Physical habitat degradation like this can significantly change the fish assemblage present in a stream (Diana et al. 2006). In general, as channel morphology and aquatic habitat become less diverse, nutrient and pollutant levels in streams increase, and macroinvertebrate and fish communities shift from species that require high quality water to species that can survive in degraded water quality and habitat conditions (Magee 2009).

Urban and suburban areas concentrate wastewater inputs to waterbodies. Common wastewater inputs include effluents (from both wastewater treatment plants and industrial discharges), stormwater runoff, sewer overflows, and septic systems. These wastewaters can result in increased nutrients, pathogens, metals, pharmaceuticals and personal care products, toxics, and dissolved solids. They also increase stream discharge and water temperature and decrease dissolved oxygen.

7.1.2 Water Quality

This section describes the current status and recent health trends of aquatic ecosystems within the *Action Area*. EPA sampling results (USEPA 2015a) are summarized by region for the following biological, chemical, and physical indicators: 1) Biological – benthic macroinvertebrates; 2) Chemical – phosphorous, nitrogen, ecological fish tissue contaminants, sediment contaminants, sediment toxicity, and pesticides; and 3) Physical – dissolved oxygen, salinity, water clarity, pH, and Chlorophyll a. Cumulatively, these biological, chemical, and physical measures provide an overall picture of the ecological condition of aquatic ecosystems. Different thresholds, based on published references and the best professional judgment of regional experts, are used to evaluate each region as "good," "fair," or "poor" for each water quality indicator. EPA rates overall water quality from results of the five key indicators using the following guidelines: "poor" – two or more component indicators are rated poor; "fair" - one indicator is rated poor, or two or more are rated fair; "good" - no indicators are rated poor, and a maximum of one is rated fair.

Benthic macroinvertebrates (e.g., worms, mollusks, and crustaceans) inhabiting the bottom substrates of aquatic ecosystems are an important food source for a wide variety of fish, mammals, and birds. Benthic communities serve as reliable biological indicators of environmental quality because they are sensitive to chemical contamination, dissolved oxygen stresses, salinity fluctuations, and sediment disturbances. A good benthic index rating means that benthic habitats contain a wide variety of species, including low proportions of pollution-tolerant species and high proportions of pollution-sensitive species. A poor benthic index rating indicates that benthic communities are less diverse than expected and are populated by more pollution-tolerant species and fewer pollution-sensitive species than expected.

Chemical and physical components are measured as indicators of key stressors that have the potential to degrade biological integrity. Some of these are naturally occurring and others result only from human activities, but most come from both sources. EPA evaluates overall water quality based on the following primary indicators: surface nutrient enrichment—dissolved inorganic nitrogen and dissolved inorganic phosphorus concentrations; algae biomass—surface chlorophyll a concentration; and potential adverse effects of eutrophication—water clarity and bottom dissolved oxygen levels (USEPA 2015a). Contaminants, including some pesticides, PCBs and mercury, also contribute to ecological degradation. Many contaminants adsorb onto suspended particles and accumulate in areas where sediments are deposited and may adversely affect sediment-dwelling organisms. As other organisms eat contaminated sediment-dwellers the contaminants can accumulate in organisms and potentially become concentrated throughout the food web.

Northeast Region (Maine to Virginia)

A wide variety of coastal environments are found in the Northeast region including rocky coasts, drowned river valleys, estuaries, salt marshes, and city harbors. The Northeast is the most populous coastal region in the U.S. In 2010, the region was home to 54.2 million people, representing about a third of the nation's total coastal population (USEPA 2015a). The population in this area has increased by ten million residents (~ 23 percent) since 1970. The coast from Cape Cod to the Chesapeake Bay consists of larger watersheds that are drained by major riverine systems that empty into relatively shallow and poorly flushed estuaries. These estuaries are more susceptible to the pressures of a highly populated and industrialized coastal region.

A total of 238 sites were sampled to assess approximately 10,700 square miles of Northeast coastal waters. Figure 5 shows a summary of findings from the EPA's National Coastal Condition Assessment Report for the Northeast Region (USEPA 2015a). Biological quality is rated as good in 62 percent of the Northeast coast region based on the benthic index. Poor biological conditions occur in 27 percent of the coastal area. About 11 percent of the region reported missing results, due primarily to difficulties in collecting benthic samples along the rocky coast north of Cape Cod. Based on the water quality index, 44 percent of the Northeast coast is in good condition, 49 percent is rated fair, and 6 percent is rated poor.

Based on the sediment quality index, 60 percent of the Northeast coastal area sampled is in good condition, 20 percent is in fair condition, and 9 percent is in poor condition (11 percent were reported "missing"). Compared to ecological risk-based thresholds for fish tissue contamination, less than 1 percent of the Northeast coast is rated as good, 27 percent is rated fair, and 33 percent is rated poor. Researchers were unable to evaluate fish tissue for 39 percent of the region, including almost the entire Acadian Province, because target species were not caught for analysis. The contaminants that most often exceed the thresholds for a "poor" rating in the assessed areas of the Northeast coast are selenium, mercury, arsenic, and, in a small proportion of the area, total PCBs.

New Hampshire conducted site specific water quality assessments on 42 percent of rivers, 81 percent of aquatic estuarine waters, and 85 percent of ocean waters within the state. Results reported in the New Hampshire 2012 Surface Water Quality Report indicate that approximately 0.8 percent of freshwater rivers and stream mileage is fully supportive of aquatic life, 26.0 percent is not supportive, and 73.2 percent could not be assessed due to insufficient information (NHDES 2012). In estuarine waters, approximately 0.8 percent of the square mileage is fully supportive of aquatic life, 91.9 percent is not supportive and 7.2 percent could not be assessed due to insufficient information. Twenty-six percent of estuarine waters fully met the water quality standards, 54 percent were impaired, and 19 percent could not be assessed due to insufficient information. In ocean waters, approximately 94.1 percent of the square mileage is fully supportive of aquatic life, 0.0 percent is not supportive and 5.9 percent could not be assessed due to insufficient information (NHDES 2012). Fifty-six percent of ocean waters fully met the water quality standards, 29 percent were impaired, and 15 percent could not be assessed due to insufficient information.

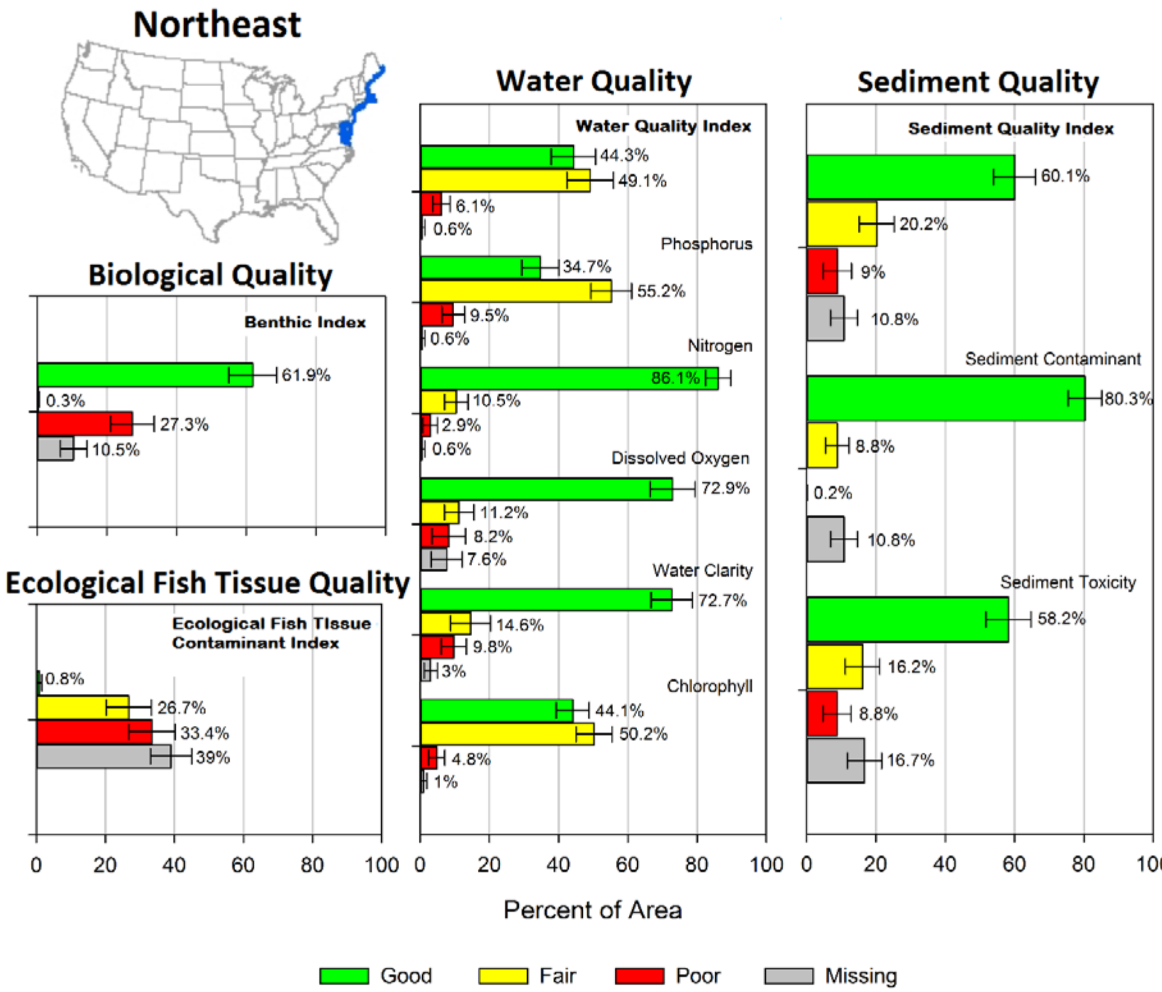

Figure 5. National Coastal Condition Assessment 2010 Report findings for the Northeast Region. Bars show the percentage of coastal area within a condition class for a given indicator (n = 238 sites sampled). Error bars represent 95 percent confidence levels (USEPA 2015a).

All of New Hampshire waters are impaired by mercury contamination in fish tissue, with the source being atmospheric deposition. All New Hampshire's bays and estuaries are impaired by dioxins and PCBs. The top five reasons for impairment in New Hampshire rivers for 2012 were: mercury (16,962 acres), pH (3,821 acres), E coli (1,306 acres), dissolved oxygen (688 acres), and aluminum (563 acres) (NHDES 2012). The top five reasons for impairment in New Hampshire estuaries for 2012 were: mercury (18 acres), dioxin (18 acres), PCBs (18 acres), estuarine bioassessments (15 acres), and nitrogen (14 acres). The top five reasons for impairment in New Hampshire ocean waters for 2012 were: PCBs (81 acres), mercury (81 acres), dioxin (81 acres), Enterococcus (0.5 acres), and fecal coliform (0.5 acres). Besides atmospheric deposition, sources of impairment in New Hampshire include forced drainage pumping, waterfowl, domestic wastes, combined sewer overflows, animal feeding operations, municipal sources, and other unknown sources (NHDES 2012).

Violation rates among EPA- permitted pollutant sources are low in New Hampshire. A total of 68 (13 percent) of 492 NPDES-permitted facilities are in violation of their permits, and only 12 (2 percent) of these violations are classified as a significant noncompliance. Among these only one facility is near waters where ESA species occur. At the time of this writing, only one discharger that is in significant noncompliance is near waters where ESA-listed species occur.

In 2012, Massachusetts assessed the condition of 2,816 miles (28 percent) of the state's rivers and streams and found 63 percent to be impaired[7]. Four out of the top five impairment causes for rivers and streams in Massachusetts are attributed to pathogens and nutrients. The probable sources for these impaired waters include unknown sources, municipal discharges and unspecified urban stormwater. The distribution of impairment causes and probable sources suggest that eutrophication is a factor in Massachusetts rivers and stream impairments. PCBs in fish tissue from legacy sediment contamination is identified as a contributing factor in 14 percent of assessed river or stream miles. Both invasive species and atmospheric mercury deposition are major contributors to impairments of lakes, reservoirs and ponds. Nearly the entire spatial area of Massachusetts' bays and estuaries were assessed (98 percent of 248 square miles), with 87 percent found to be impaired. Fecal coliform contamination from municipal discharges impair the entire extent of assessed bays and estuaries. PCBs in fish tissue are also a significant factor, occurring in 36 percent of assessed waters. The impairment classification "other cause" is identified in 27 percent of estuaries and bays. This reporting category is used for dissolved gases, floating debris and foam, leachate, stormwater pollutants, and many other uncommon causes lumped together. Among sources for pollutants, stormwater was a major factor for Massachusetts estuaries and bays as three of the top five identified sources of impairments are discharges from municipal separate storm sewer systems (53 percent of impaired area), wet weather discharges (27 percent) and unspecified urban stormwater (25 percent). Among the 1511 NPDES discharge-permitted facilities located in Massachusetts, 231 (15 percent) are in violation, with 29 (2 percent) of these violations classified as a significant noncompliance. Among those with effluent violations, 3 discharge to tidal or coastal waters where ESA-listed species or designated critical habitat under NMFS' jurisdiction occur: the waste water treatment facilities for the municipalities of Marion and Salisbury and a supplier of crushed aggregates, hot mix asphalt, and recycled products, the P.J. Keating company.

In 2014, the District of Columbia (D.C.) assessed the condition of 98.5 percent of its 39 miles of rivers and streams and 99 percent of its 6 square miles of bays and estuaries[8]. All waters assessed were found to be impaired by PCBs. By impairment group, pesticides accounted for the most causes for impairment for 303 (d) listed waters assessed in D.C. Out of 86 NPDES-permitted facilities in D.C., 13 permits (15 percent) are in violation, with a single permit in significant noncompliance related to effluent violations. However, the facility in significant noncompliance discharges to the Anacostia River which has no ESA-designated critical habitat and ESA-listed species under NMFS' jurisdiction are not expected to use the river.

The remaining East coast portion of the *Action Area* is very small. It includes Tribal and federal lands within 24 subwatersheds distributed among Maine, Vermont, Connecticut, and Delaware. Although 13 of these are in Maine, few river and stream aquatic impairments are reported in this state (8 out of 250 total assessed water bodies are impaired). Impairment causes in Maine are identified as low dissolved oxygen and dioxins. Microbial pollution of rivers and streams are indicated as major impairment causes in Vermont, Connecticut and Delaware, accounting for nearly 60 percent of the impaired river and stream miles among these states (EPA Water Quality

[7] MA 2014 Water Quality Assessment Report, https://iaspub.epa.gov/waters10/attains_state.control?p_state=MA

[8] DC 2014 Water Quality Assessment Report, https://iaspub.epa.gov/waters10/attains_state.control?p_state=DC

Assessment and TMDL Information, https://iaspub.epa.gov/waters10/attains_index.home). Mercury, arsenic pollution and "unknown" are also among the top impairment causes for rivers and streams in these states.

West Coast Region

The West Coast region contains 410 estuaries, bays, and sub-estuaries that cover a total area of 2,200 square miles (USEPA 2015a). More than 60 percent of this area consists of three large estuarine systems—the San Francisco Estuary, Columbia River Estuary, and Puget Sound (including the Strait of Juan de Fuca). Sub-estuary systems associated with these large systems make up another 27 percent of the West Coast. The remaining West Coast water bodies, combined, compose only 12 percent of the total coastal area of the region.

The majority of the population in the West Coast states of California, Oregon, and Washington lives in coastal counties. In 2010, approximately 40 million people lived in these coastal counties, representing 19 percent of the U.S. population residing in coastal watershed counties and 63 percent of the total population of West Coast states (U.S. Census Bureau, http://www.census.gov/2010census/). Between 1970 and 2010, the population in the coastal watershed counties of the West Coast region almost doubled, growing from 22 million to 39 million people.

A total of 134 sites were sampled to characterize the condition of West Coast waters. Figure 6 shows a summary of findings from the EPA's National Coastal Condition Assessment Report for the west Coast Region (USEPA 2015a).

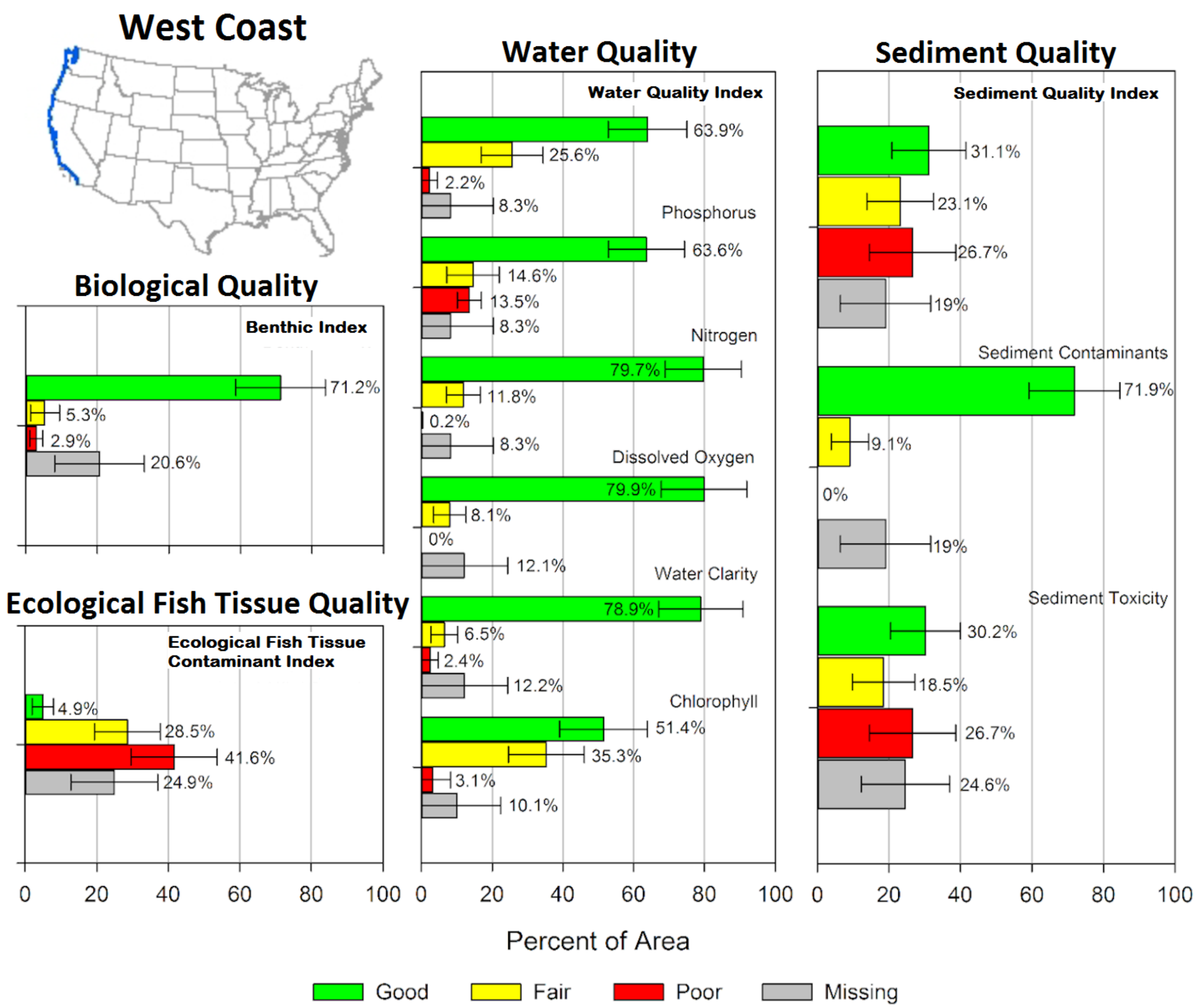

Figure 6. National Coastal Condition Assessment 2010 Report findings for the West Coast Region. Bars show the percentage of coastal area within a condition class for a given indicator (n = 238 sites sampled). Error bars represent 95 percent confidence levels (USEPA 2015a).

Biological quality is rated good in 71 percent of West Coast waters, based on the benthic index. Fair biological quality occurs in 5 percent of these waters, and poor biological quality occurs in 3 percent (data are missing for an additional 21 percent of waters due to difficulty obtaining samples). Based on the water quality index, 64 percent of waters in the West Coast region are in good condition, 26 percent are rated fair, and 2 percent are rated poor (USEPA 2015a).

Based on the sediment quality index, 31 percent of West Coast waters sampled are in good condition, 23 percent in fair condition, and 27 percent in poor condition (data missing for 19 percent of waters sampled) (USEPA 2015a). Based on the ecological fish tissue contaminant index, 42 percent of West Coast waters are in poor condition, 29 percent in fair condition, and 5 percent in good condition (data missing for 25 percent of waters sampled). The contaminants that most often exceed the thresholds for “poor” condition are selenium, mercury, arsenic, and, in a very small proportion of the area, hexachlorobenzene (USEPA 2015a).

Subwatersheds associated with Washington State federal lands where CGP eligible activities may occur (e.g., Department of Defense, Bureau of Land Management, Bureau of Reclamation) or Tribal lands, are distributed throughout the state and along the coast line. Information from the 2008 state water quality assessment report for the entire state was used to infer conditions within the *Action Area*. For the 2008 reporting year, the state of Washington assessed 1,997 miles of rivers and streams, 434,530 acres of lakes, reservoirs, and ponds, and 376 square miles of ocean and near coastal waters (Washington 2008 Water Quality Assessment Report, https://iaspub.epa.gov/waters10/attains_state.control?p_state=WA). Among assessed waters, 80 percent of rivers and streams, 68 percent of lakes, reservoirs, and ponds, and 53 percent of ocean and near coastal waters were impaired. Temperature (39 percent of assessed waters) and fecal coliform (32 percent of assessed waters) are prominent causes of impairments. These are followed by low dissolved oxygen (19 percent), pH (9 percent), and instream flow impairments (2 percent). Ocean and near coastal impairment causes include fecal coliform in 17 percent of assessed waters, followed by low dissolved oxygen in 12 percent of these waters. The remaining contributors are invasive exotic species, sediment toxicity, and PCBs.

Among the 47 permitted facilities located within Washington's Tribal lands, 36 are in violation of their permits, with 2 of these violations classified as a significant noncompliance with effluent violations. There are 12 facilities with violations reported for the 38 EPA-permitted facilities within the watersheds associated with federally operated facilities in Washington. One operation is in significant noncompliance for failure to submit a discharge monitoring report.

The area covered by subwatersheds within Tribal lands in Oregon where EPA has permitting authority account for only 1.5 percent of the *Action Area*. Direct examination of these areas using EPA's geospatial databases from 2006 indicate that 80 percent of the 376 km of rivers and streams assessed are impaired by elevated iron (NMFS 2015a). While the source of the iron is not identified, iron contamination can result from acid mine drainage. Eleven out of the 13 assessed lakes, reservoirs, and ponds in subwatersheds associated with these lands are impaired, with causes listed as temperature and fecal coliform bacteria. This amounts to impairment of 93 percent of the assessed area.

The EPA also has permitting authority for Tribal lands in California. The subwatersheds associated with these lands account for about 6 percent of the total *Action Area*, but are dispersed widely and make up a very small fraction of the watersheds within the state. As such, we did not make generalizations about water quality in these areas based on the 2012 statewide water quality assessment report. Rather, information for the relevant watersheds was extracted from EPA geospatial databases and analyzed separately. Ninety-one percent of the assessed rivers and streams within these Tribal land subwatersheds are impaired by temperature, sediment, aluminum, nutrients/eutrophication, development and pH. Stressor sources are attributed to loss of riparian habitat, hydrological modification, forestry activities, development and roads, agriculture and construction. High impairment rates (97 percent) are also found for assessed lakes, reservoirs and ponds within the *Action Area* in California. The most common impairment for these waters is arsenic, affecting 35 percent of assessed waters, while nutrients and mercury are factors in about 33 and 31 percent of assessed waters, respectively. Greater than 99 percent of California's assessed bays and estuaries are impaired. Mercury, PCBs, DDT, and exotic invasive species are the top impairment causes, degrading 63-64 percent of these waters. Among the 20 permits located in Indian country lands the California *Action Area*, a total of 8 facilities are in violation of their NPDES permit, with 2 of these violations classified as a significant noncompliance for compliance schedule violations.

Inland waters of Idaho where anadromous salmonids occur were not covered by the EPA's 2015 coastal assessment report. In 2012 Idaho assessed 65 percent of its 96,391 miles of rivers and streams. The report indicates that 54 percent of rivers and streams to be impaired. Water temperature and sedimentation are the two most important causes of impairments, affecting 29 percent and 24 percent of assessed waters, respectively. Other causes included nutrients, pathogens, impaired aquatic assemblages, and flow regime alteration. The primary sources for impairments are all various expressions of livestock activity within the assessed watersheds, e.g., grazing, including grazing on riparian shorelines and rangeland. Among the 830 EPA NPDES-permitted facilities located in Idaho, a total of 568 (31 percent) are in noncompliance with their permits and with 21 (2.5 percent) of these violations classified as a significant noncompliance, 12 of which are effluent violations. Four of the current effluent violations occur in watersheds where ESA-listed species and designated critical habitat under NMFS' jurisdiction occur. One facility the waste water treatment facility fir City of Culdesac discharges directly to ESA-designated critical habitat in Lapwai Creek.

Puerto Rico

Since the ESA-listed species and designated critical habitat under NMFS' jurisdiction in Puerto Rico are strictly marine and do not occur in freshwaters or wetlands, this discussion will focus on water quality conditions reported for coastal shoreline and saltwater habitats. In 2014, Puerto Rico assessed the condition of 390 out of 550 miles of coastal shoreline (70.9 percent) and all 8.7 square miles of the surrounding bays and estuaries. The findings indicate that 77 percent of the coastline and 100 percent of the assessed estuaries and bays are impaired (Puerto Rico Water Quality Assessment Report, https://iaspub.epa.gov/waters10/attains_index.control?p_area=PR#total_assessed_waters). TMDLs are needed in 100 percent of coastal areas sampled but none have been completed. TMDLs are needed in 58.6 percent of bay/estuary areas sampled but are completed for less than 2 percent of assessed areas. Pathogens (e.g., fecal coliform, total coliform, Enterococcus) and pathogen sources dominate the impairment profiles for all three types of assessed waters. These include onsite waste water systems, agriculture, concentrated animal feed operations, major municipal point sources, and urban runoff. Coastline impairment causes include pH, turbidity, and Enterococcus bacteria. Many of these impairments are attributed to sewage and urban-related stormwater runoff. Rates of noncompliance among EPA-permitted pollution sources are fairly high. Among the 808 NPDES-permitted facilities located in Puerto Rico, 30 percent were in violation of their, and 18 percent were classified in significant noncompliance and 5 of these violations were effluent violations and four discharges either directly to coastal waters where ESA ESA-listed species under NMFS' jurisdiction occur or discharged to a creek within one mile of coastal waters.

Pacific Islands

The EPA has NPDES permitting authority in the Pacific islands of Guam, the Northern Marianas, and American Samoa. Because the ESA-listed species and designated critical habitat under NMFS' jurisdiction in these areas are strictly marine and do not occur in freshwaters or wetlands, this discussion will focus on water quality conditions reported for coastal shoreline and saltwater habitats.

The population of American Samoa was 55,519 in 2010. Factors such as population density, inadequate land-use permitting, and increased production of solid waste and sewage, have impaired water quality in streams and coastal waters of this U.S. territory. The total surface area of American Samoa is very small, only 76.1 sq. miles, which is divided into 41 watersheds with an average size of 1.8 sq. miles. Water quality monitoring, along with coral and fish benthic monitoring, covers 34 of the 41 watersheds, which includes areas populated by more than 95 percent of the total population of American Samoa. For the goal to protect and enhance ecosystems (aquatic life), of the 45.1 shoreline miles (out of 149.5 total) assessed in 2012-2013, 15.5 miles were found to be fully supporting, 12.8 miles were found to be partially supporting, and 16.8 miles were found to be not supporting (Tuitele et al. 2014). For the goal to Protect and Enhance Public Health, all 7.9 shoreline miles assessed in 2012-2013 for fish consumption were found to be not supporting. Eighty-four percent of American Samoa's coastline was assessed in 2010 and 60 percent of the assessed waters were found to be impaired. Enterococcus is identified as causing impairments along 50 percent of the coastline evaluated, while 26 percent of assessed coastline had nonpoint source pollutants contributing to impairments. Of the 5.7 km^2 of reef flats assessed in 2010, 76 percent were fully supporting and 24 percent were not supporting the goal of Protect and Enhance Ecosystems(Tuitele et al. 2014). The major stressors identified were PCBs, metals (mercury), pathogen indicators, and other undetermined stressors(Tuitele et al. 2014). The major sources of impairment included sanitary sewer overflows and animal feed operations, each implicated for 50 percent of the waters assessed. Multiple nonpoint sources were identified as a stressor source for 26 percent of assessed waters, while contaminated sediments contributed to impairments in 6 percent of assessed waters. Five out of 6 American Samoa facilities with NPDES permits were in noncompliance, with 2 in significant noncompliance, one with effluent violations for discharges into Pago Pago Harbor.

Guam assessed 3 percent of its 915 acres of bays/estuaries and 14 percent of its 117 miles of coastline in 2010 (Guam 2010 Water Quality Assessment Report, https://iaspub.epa.gov/waters10/attains_state.control?p_state=GU). Impairments are identified in 42 percent of assessed bays and estuaries and the entire extent of assessed coastline. PCBs levels in fish tissue was the cause of impairment in 33 percent of assessed bays and estuaries, followed by antimony, dieldrin, tetrachloroethylene, and trichloroethylene, each listed as causing impairments to 6 percent of assessed waters. Enterococcus bacteria is the cause of impairment in nearly all of Guam's coastal shoreline waters (96 percent), while PCB contamination is a minor contributor to impairment of the coastal shoreline (4 percent). Sources of impairment causes have not been identified for Guam. Among the 26 NPDES-permitted facilities located in Guam, a total of 17 (65 percent) were in violation of their permit at the time of this writing, with 4 of these violations classified as a significant noncompliance, three with effluent violations for discharges to the Pacific Ocean or Tipalao Bay.

In the Northern Marianas, 36 percent of the 235.5 miles of assessed shoreline were found to be impaired in 2014 (N. Mariana Islands Water Quality Assessment Report, https://iaspub.epa.gov/waters10/attains_state.control?p_state=CN). Phosphate is listed as a cause for all impaired areas. Other causes identified among the impaired stretches of shoreline include microbiological contamination from Enterococcus bacteria (22 percent), dissolved oxygen saturation levels (16 percent), and mercury in fish tissue (1 percent). The presence of Enterococci bacteria was implicated for the impairment of 32.2 miles of Saipan's, 17.8 miles of Rota's, and 24.3 miles of Tinian's shoreline for recreational uses. In addition, 15 percent of the assessed waters had impaired biological assemblages. Sources of impairments included sediments (15 percent), unknown sources (13 percent), on-site septic treatment systems (12 percent), urban runoff (12 percent), and livestock operations (7 percent). Three out of the six NPDES-permitted facilities on the Northern Marianas were in noncompliance, but the none were in significant noncompliance.

7.1.3 Climate Change

Climate change is a component of the current and future baseline conditions. Climate change is already having a profound effect on life in the oceans. Marine species tend to be highly mobile, and the ranges of many are moving quickly toward the poles and cooler waters as average ocean temperatures rise. These shifts can cause ecological disruptions as predators become separated from their prey. They can also cause economic disruptions if a fish population becomes less productive or moves out of range of the fishermen who catch them.

In addition to getting warmer, the oceans are also becoming more acidic as they absorb about one-half of the CO2 we emit into the atmosphere. This increased acidity can make life difficult for organisms that build shells out of calcium carbonate. This includes not only corals and shellfish, but also tiny organisms like pteropods that form the foundation of many marine food webs.

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). This temperature increase is greater than what would be expected given the range of natural climatic variability recorded over the past 1,000 years (Crowley and Berner 2001). The IPCC estimates that the last 30 years were likely the warmest 30-year period of the last 1,400 years, and that global mean surface temperature change will likely increase in the range of 0.3 to 0.7°C by about 2033.

All species discussed in this opinion are or are likely to be threatened by the direct and indirect effects of global climatic change. Global climate change stressors, including consequent changes in land use, are major drivers of ecosystem alterations. Climate change is projected to have substantial direct effects on individuals, populations, species, and the community structure and function of marine, coastal, and terrestrial ecosystems in the foreseeable future (McCarty 2001, IPCC 2002, Parry et al. 2007, IPCC 2013). Increasing atmospheric temperatures have already contributed to changes in the quality of freshwater, coastal, and marine ecosystems and have contributed to the decline of populations of endangered and threatened species (Mantua et al. 1997, Karl et al. 2009, Littell et al. 2009).

Warming water temperatures attributed to climate change can have significant effects on survival, reproduction, and growth rates of aquatic organisms (Staudinger et al. 2012). For example, warmer water temperatures have been identified as a factor in the decline and disappearance of mussel and barnacle beds in the Northwest (Harley 2011). Increasing surface water temperatures can cause the latitudinal distribution of freshwater and marine fish species to change: as water temperatures rise, cold and warm water species will spread northward (Hiddink and ter Hofstede 2008, Britton et al. 2010). Cold water fish species and their habitat will begin to be displaced by the warm water species (Hiddink and ter Hofstede 2008, Britton et al. 2010). Fish species are expected to shift latitudes and depths in the water column, and the increasing temperatures may also result in expedited life cycles and decreased growth (Perry et al. 2005). Shifts in migration timing of pink salmon (*Oncorhynchus gorbuscha*), which may lead to high pre-spawning mortality, have also been tied to warmer water temperatures (Taylor 2008).

Climate-mediated changes in the global distribution and abundance of marine species are expected to reduce the productivity of the oceans by affecting keystone forage species in marine ecosystems such as phytoplankton, krill, and cephalopods. For example, climate change may reduce recruitment in krill by degrading the quality of areas used for reproduction (Walther et al. 2002).

Warmer water also stimulates biological processes which can lead to environmental hypoxia. Oxygen depletion in aquatic ecosystems can result in anaerobic metabolism increasing, thus leading to an increase in metals and other pollutants being released into the water column (Staudinger et al. 2012). In addition to these changes, climate change may affect agriculture and other land development as rainfall and temperature patterns shift. Aquatic nuisance species invasions are also likely to change over time, as oceans warm and ecosystems become less resilient to disturbances (USEPA 2008). If water temperatures warm in marine ecosystems, native species may shift poleward to cooler habitats, opening ecological niches that can be occupied by invasive species introduced via a ship's ballast water or other sources (Ruiz et al. 1999, Philippart et al. 2011). Invasive species that are better adapted to warmer water temperatures could outcompete native species that are physiologically geared towards lower water temperatures; such a situation currently occurs along central and northern California (Lockwood and Somero 2011).

Climate change is also expected to impact the timing and intensity of stream seasonal flows (Staudinger et al. 2012). Warmer temperatures are expected to reduce snow accumulation and increase stream flows during the winter, cause spring snowmelt to occur earlier in the year, and reduced summer stream flows in rivers that depend on snow melt. As a result, seasonal stream flow timing will likely shift significantly in sensitive watersheds (Littell et al. 2009). Warmer temperatures may also have the effect of increasing water use in agriculture, both for existing fields and the establishment of new ones in once unprofitable areas (ISAB 2007). This means that streams, rivers, and lakes will experience additional withdrawal of water for irrigation and increasing contaminant loads from returning effluent. Changes in stream flow due to use changes and seasonal run-off patterns alter predator-prey interactions and change species assemblages in aquatic habitats. For example, a study conducted in an Arizona stream documented the complete loss of some macroinvertebrate species as the duration of low stream flows increased (Sponseller et al. 2010). As it is likely that intensity and frequency of droughts will increase across the southwest (Karl et al. 2009), similar changes in aquatic species composition in the region is likely to occur.

Ocean acidification, as a result of increased atmospheric carbon dioxide, can interfere with numerous biological processes in corals including: fertilization, larval development, settlement success, and secretion of skeletons (Albright et al. 2010). Over the past 200 years, the oceans have absorbed about half of the CO2 produced by fossil fuel burning and other human activities. This increase in CO2 has led to a reduction of the pH of surface seawater of 0.1 units, equivalent to a 30 percent increase in the concentration of hydrogen ions in the ocean. If global emissions of CO2 from human activities continue to increase, the average pH of the oceans is projected to fall by 0.5 units by the year 2100 (Royal Society of London 2005). In addition to global warming, acidification poses another significant threat to oceans because many major biological functions respond negatively to increased acidity of seawater. Photosynthesis, respiration rate, growth rates, calcification rates, reproduction, and recruitment may be negatively impacted with increased ocean acidity(Royal Society of London 2005). Kroeker et al (2010) reviewed 139 studies that quantified the effect of ocean acidification on survival, calcification, photosynthesis, growth, and reproduction. Their analysis determined that the effects were variable depending on species, but effects were generally negative, with calcification being one of the most sensitive processes. Their meta-analysis was not able to show significant negative effects to photosynthesis. Although the scale of acidification changes would vary regionally, the resulting pH could be lower than the oceans have experienced over at least the past 420,000 years and the rate of change is probably one hundred times greater than the oceans have experienced at any time over that time interval.

Aquatic species, especially marine species, already experience stress related to the impacts of rising temperature. Corals, in particular, demonstrate extreme sensitivity to even small temperature increases. When sea temperatures increase beyond a coral's limit, the coral "bleaches" by expelling the symbiotic organisms that not only give coral its color, but provide food for the coral through their photosynthetic capabilities. According to (Hoegh-Guldberg 2010), bleaching events have steadily increased in frequency since the 1980s.

In summary, the direct effects of climate change include increases in atmospheric temperatures, decreases in sea ice, and changes in sea surface temperatures, patterns of precipitation, and sea level. Indirect effects of climate change include altered reproductive seasons/locations, shifts in migration patterns, reduced distribution and abundance of prey, and changes in the abundance of competitors and/or predators. Climate change is most likely to have its most pronounced effects on species whose populations are already in tenuous positions (Williams et al. 2008).

8 EFFECTS OF THE ACTION

Section 7 of the ESA regulations define "effects of the action" as the direct and indirect effects of an action on the species or designated critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but are reasonably certain to occur. This includes effects on prey resources and "legacy effects" of the action, such as the redistribution of pollutants by stormwater or disturbed sediment and maternal or dietary transfer of accumulated toxicants.

To evaluate the effects in this opinion, we conduct a Risk Analysis (Section 8.2) in which we consider the likelihood of exposure to the stressors of the action of individuals of species and essential features of designated critical habitat and the potential for adverse responses. We then integrate the information to characterize the risk of adverse effects to identified environmental values, referred to as assessment endpoints. In this Risk Analysis section, we analyze the risks posed by the discharges without consideration of EPA's decision-making process or protective control measures in the CGP to minimize or prevent adverse effects. We evaluate EPA's process to determine the effectiveness of the CGP program (Section 8.3).

The analysis evaluates the decision-making process and the control measures EPA intends to establish to protect ESA-listed species or designated critical habitat from the adverse direct or indirect effects of the activities authorized by the 2017 CGP. As part of this analysis, we evaluate the past performance of the CGP and consider the performance of those controls as indicative of how well the controls of the 2017 CGP are likely to work. For many consultations on programs that authorize multiple activities, the action agency has structured the program so that neither species nor designated critical habitat are exposed to the stressors of the action until there is a separate ESA section 7 consultation addressing site specific activities that will result in exposure. However, in this instance, EPA intends to authorize a large number of discharges without subsequent ESA section 7 consultations, except for those discharges that do not qualify for coverage under the general permit and for which the discharger must seek an individual permit. Accordingly, if there is overlap with species, EPA's action will result in exposure of ESA-listed species and designated critical habitat to the action.

8.1 Contribution of the Action to Climate Change

On December 5, 2016, NMFS transmitted to EPA a formal initiation letter indicating that formal consultation on the 2017 CGP NOI would begin upon receiving EPA's climate change analysis for the CGP. On December 29, 2016, the EPA provided the following language:

> *Although greenhouse gases (GHGs) by their nature have impacts that are global and long-lasting, EPA anticipates that GHGs associated with authorized discharges and discharge-related activities over the permit term will be marginal in scale. This includes installation and maintenance of stormwater control measures over the permit term, where appropriate, and the fact that operators exercise wide discretion in choosing stormwater control measures to comply with the permit.*

The EPA's assertion that GHGs associated with CGP-authorized activities will be "marginal in scale" does not provide the scale to which this statement refers. This could refer to global or regional GHG emissions, emissions resulting from all activities authorized by EPA, emissions resulting from all construction activities, whether or not stormwater discharges were

authorized by EPA, or emissions over the current CGP term relative to GHG releases from past and future CGP terms. Regardless, EPAs assessment is limited to the CGP permit term (5 years) that is the subject of this opinion. Such releases represent a contribution incremental to past iterations of the CGP as well as baseline global GHG releases. Climate change and will be considered further as part of the baseline and cumulative effects.

8.2 Risk Analysis

In the Risk Analysis portion of this consultation we were concerned with the potential adverse effects of discharges covered under the CGP on ESA-listed species and designated critical habitat under NMFS' jurisdiction. Due to the scope and complexity of the action and the uncertainty regarding the type and location of discharges that will actually occur, this analysis applies a qualitative strength of evidence assessment of risks. As noted above, this Risk Analysis portion considers the adverse effects resulting from Construction discharges without consideration of the effectiveness of EPA's 2017 CGP program in minimizing or preventing risk.

The Risk Analysis portion integrates elements of EPA's ecological Risk Analysis framework (ERA-Framework, EPA 1998) into NMFS' assessment approach. The Risk Analysis is organized in three phases:

1) Problem formulation examines the stressors of the action, the action area, its environmental baseline, and the status of the species and designated critical habitat in order to formulate risk hypotheses on how species may respond to exposures to the stressors of the action. Risk hypotheses organize the analysis by positing the relationships among exposure to stressors, response to stressors, and environmental values, referred to as assessment endpoints. Once the risk hypotheses are formulated, the analyses proceeds through the exposure → response → risk characterization path. A risk hypothesis is disproved when there is little or no likelihood of adverse effects to the assessment endpoints, and no further analysis of that hypothesis is merited in the opinion.
2) The exposure and response analysis evaluates how individuals of species and essential features of designated critical habitat may be affected and determines whether stressor exposures would result in adverse responses representing the assessment endpoints. For example, reduced number of viable eggs would represent an effect to the assessment endpoint "reduced fecundity."
3) The risk characterization considers the population-level implications of adverse responses representing the assessment endpoints to determine if these are sufficiently large to affect population parameters (e.g., assessment endpoints such as recruitment or reproductive rate). Effects to the conservation value of the physical and biological features of designated critical habitat are evaluated at this point in the assessment.

8.2.1 Problem Formulation

The problem formulation integrates what is known about the status of the species and designated critical habitat (Section 0) and baseline conditions (Section 7) with the proposed action (Section 0) and the stressors resulting from that action (discussed below) to identify the types of effects that may occur as a result of the action and formulate risk hypotheses to be evaluated in the *Exposure and Response Analysis* (Section 8.2.2) and *Risk Characterization (Section 8.2.3*).

8.2.1.1 Stressors of the Action and Associated Risk Hypotheses

The objective of the Risk Analysis portion of this opinion is to determine whether discharges eligible for coverage under the CGP, in the absence of controls and requirements under the CGP, would directly or indirectly adversely affect individual survival or fitness such that the extinction risk of ESA-listed populations or species would be increased or that designated critical habitat necessary for the persistence of ESA-listed species would be destroyed or adversely modified. Generally speaking, the values to be protected are the survival and fitness of individuals and the value of designated critical habitat for the conservation of an ESA-listed species.

Risk hypotheses organize the analysis by positing the relationships among exposure to stressors, response to stressors, and environmental values, referred to as assessment endpoints. Once the risk hypotheses are formulated, the analyses proceed through an exposure → response → risk characterization path. A risk hypothesis is disproved when there is little or no likelihood of adverse effects to the assessment endpoints, and no further analysis of that hypothesis is merited in the opinion.

Risk hypotheses are constructed by placing information on the stressors of the action in context of species and essential features of designated critical habitat potentially affected by these stressors through direct lethality, disrupted growth and maturation, reduced offspring survival, or reduced reproductive capacity.

Stressor: Sediment

Erosion is a natural occurrence in aquatic systems where the flow or movement of water mobilizes soil and sediment from uplands, stream banks, and shorelines. Erosion can be exacerbated by activities which disturb soils or alter hydrology (e.g., logging, construction, paving). It is commonly correlated with urbanization and the associated large areas of pavement, buildings, and compacted soil (i.e., impervious surfaces) that prevent infiltration of stormwater and snowmelt, resulting in runoff. Impervious surfaces in a watershed increase the natural flow and volume of water during rain events causing increased scouring and sediment transport potential. Specific land use factors of the watershed also play a role in erosion intensity. For example, construction sites can be susceptible to excessive sediment erosion during storm events as the unvegetated soils are easily scoured and transported to surface waters. Stormwater erosion directly contributes to spikes in TSS, turbidity, and nutrient concentrations in the water column, as well as causing indirect changes in chemistry and physical properties such as light penetration and temperature.

During high flow events, eroded sediment is transported as suspended solids until it reaches low flow areas where it settles out of solution and sinks to the bottom, at least temporarily (Cover et al. 2008) in the watershed from surface erosion and landslides. In watersheds with excessive erosion, the particulate sediment can cover the natural substrate causing direct and indirect biological effects. The parameter TSS is considered to be one of the major pollutants that contributes to the deterioration of water quality, contributing to higher costs for water treatment, decreases in fish resources, and the general aesthetics of the water (Bilotta and Brazier 2008).

Excessive sediment loads introduced into receiving waterbodies can cause smothering and disruption of aquatic habitats, reduce light penetration and transport many other potentially harmful pollutants (e.g. hydrocarbons, heavy metals, phosphorus) (Duncan et al. 1999). Deposited sediments can have indirect effects by reducing oxygen levels either with restricted flow through substrates or by oxygen consumption by bacterial respiration, especially when sediments contain a high concentration of organic matter. Insufficient sediment also can affect aquatic biota. When sediment export exceeds sediment deposition, erosion to bedrock or boulders, may result in unsuitable suitable habitat for some organisms.

Direct effects of suspended materials on invertebrates and fish are complex, ranging from behavioral to physiological to toxicological. Suspended sediments have been documented to have a negative effect on the survival of fish, freshwater mussels, and other benthic organisms. In a frequently cited review paper prepared by Newcombe and Jensen (1996), sublethal effects (e.g. increased respiration rate) were observed in eggs and larvae of fish when exposed to TSS concentrations as low as 55 mg/L for one hour. Excess sediment smothers benthic organisms and the surface layer of the benthos can be heavily impacted and altered. Increased turbidity associated with suspended sediments can reduce primary productivity of algae as well as growth and reproduction of submerged vegetation (Jha and Swietlik 2003). In addition, once in the system, resuspension and deposition can “recycle” sediments so that they exert water column and benthic effects repeatedly over time and in multiple locations.

High levels of TSS can influence macrophytes and algae, primarily through affecting the amount of light penetrating through the water column (Bilotta and Brazier 2008). The reduction in light penetration through the water column will restrict the rate at which periphyton and emergent and submersed macrophytes can assimilate energy through photosynthesis, which could impact primary consumers. Certain waterbody types are capable of recovering more quickly from events causing excess suspended sediment and turbidity (e.g., high energy streams), whereas others may retain accumulated sediments for years (e.g., lakes and wetlands) (USEPA 2009). Short-term increases in suspended sediment and turbidity levels can naturally occur during spring thaws, storms, and other high flow events. Naturally occurring inputs of sediment are considered to be small and nondestructive to stream habitat and biota. However, anthropogenic sources such as uncontrolled stormwater discharges and runoff can change natural sediment and turbidity dynamics by elevating sediment and turbidity levels significantly beyond those associated with natural events, for longer periods of time, and at times when an aquatic ecosystem and its organisms are unaccustomed to receiving such inflows (e.g., late summer low flow periods).

Jones et al. (1999) noted significant reductions in overall fish abundance with an increased sediment load. Deforestation and the resulting increase in erosion and fine particles caused critical fish habitats to become filled with fine particles and altered the population dynamics of several streams in the Little Tennessee River drainage (Jones et al. 1999). Studies have also shown that benthic macroinvertebrate communities are negatively affected by fine sediment accumulation in riffle and pool areas of streams and rivers. For example, Vasconcelos and Melo (2008), observed significant changes in macroinvertebrate abundance and community structure with additions of various size sand particles to their habitat.

The potential cumulative effect of sediment impacts includes reduced disease and parasite resistance, reduced growth, and degraded health of individual organisms in the aquatic community. Population reductions can take place both through direct mortality in the short term and reduced reproductive success in the long term. Suspended sediment is associated with negative effects on the spawning, growth, and reproduction of salmonids (Bash and Ryan 2002).

Effects on salmonids will differ based on their developmental stage by altering their physiology, behavior, and habitat, all of which may lead to physiological stress and reduced survival rates.

Risk Hypotheses for Sediment

Figure 7 illustrates the pathways by which sediment discharges may cause direct and indirect effects to ESA-listed species. As discussed in Section 8.2.1.1, sediment acts directly to reduce survival and fitness of ESA-listed individuals and indirectly through reducing or altering the physical habitat or the survival and fitness of forage species. In sum, the figure illustrates that high suspended sediment concentrations may adversely affect aquatic organisms through:

1) impairment of filter feeding, by filter clogging or reduction of food quality;
2) reduction of light penetration and visibility in the stream, influencing interactions between visually-cued predators and prey and reducing photosynthesis;
3) physical abrasion by sediments resulting in tissue damage (e.g., gills of fish and invertebrates);
4) contribution of nutrients, and organic matter which may favor some types of species over others, and
5) increased heat absorption, leading to increased water temperatures.

Deposited and bedded sediments may result in adverse effects through:

1) increased coverage by fine particles, which can alter benthic habitats (e.g., increasing fine substrate habitats favored by burrowing insects, while smothering hardbottom or cobble surfaces favored by other species, or reducing deeper pool habitats) and bury immobile taxa and life stages;
2) clogging of interstitial spaces, leading to reduced interstitial flows, habitats, and refugia; and
3) reduction of substrate particle size, leading to reduced substrate diversity and stability.

Finally, erosive waters mobilizing sediment can also scour sediment away from portions of a waterbody, leaving behind bedrock or large boulders and cobble, resulting in unstable substrates and unsuitable habitat for the original inhabitants of the area.

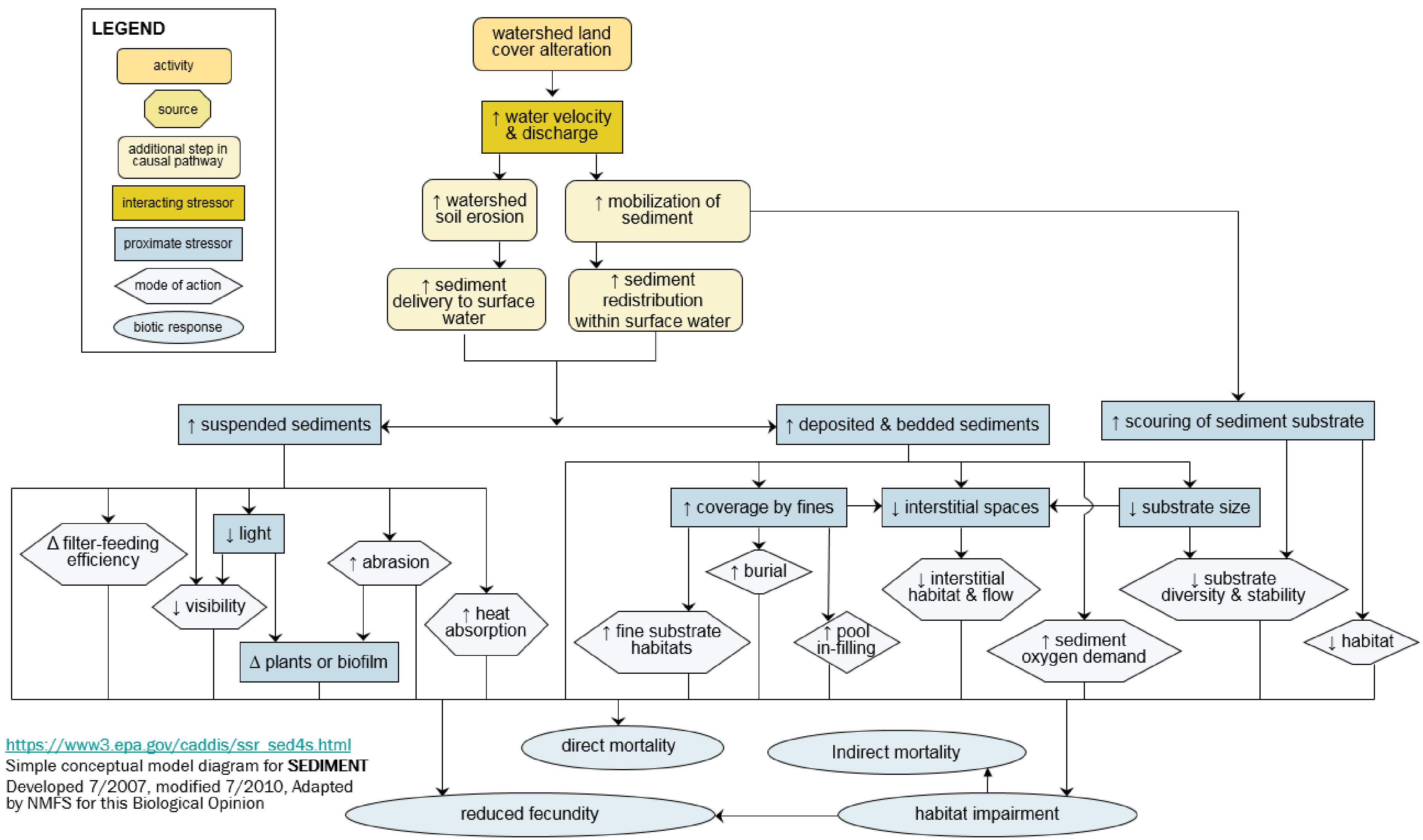

Figure 7, Generalized pathways through which excess sediment discharged due to construction activities affect ESA-listed species.

Stormwater discharges from construction activities result in exposures that may directly affect the survival and fitness of ESA-listed individuals under NMFS' jurisdiction through:

- direct mortality
- reduced growth
- altered behavior
- reduced fecundity (i.e., reduced reproductive output or offspring survival)

Stormwater discharges from construction activities may result in exposures that could indirectly affect the survival and fitness of ESA-listed individuals under NMFS' jurisdiction through reduction in forage species.

Effects to designated critical habitat analysis includes direct and indirect effects on biological elements within the spatial extent of designated critical habitat (e.g., prey, plant cover) affecting the value of the habitat for the conservation of the species. Since the stressors of the action may exert effects on organisms and the physical habitat, both the biological and structural features specified in designated critical habitat may be affected by the action. The overarching risk hypothesis for evaluating effects to designated critical habitat is:

> "Stormwater discharges will result in adverse effects to designated critical habitat features that are essential to the conservation of the species."

Stressor: Flocculating Agents

Chemical measures are sometimes used to immobilize or encourage the settling of suspended sediment (and pollutants adsorbed onto sediment) in stormwater to control erosion and prevent sediment and associated pollutants from reaching surface waters or off-site stormwater conveyances. Tackifiers bind and prevent the movement of mulch and straw used to protect exposed soil and seeded surfaces from the erosive forces of wind, rain, and snowmelt. Soil stabilizing chemicals increase the adhesion of soil particles, making it less vulnerable to these erosive forces. Stabilizing chemicals may be applied to the surface of disturbed soils or placed as "logs" in stormwater ponds or onsite conveyances.

Common flocculating agents currently in use[9] include polyacrylamide (PAM) and copolymer mixtures. An important distinction for these products is whether they are anionic or cationic. A comparison of the toxicity of commercial PAM products demonstrated that anionic PAM itself is essentially nontoxic, but the surfactants and emulsifiers in oil based formulations of PAM resulted in toxic discharges when applied at concentrations at and below those used in agricultural operations (Weston et al. 2009). Tests demonstrated that the oil-based polyacrylamides were more toxic, with statistically significant mortality in fathead minnows 1.5 mg/L, and *Ceriodaphnia dubia*, the most sensitive test species, experiencing complete mortality at concentration of 0.75 mg/L and greater (calculated LC50 0.3 mg/L). Exposures to block and granular forms of anionic PAM were reported to result in gill tissue irritation in rainbow trout, but this effect was temporary (Kerr et al. 2014).

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[9] Based on materials identified in the 2012 CGP NOI

A search of the Web of Science[10] for information on the toxicity of anionic copolymers returned research articles on their biomedical applications. Review of toxicity data reported in Material Safety Data Sheet for one anionic polymer product line indicate no adverse effects to aquatic organisms at concentrations of 50,000 µg/L. To place this value in context of substances that are regulated due to toxicity, ambient water quality criteria for the allowable concentrations of priority pollutants in surface waters range from 0.0002 µg/L (most toxic) to 120 µg/L (least toxic). The Material Safety Data Sheet for one product identified in two NOI, Nalcolyte® 8105, reported that the material was toxic due to suffocation or immobilization when dissolved in laboratory water in the absence of organic carbon, but was an order of magnitude or more less toxic in natural waters. Based on recommended product application rates, the potential for environmental exposure to levels causing adverse effects is low. In contrast to the anionic agents, cationic flocculating agents (e.g., chitosan) are toxic to aquatic life because they bind to mucous membranes, in particular, gills, influencing ion exchange and impairing oxygen uptake. Gill tissue irritation occurred in rainbow trout exposed to cationic PAM concentrations that were 1000-fold lower than environmentally relevant concentrations of anionic PAM (Kerr et al. 2014).

<u>Risk Hypotheses for Cationic Flocculating Agents</u>

Exposure to cationic flocculating agents may result in observable toxic responses: excess mucous production and gill irritation leading to death, at concentrations expected from normal application rates and use. Sublethal effects are not expected. Accordingly, the risk hypothesis for the use of cationic flocculating agents is:

> "Stormwater discharges containing cationic flocculating agents will result in direct mortality of exposed ESA-listed species under NMFS' jurisdiction and indirect effects through mortality of exposed forage species."

The risk hypothesis for effects on designated critical habitat applies to the biological essential features that would respond to cationic flocculating agent toxicity:

> "Stormwater discharges containing cationic flocculating agents will result in adverse effects to designated critical habitat through toxicity to forage species that are listed as features that are essential to the conservation of the species."

8.2.2 Exposure and Response Analysis

The exposure and response analysis evaluates whether individuals of ESA-listed species or the essential elements of their designated critical habitat may be exposed to the stressors the CGP is designed to control at intensities that would result in an adverse response, as proposed by the risk hypotheses arrived at in the problem formulation above. Before proceeding with a response analysis, we must first establish that construction activities can result in exposures to harmful discharges.

8.2.2.1 Exposure to harmful levels of sediment resulting from construction

The *Environmental Baseline* (Section 7) identified the overall condition, along with sources and types of stressors impairing the nation's waters within the range of ESA-listed species and designated critical habitat under NMFS' jurisdiction and within areas where EPA is permitting authority. In this section we highlight the contribution of construction-associated stressors to the

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[10] Accessed 12/14/2016

environmental baseline to establish whether discharges from future construction activities may result in harmful exposures. The ability of the GCP and its implementation to identify and prevent such exposures is evaluated in the assessment of the CGP as a permitting program (Section 8.3).

Nationwide, there are more than 2300 waterbodies with sediment impairments, conditions identified as not meeting designated uses due to construction-associated stressors, for example the support of shellfish or aquatic life. This is likely an underestimate of the number of construction-stressor impaired waters, as some states, like the state of Washington, do not identify the sources of stressors causing aquatic impairments. Further, sources of stressors for some impairments are listed as "unknown" but could include contributions from construction. Further, contributions from construction activity may be masked by contributions from other sources, such as agricultural runoff.

Within states where EPA has full or partial permitting authority and ESA-listed species and designated critical habitat under NMFS' jurisdiction occur, nearly eight thousand linear miles of streams and rivers, four miles of coastline, and one square mile of a bay currently have sediment impairments attributed to construction. These are in Idaho, California, Puerto Rico, Massachusetts, and New Hampshire.

The 100 miles of streams and rivers impaired by sediment from construction activity in Idaho were placed on EPA's 303(d) list in 2012. These impairments are located in southeastern part of the state and not within watersheds where ESA-listed species or designated critical habitat under NMFS' jurisdiction occur.

Of the eleven construction-related sediment impairments in California, seven are in rivers designated as critical habitat. Impairments at Big River, Mattole River, and Redwood Creek comprise just over 1600 miles of designated critical habitat for Central California Chinook salmon. In addition, Redwood creek, 523 miles of which are impaired, is identified as spawning habitat for this species. The impaired portions of the Gualala, Navarro, Eel, and Van Duzen Rivers comprise just over 6,000 miles of the critical habitat designated for Northern California steelhead. These waters are rearing habitat, with none identified as spawning habitat. Finally, the Upper Newport Bay ecological reserve is impaired by construction sediment and is within the range of black and white abalone. While the EPA does not have permitting authority for any of the sediment-impaired waters in California, these impairments demonstrate that sediment from construction activities adversely affects aquatic habitats.

A single coastline construction sediment impairment in Puerto Rico was placed on the 303(d) list in 2014. It runs along Cayo Parguera to Punta Guayanilla in Puerto Rico, an area that had been identified as seagrass habitat during the 2000-2002 benthic habitat mapping conducted by the National Center for Coastal Ocean Science.[11]

There are just over thirteen miles of streams and rivers in Massachusetts and New Hampshire with construction sediment impairments. While these are not waters where ESA-listed species under NMFS' jurisdiction occur, they provide evidence that construction activities impair waters in this part of the country as well.

[11] https://coastalscience.noaa.gov/projects/detail?key=182

NMFS concludes that individuals of ESA-listed species and essential elements of designated critical habitat may be exposed to harmful levels of stressors in construction stormwater discharges because EPA's 303(d) list identifies construction as the source of sediment impairment of aquatic habitats within the range of these species, and in some cases, within designated critical habitat.

8.2.2.2 Exposure to Harmful Levels of Flocculating Agents

Our assessment of the potential for exposure to harmful levels of flocculating agents is based on reported use over the course of the 2012 CGP permitting period and the best toxicity information available for these commercial products. This information was transmitted as a spreadsheet by EPA to NMFS on October 25, 2016, In our review of the 2012 CGP NOI, NMFS found that EPA collected information on the use of flocculating agents using a free text field (i.e., anything could be typed into portion of the NOI form). As a result, clear interpretation of this information was complicated because the entries varied in spelling and punctuation and identified the substances in a variety of ways: commercial product names, product constituents, general terms such as "flocculant," or "anionic," and statements of how and when chemical treatments might be used, but not what substance would actually be used. It is expected that those NOI where the actual flocculating agents could be identified (n=90) are representative of the 205 NOI indicating that flocculating agents would be used or might be used where needed. The 205 NOI filed for the 2012 CGP make up about 1 percent of all the NOI filed.

Among the stabilizers that could be identified using information in the NOI, the most common was PAM (n=45) and anionic copolymer mixtures (n=29). The 2017 CGP NOI does not specifically request information on whether any flocculant used is oil based, but in cases where commercial products are identified on the NOI, most were solid-form (i.e., floc blocks) and none were oil based.

Only 11 out of the more than 23,000 NOI filed under the 2012 CGP clearly indicated that cationic flocculating agents would be used. Two of these identified the use of cationic products in error because the NOI provided the commercial name for an anionic solid PAM product, Applied Polymer Systems' 700 series Floc Logs. In all but one of the remaining 9 NOI, chitosan was identified as the cationic flocculating agent. One NOI that did not check the box flagging the intended use of a cationic flocculating agent evidenced a misunderstanding of chitosan, stating that *"Chitosan or similar type of natural non-toxic flocking agent would be used."*

Half of those NOI indicating flocculants would be used were filed for activities occurring in Massachusetts (n=106). Three of these were directly adjacent to waters used by Atlantic and shortnose sturgeon and three were within 2 km of such waters. Twenty NOI filed for construction activities expecting to use flocculants in Idaho included one discharging to an unnamed tributary to the Upper Salmon River that is designated as critical habitat for Snake River Steelhead. One of the four NOI with flocculant use filed in Washington state discharged to designated critical habitat for Puget Sound Chinook salmon. These NOI did not indicate that cationic flocculants were to be used.

NMFS concludes that exposures to toxic flocculating agents may occur for individuals of ESA-listed species and any forage species that may or may not be essential elements of designated critical habitat. Although the NOI suggest that flocculating agents are infrequently used (i.e., in 208 out of more than 23,000 NOI) and when flocculating agents are used, nontoxic agents are most frequently employed, in many cases the NOI do not provide

sufficient information to identify the actual agents used and the NOI do not require applicants to certify that cationic flocculating agents will not be used. Since the 2017 CGP allows for the use of toxic flocculating substances which may result in adverse effects, and we are uncertain of how frequently they are used or whether their use is reliably reported, responses to exposures to these agents must be evaluated in this opinion.

8.2.2.3 Responses of ESA-listed Species and Designated Critical Habitat Considered in this Opinion

The following sections describe risks posed by stormwater discharges from construction activities to ESA-listed species and essential features of designated critical habitat under NMFS' jurisdiction and within the EPA's action area.

Cetaceans

While individual southern resident killer whales are not expected to be directly exposed and respond to stormwater discharges from construction activities, discharges may destroy or adversely modify an essential feature of their designated critical habitat: *forage species of sufficient quantity, quality and availability to support individual growth, reproduction and development, as well as overall population growth.* Chinook salmon are the preferred forage species, making up over 70 percent of the diet during the summer months in Puget Sound (Hanson et al. 2010). Effects to salmon, and in particular, Chinook salmon, affects the designated critical habitat for this species.

Salmonid and Non-salmonid Anadromous Fish

The anadromous salmon, sturgeon, and eulachon under NMFS' jurisdiction are particularly vulnerable to the effects of stormwater discharges because the freshwater inland habitats they use for spawning and rearing allow for more immediate exposures at lower dilution volumes relative to exposures occurring in bays and estuaries. These species are treated together in this opinion due to their shared vulnerability and the colocation of, eulachon, and green sturgeon ranges and designated critical habitat on the West coast and of Atlantic salmon and shortnose and Atlantic sturgeon ranges on the East coast.

A great body of literature exists on the effects of urbanization and stormwater pollutants on the Pacific salmonids in comparison to less literature for Atlantic salmon, eulachon, and the sturgeon species. This analysis focuses on the sediment itself and cationic flocculating agents, as the 2017 CGP does not authorize the discharge of toxic legacy contaminants.

Turbidity and bedded sediment preferences vary from species to species and life stage. For example, sturgeon are soft bottom feeders but require clean solid substrate for spawning so eggs will adhere to the substrate and not drift downstream towards more saline waters where they will die. Meanwhile salmonids spawn in gravel substrates where eggs and larvae are protected in the interstitial spaces. For both species groups, sediment can make substrate unsuitable for spawning or bury eggs after they are released. Eulachon spawning substrates are more variable, ranging in size from silt and organic debris to gravel and cobble (NMFS 2016).

Newcombe and Jensen (1996) developed a model that synthesizes effects data to provide severity-of-ill-effect scores for juvenile and adult salmonids. According to the model, one hour exposures to TSS concentrations between 55 and 148 mg/L would lead to abandonment of cover and avoidance, at three hours, feeding rates would be reduced, and seven hours of elevated TSS would result in minor to moderate physiological stress. The influence of suspended sediment on the foraging activity, territorial behavior and alarm reaction of juvenile Atlantic salmon was reported to be seasonal, with reduced responses in colder waters of winter and increased reaction during warmer months (Robertson et al. 2007). Berg and Northcote (1985) demonstrated the influence of short-term pulses of sediment (30-60 nephelometric units, or NTU) on visual cues necessary for territorial behavior and feeding by juvenile Coho salmon. Visual isolation under turbid conditions increased feeding behavior of juveniles. The authors stated that this was because juveniles they could not see the more dominant fish present. However, the increased turbidity also reduced the volume of water that could be searched for prey and reduced capture success and the amount of food ingested. Gill flaring also increased under conditions of high turbidity, suggesting gill irritation. The authors concluded that repeated disruption of the social organization of the fish, reduced feeding success, and physiological stress may incur energetic costs that might otherwise have been allocated towards growth of juveniles, thus impairing fitness. Gregory and Northcote (1993) also observed increased foraging rates in juvenile Chinook under moderately turbid conditions (~35-150 nephelometric units), but attributed this to decreased predation risk per Gregory (1993). Unfortunately the Gregory and Northcote (1993) study tracked capture success or the amount of food ingested.

A study evaluating the effects of fine sediments reported that blockage of interstitial spaces among gravel river bed and coating of Atlantic salmon embryos reduced the availability of oxygen, and thus, survival (Greig et al. 2005a, Greig et al. 2005b). It is reasonable to expect this is also the case for other salmonid species, if not other fish species in general. Incubation of steelhead and Chinook salmon in gravel with sediments of varying particle sizes indicated that the greatest mortality occurred with finer sediments (Reiser and White 1988). Fine sediments with high organic matter content were shown to be more detrimental to the survival of brown trout and Atlantic salmon eggs due to the oxygen demand consumed by biodegradation of the organic matter (Sear et al. 2016).

The impacts of sediment plumes on survival and swimming behavior of juvenile Atlantic sturgeon were found to be negligible in the lab and are expected to be minimal in the nature as fish will avoid plumes (Wilkens et al. 2015). NMFS expects that the survival and swimming behavior of shortnose and green sturgeon would similarly not be affected by turbidity. It is reasonable to expect that the foraging behavior of sturgeon species would not be influenced by turbidity because these species are not sight predators. Rather they use tactile barbels to sense prey on the bottom substrate (Figure 8). The ventrally located mouth is used to vacuum up benthic organisms on a rocky bottom or within soft sediments, straining benthic fauna from any and gravel that may have been taken in.

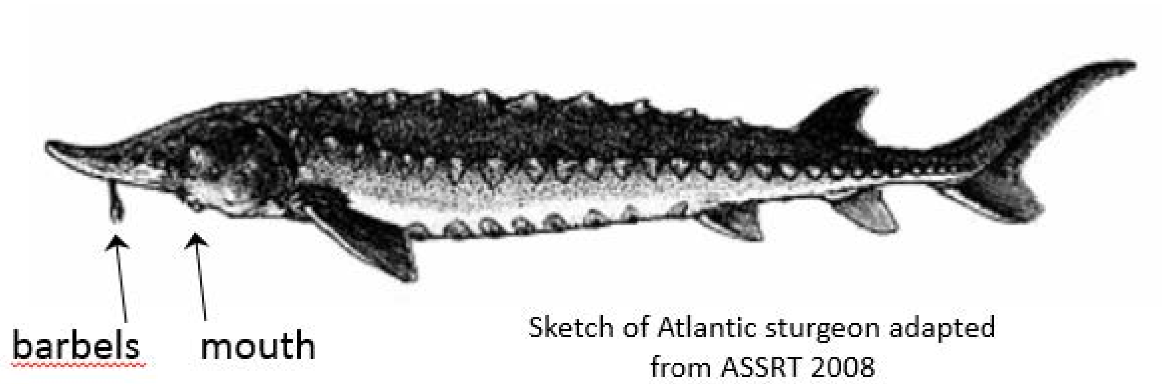

Figure 8. Sketch of an Atlantic sturgeon showing the location of barbels and mouth.

While there are no data on the effects of bedded sediment or sedimentation/siltation on eggs of ESA-listed sturgeon species under NMFS' jurisdiction, a study examining survival in the endangered white sturgeon of the Kootenai river found that a coating of 5 mm fine sediment reduced egg survival to 50 percent after 4 days and 20 percent after 9 days (Kock et al. 2006). Among surviving eggs, hatches were delayed relative to controls and the larvae were smaller. Silt is harmful to sturgeon eggs in the wild because it prevents their adhesion to hard rocky substrate. Without adhesion to a rocky substrate, eggs can drift towards more saline estuary waters where they will die.

Very little information is available on the effects of bedded and suspended sediment on eulachon. While eulachon will spawn on a more diverse range of substrates than salmonids and sturgeon, egg mortality was reported to be higher for those laid on silt or organic debris relative eggs laid on sand or gravel (Langer et al. 1977).

Very little toxicity data are available for cationic flocculating agents. The best available toxicity data is the study by (Kerr et al. 2014) reporting cationic PAM effects on rainbow trout at concentrations 1000 times lower than environmentally relevant concentrations of the anionic PAM. In the absence of species-specific data on cationic flocculant toxicity for ESA-listed salmonid and non-salmonid anadromous species under NMFS' jurisdiction, steelhead are a suitable representative species for indicating the potential effects of cationic flocculants.

Indirect Effects. Potential indirect effects to salmon and sturgeon would include loss of prey items and habitat characteristics that are affected by sediment. Indirect effects on eulachon through effects to forage species is not expected because they forage in the open ocean, chiefly eating crustaceans such as copepods and euphausiids (Barraclough 1964, Hay and McCarter 2000).

Designated Critical Habitat. The critical habitat designation for Chinook salmon includes essential features with respect to habitat, water quality, and food abundance in freshwater, estuarine, and marine habitats. Effects to habitat would be associated with the physical disturbance and contribution of sediment. However, construction stormwater may also impact water quality and food abundance of both forage fish and invertebrates (McCarthy et al. 2008, Johnson et al. 2013) in the critical areas used by Chinook salmon.

The Status of the Species and Designated critical habitat section describes the common essential features for seven California listed Chinook salmon and steelhead, 12 ESUs of Oregon, Washington, and Idaho salmon (chum, sockeye, Chinook) and steelhead, and for the Oregon coast coho salmon. Among these, the biological and substrate essential features which may be affected by CGP discharges include water quality and substrate attributes necessary to support spawning, incubation and larval development; water quality and forage to support juvenile development; and natural cover including vegetation in in water courses used during rearing, migration, and freshwater-marine transition; juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation in estuarine, and nearshore areas. Essential habitat features for coho salmon ESUs, which are less detailed, were also summarized in in the Status of the Species and Designated Critical Habitat section of this opinion. Essential attributes of coho salmon designated critical habitat which may be affected by CGP discharges include substrate, water quality, cover/shelter, food, and riparian vegetation. Sediment discharges may infiltrate and embed spawning gravels and cobble, making the substrate unsuitable for nesting or reducing the survival of any eggs or newly hatched larvae present. Erosive flows may also dislodge and redistribute substrates.

Critical habitat for shortnose sturgeon has not been designated but other species in the sturgeon species group, Atlantic and green sturgeon have proposed and designated critical habitat, respectively. The essential features of designated critical habitat proposed for Atlantic sturgeon include hard bottom substrate composed of (rock, cobble, gravel, boulder, etc.) for settlement of fertilized eggs, refuge, growth, and development of early life stages, aquatic rearing habitat with soft substrate (e.g., sand, mud) downstream of spawning sites for juvenile foraging and physiological development. The essential features of the designated critical habitat for Gulf sturgeon include water and sediment quality (e.g., organic matter content, toxicant content), sediment substrate (e.g., grain size, availability of interstitial spaces), flow regime, prey quality and abundance, as well as clear migratory pathways. The essential features for green sturgeon designated critical habitat include abundant prey items for larval, juvenile, subadult, and adult life stages, suitable water flow and physical substrate for spawning and water and sediment of sufficient quality for normal behavior, growth, and viability of all life stages. Physical habitat essential features, including sediment substrate, flow regime, and clear migratory pathways, are expected to be affected by turbidity. Impacts to the dietary component of the designated critical habitats designated for salmonids and sturgeon, that is to say, invertebrate populations, are highly location and discharge specific and are accompanied by substantial amounts of uncertainty.

Marine fish: Nassau grouper

Nassau grouper inhabits shallow waters of the Caribbean, including Puerto Rico where the EPA has permitting authority. Juveniles are particularly vulnerable to land-based pollutants like construction stormwater because they are nearshore seagrass and macroalgal beds (NMFS 2013a). Information on the effects of turbidity on the survival and behavior of Nassau grouper can be inferred from the responses of other species of grouper and estuarine fish. Changes in food consumption and growth were not observed in juvenile green grouper exposed to environmentally realistic suspended sediment for six weeks (Au et al. 2004). However gill tissue abnormalities and biochemical analysis indicated osmoregulatory stress, suggesting that prolonged or chronic exposures would weaken fish, affecting long term growth and fitness. A study examining effects of suspended sediment on snapper demonstrated the potential for such effects that short term exposures reduced foraging success, but long term exposure resulted in gill damage, gill parasite infestation, and weight loss. Examination of the gills of field-collected snapper from areas with differing levels of suspended sediment were consistent with laboratory observations (Lowe et al. 2015). The study examining effects on green grouper did not assess foraging success. Nassau groupers forage through ambush, which relies on sight (NMFS 2013a).

Data on the effects of cationic flocculating agents in marine environments were not found. Cationic flocculating products have been reported to effectively treat drilling brine (Li et al. 2016) and solid waste from brackish aquaculture systems (Li et al. 2016). It is reasonable to expect that cationic flocculating products will also affect marine species. The release of such agents to marine systems cannot be assumed to be resolved by dilution prior to exposure of Nassau grouper because juveniles will use tidal creeks and other shallow habitats.

Indirect Effects. As a reef dependent species, the direct effects described for corals below, are also indirect effects on Nassau Grouper. In addition, seagrass and macroalgal beds are used by juvenile grouper. Damage to seagrass habitat due to sediment discharges resulting from construction activity in Puerto Rico has been documented by staff at NMFS South East Regional Office (Figure 9).

Figure 9. Sediment coated seagrass near a construction site in Costa del Mar, Puerto Rico (photo credit, Lisamarie Carrubba, NMFS Southeast Regional Office).

Designated Critical Habitat. Designated critical habitat has not been proposed for Nassau grouper

Sea Turtles

There is limited information on the responses of ESA-listed sea turtles to turbid waters. Avoidance of turbid waters by hawksbill sea turtles was suggested by a study systematically sampling Golfo Dulce, Costa Rica (Chacon-Chaverri et al. 2015). Capture success declined during spring rainy season when the waters sampled became more turbid. In contrast, olive ridley hatchlings in the turbid waters of the Gulf of Fonseca were observed to spend less time swimming at the surface during daytime, apparently using the water's turbidity as cover to avoid avian predators (Duran and Dunbar 2015). The Maroni River estuary is also a turbid environment and lacks sea grasses, but gravid green sea turtles use this sub-optimal habitat during nesting season (Chambault et al. 2016).

Data were not found on the effects of flocculating agents on sea turtles. Sea turtles are air breathers, so the respiratory systems would not be exposed to such agents.

Indirect Effects. Indirect effects of stormwater discharges on sea turtles are associated with the effects of these discharges on coral reefs (discussed below) and sea grasses (see discussion on Nassau grouper and Figure 9). Hawksbill sea turtles are dependent on coral reefs for food and shelter while green sea turtles require seagrass beds for foraging. As discussed previously, sediment loads in stormwater discharges adversely affect the quality of these habitats.

Designated Critical Habitat. Critical habitat designated for green and hawksbill turtles and the St. Croix population of leatherback turtles does not specify essential features, rather activities requiring species management are identified for these areas. These include coastal construction and point and nonpoint pollution, such as that contributed through stormwater. Critical habitat for west coast leatherback sea turtles and gulf coast loggerhead turtle include marine forage species, which, given the distance from the coastline where these forage species are consumed, are not likely to be affected by stormwater discharges. Designated critical habitat for green sea turtles centers on the Island of Culebra in Puerto Rico and specifies that seagrasses are principal dietary items for juvenile and adult green sea turtles in the Caribbean. The impacts of sediment in construction stormwater on seagrasses in Puerto Rico was documented by NMFS Southeast Regional Office (see discussion on Nassau grouper and Figure 9). Designated critical habitat for hawksbill sea turtle are the beaches waters around Mona Island, a nature reserve where construction activities will not likely occur.

Corals

While there are no available sediment criteria or effects thresholds for coral species at this time, sediment discharges under the CGP are a concern for corals. Puerto Rico waters have been burdened by sediment due to a legacy of deforestation in the 1950's to support sugarcane agriculture which endured into the 1980s (Marinez and Lugo 2008). Increasing urban expansion and associated construction activities, in some cases construction converting agricultural land to a built environment, contribute to these sediment loads. Sediment favors competition by macroalga and reduces the availability of suitable colonizing substrate, smothers new recruits, and reduces fertilization (Humphrey et al. 2008, Jokiel et al. 2014, Jones et al. 2015).

The entire refe

Figure 10 Sediment plume washing over elkhorn coral reef. (http://sero.nmfs.noaa.gov/protected_resources/coral/elkhorn_coral/).

There can be substantial natural variability in turbidity/suspended sediment among coral reef environments due to tides, storms, and river input (e.g. Figure 10) and sediment tolerance varies among coral species (reviewed in (Harmelin-Vivien 1994, Anthony et al. 2004, Orpin et al. 2004, Storlazzi et al. 2004, Jouon et al. 2008, Erftemeijer et al. 2012). Light attenuation from sediment concentrations above tolerated levels impairs photosynthesis by zooanthellae symbionts, reducing the energy available to the host coral. In addition to effects on energy supplied by the zooanthellae, sediment blanketing of coral poses additional energetic costs through impaired feeding, increased polyp cilliary activity and stimulation of mucous production, to clear the sediment(Peters and Pilson 1985, Riegl and Bloomer 1995, Riegl and Branch 1995). An example of this type of damage is shown in Figure 11. The structure of many coral species maximizes surface area and geometric arrangement such that the capture of light and food particles carried by the current is optimized. Certain morphologies are prone to collect more sediment from the water column than the coral species is able to clear (Hubbard and Pocock 1972, Bak and Elgershuizen 1976, Dodge 1977, Rogers 1990, Stafford-Smith 1993, Sanders and Baron-Szabo 2005). The consequences of these photo-physiological responses include increased susceptibility to disease and reduced coral growth, calcification, and regeneration rates. Sediment blanketing substrate also inhibits settlement of larval corals and reduces recruitment. At high sediment stress levels, individual-scale responses compound to colony and reef scale effects manifested as changes in coloration, bleaching and necrosis. Sustained sediment stress can lead to widespread mortality and changes in community structure.

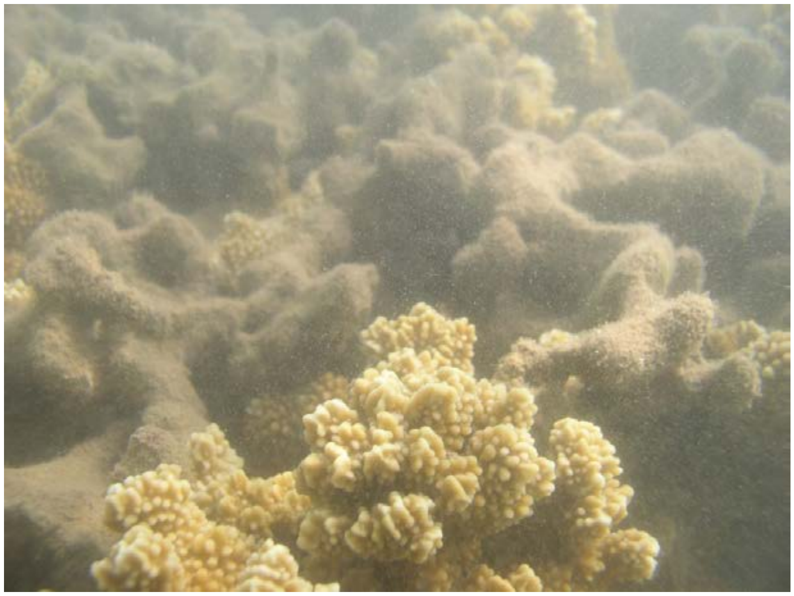

Figure 11 Sediment from land-based sources of pollution covers coral near a wharf in Kanakakai, Hawaii. Photo Credit: Kathy Chaston, http://coralreef.noaa.gov/aboutcrcp/strategy/reprioritization/wgroups/resources/lbsp/welcome.html

Organisms vary in their ability to tolerate and recover from exposure to sediment or turbidity. The proportion of organisms able to tolerate (or escape) periods of elevated sediment and turbidity levels can increase in impacted surface waters, while the proportion of sensitive species may decline. However, even organisms adapted to sediment or turbidity influx (whether episodic or constant) can be harmed if input levels rise excessively or if their resiliency is taxed by other stressors. Given the broad range of sensitivity and resilience among coral species and habitats, the effects of construction stormwater discharges will therefore be very location and species-specific.

Data were not found on the effects of cationic flocculating agents on coral species. Because coral will clear sediment through mucous excretions, it is reasonable to expect cationic flocculants will bind with the mucous produced by corals, potentially impairing the ability to clear sediment from coral in addition to interfering with gill respiration and filter feeding.

Indirect Effects. Indirect effects to corals from sediment include responses by other organisms that profoundly affect health and abundance of corals, including organisms that facilitate coral settlement, alter the structural strength of the reef substratum, compete for space with corals, infect corals with diseases, and prey on corals (Fabricius 2005).

Designated Critical Habitat. Critical habitat designated for elkhorn and staghorn coral required certain substrate. Elkhorn and staghorn coral have designated critical habitat in the tropical western Atlantic Ocean that includes reef rubble, reef crests, reef flats, spur and groove reefs and transitional reefs. The only essential feature listed is suitable colonizing substrate, which may be embedded by sediments.

8.2.3 Risk Characterization

The risk characterization considers the population-level implications of adverse responses representing the assessment endpoints to determine if these are sufficiently large to affect population parameters (e.g., assessment endpoints such as recruitment or reproductive rate).

Effects to the conservation value of the physical and biological features of designated critical habitat are evaluated at this point in the assessment. To review, the risk hypotheses evaluated are:

Risk Hypotheses for Direct Effects of Sediment: Stormwater discharges from construction activities result in exposures that will directly affect the survival and fitness of ESA-listed individuals under NMFS' jurisdiction through:

- direct mortality
- reduced growth
- altered behavior
- reduced fecundity (i.e., reduced reproductive output or offspring survival)

Risk Hypothesis for Indirect Effects of Sediment: Stormwater discharges from construction activities will result in exposures that will indirectly affect the survival and fitness of ESA-listed individuals under NMFS' jurisdiction through reduction in forage species.

Risk Hypothesis for Effects of Sediment to Designated Critical Habitat: analysis includes direct and indirect effects on biological elements within the spatial extent of designated critical habitat (e.g., prey, plant cover) affecting the value of the habitat for the conservation of the species. Since the stressors of the action are exert effects on organisms and the physical habitat, both the biological and structural features specified in designated critical habitat may be affected by the action.

The overarching risk hypothesis for evaluating effects to designated critical habitat is:

> "Stormwater discharges will result in adverse effects to designated critical habitat features that are essential to the conservation of the species"

Risk Hypothesis for Direct and Indirect Effects of Cationic Flocculating Agents: Exposure to cationic flocculating agents results in observable toxic responses, excess mucous production and gill irritation leading to death, at concentrations expected from normal application rates and use. Sublethal effects are not expected. Accordingly, the risk hypothesis for the use of cationic flocculating agents is:

> "Stormwater discharges containing cationic flocculating agents will result in direct mortality of exposed ESA-listed species under NMFS' jurisdiction and indirect effects through mortality of exposed forage species."

Risk Hypothesis for Effects of Cationic Flocculating Agents to Designated Critical Habitat: The risk hypothesis for effects on designated critical habitat applies to the biological essential features that would respond to cationic flocculating agent toxicity:

> "Stormwater discharges containing cationic flocculating agents will result in adverse effects to designated critical habitat through toxicity to forage species that are listed as features that are essential to the conservation of the species"

8.2.3.1 Conclusions for the Risk Characterization

The exposure and response analysis described in section 8.2.2 indicates that construction activities potentially result in exposures to suspended and bedded sediments, and toxic cation flocculants that could affect the survival and fitness of individuals through direct mortality, reduced growth, altered behavior, and/or reduced fecundity of salmonids, sturgeon, Nassau grouper, sea turtles, and coral. Further, discharges are expected to result in exposures that could affect the survival and fitness of individuals through effects to forage species and structural habitat, including effects to essential elements of designated critical habitat essential features.

Based on the exposure and response analysis in Section 8.2.2, NMFS concludes that construction stormwater discharges may result in:

Excess turbidity

- ***potentially causing direct mortality of ESA-listed coral due to smothering and burial because these species are not mobile and cannot avoid and may become overwhelmed by sediment surface burdens or reductions in light penetrationaltering prey detection and foraging success, and consequently potentially adversely affecting the growth and fitness, of species that rely on sight when foraging in inland or nearshore waters: salmonids and Nassau grouper***
- ***clogging the gills of ESA-listed fish and filter feeding structures of ESA-listed coral species resulting in physiological responses (e.g., impaired oxygen exchange, mucous excretion) that entail energetic costs at the expense of growth and fitness***

Excess bedded sediment

- ***potentially adversely affecting the fitness of salmonids, sturgeon, and eulachon through mortality of embryo and larval life stages smothered by discharged sediment or through the burial and degradation of elimination of suitable spawning substrates***
- ***potentially adversely affecting the fitness of ESA-listed corals due to the through the burial and degradation of elimination of suitable colonization substrates***
- ***potentially adversely modifying designated critical habitat essential features of suitable spawning or colonization substrate for the conservation of ESA listed salmonids, sturgeon, and coral species***

Excess turbidity and bedded sediment

- ***indirectly affecting the survival and fitness of ESA-listed salmonids through burial of interstitial spaces of gravel substrate where invertebrate forage species occur or through the clogging of gills of forage fish species***
- ***indirectly affecting the growth and fecundity in ESA-listed coral due to light attenuation effects on symbiont photosynthesis***
- ***indirectly affecting the survival and fitness of green sea turtle and Nassau grouper through smothering or degradation of the seagrass and macroalgal habitats they rely on***
- ***potentially adversely modifying designated critical habitat essential features of forage species for the conservation of ESA-listed Southern Resident Killer Whale, salmonids, and sturgeon***

Cationic flocculation agents

- ***potentially causing direct mortality of ESA-listed salmonids, sturgeon, eulachon, Nassau grouper, and coral species due to binding to and clogging of gills, and in the case of corals, binding to mucous exuded to clear sediments and to filter feeding structures***

- ***potentially causing indirect effects to ESA-listed southern resident killer whale, salmonids, sturgeon, eulachon, and Nassau grouper through effects to pry from the binding to and clogging of gills of forage species***
- ***potentially adversely modifying designated critical habitat essential features of forage species for the conservation of ESA-listed Southern Resident Killer Whale, salmonids, and sturgeon***

According to our Risk Analysis and Risk Hypotheses, excess turbidity and bedded sediment from construction stormwater discharges would not be expected to result in direct mortality of Southern Resident Killer Whale, juvenile and adult salmonids, juvenile and adult sturgeon, juvenile and adult eulachon, juvenile and adult Nassau grouper, or sea turtles because these species are mobile and able to avoid or adapt to temporarily unsuitable conditions.

8.3 Analysis of the Construction General Permit as a Permitting Program

The preceding risk analysis establishes that stormwater from construction activities potentially adversely affects ESA-listed species and designated critical habitat under NMFS' jurisdiction. Having found that these discharges pose a risk, we now evaluate the ability of the CGP permitting program to prevent or minimize risk posed by such discharges to ESA-listed species and designated critical habitat under NMFS' jurisdiction.

8.3.1 Discharge Control Measures

In order to be authorized to discharge stormwater from construction sites under the CGP, dischargers must abide by the requirements of the permit. Operators must comply with pollution prevention requirements and are prohibited from discharging wastewater from washout of concrete, wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials, fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance, soaps, solvents, or detergents used in vehicle and equipment washing or external building washdown; and toxic or hazardous substances from a spill or other release.

The CGP-covered operators must minimize discharges of pollutants from construction activities by accounting for precipitation frequencies, the nature of stormwater flow over the site, and the soil type. Operators will also be required to design controls in accordance with good engineering practices, install stormwater controls at the beginning of each phase of construction, and ensure that all stormwater controls are maintained and remain effective during permit coverage.

Specific requirements are included that implement the sediment and erosion control limits in EPA's Construction and Development rule. These include (but are not limited to):

- Installation of vegetative buffers or equivalent controls;
- Direct stormwater to vegetated areas;
- Installation of sediment controls along perimeter areas;
- Minimize sediment track-out;
- Manage stockpiles or land clearing debris piles;
- Protection of storm drain inlets;

- Minimize erosion of conveyance channels, embankments, outlets, adjacent streambanks, slopes, and downstream waters;
- Proper design of sediment basins; and
- Additional controls for the use of treatment chemicals.

In addition to these measures the CGP restricts discharge of fertilizers from construction sites, requires exposure of wastes, including building materials containing PCBs, to precipitation be minimized.

The CGP specifies that discharges will be required to be controlled as necessary to meet applicable water quality standards, with additional proposed requirements for sites discharging to waters impaired for pollutants commonly associated with construction activities, such as sediment and nutrients.

Temporary stabilization is required immediately in areas that will not resume construction for 14 or more days. Operators will be required to complete temporary stabilization within 14 days and within 7 days for sites with discharges to sensitive waters. The final (post construction) stabilization criteria for areas not covered by a structure requires that vegetation provide a uniform (i.e., evenly distributed, without large bare areas) perennial cover with a density of 70 percent or more of the natural background cover; and/or permanent non-vegetative stabilization measures (e.g., rip-rap, geotextiles) must be implemented to provide effective cover. This does not apply to land restored to pre-construction agricultural use. Areas that are arid, semi-arid, or drought stricken are permitted to take up to 3 years to achieve final stabilization after initial seeding.

Operators are required to visually assess all stormwater controls, check for spills or leaks, identify areas where new or modified stormwater controls are needed, signs of erosion or sedimentation, and any discharges occurring during the inspection, taking note of color, odor, floating, settled, or suspended solids, foam, oil sheen, and any other indicators of stormwater pollution. Operators will be required to conduct inspections every 7 days or every 14 days and within 24 hours of a storm event of 0.25 inches or greater, or the occurrence of snowmelt runoff. Operators with discharges to sensitive waters have a more stringent inspection frequency.

More stringent discharge, stabilization, and inspection requirements are placed on NOI for discharges to waters designated by a state or tribe as Tier 2, Tier 2.5, or Tier 3 waters (i.e., high quality or outstanding natural resource waters).

8.3.1.1 Standard Permit Conditions

As discussed in section 3.8 of this opinion, the 2017 CGP incorporates standard permit conditions consistent with the general permit provisions required under 40 CFR 122.41: Conditions applicable to all permits. (see appendix I of the 2017 CGP). These conditions establish obligations of permittees, including the obligation to comply with the permit, that failure to comply with the permit constitutes a violation of the CWA, and specifies the penalties for failures to comply with the permit. The conditions include reporting requirements for any noncompliance which may endanger health or the environment which may result from a bypass (i.e., intentional diversion of a discharge not consistent with the permit) or upset (i.e., exceptional incident leading to unintentional discharge exceeding permit limits). Under this provision, circumstances where ESA-listed species may be harassed or harmed or designated critical habitat would be adversely modified would be reported to EPA within 24 hours of the noncompliance or action that may result in noncompliance.

8.3.1.2 Implementation: Incorporation of NMFS' expertise

As part of the measures for EPA, to insure that their authorization of individual CGP discharges, is not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitat, the CGP incorporates NMFS expertise during the CGP's 14-day review period prior to authorization. General permit NOI, and any supporting documentation submitted with the NOI, are automatically transmitted to NMFS for review once the applicant completes their submission (see History of the Consultation, November 2, 2016 request by EPA for verified e-mail addresses). If during the 14-day review period, NMFS informs EPA that ESA eligibility may not have been correctly certified, EPA has the authority to place a hold on authorization, require an operator to submit additional information, or require an operator to obtain an individual permit in order to discharge.

8.3.2 Assessment of the Permitting Program: Measures to Protect ESA-listed Species and Designated Critical Habitat

Coverage under the 2017 CGP is available only for stormwater discharges, allowable non-stormwater discharges, and stormwater discharge-related activities that, with respect to ESA-listed species or designated critical habitat either: have no effect; are not likely to adversely affect; or, are covered through a prior ESA section 7 consultation or ESA section 10 incidental take permit. Additionally, a site will only be eligible to discharge under the CGP only if stormwater discharges, allowable non-stormwater discharges, or stormwater discharge-related activities would not cause a prohibited "take" of federally-listed endangered or threatened species (as defined under section 3 of the ESA and 50 CFR 17.3), unless such takes are exempted/authorized under sections 7 or 10 of the ESA.

The EPA specifies five provisions in the draft CGP upon which EPA based its finding of not likely to adversely affect in its biological evaluation:

- To gain coverage under the permit, the operator will be required to meet all conditions, including specific detailed conditions related to ESA.
- In submitting an NOI, the operator will be required to include information justifying its determination regarding the ESA eligibly criteria.
- Any permit noncompliance will constitute a violation of the CWA and will be grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.
- The permit will require reporting of planned changes in many circumstances.
- The permit has a reopener clause which provides EPA the authority to modify or revoke or reissue the permit if certain conditions are met.

It is NMFS' opinion that the CGP discharge control measures, taken with the SWPPP, effluent limits, inspection, and reporting requirements described in the Description of the Action (Section 0) and summarized above, work together to minimize exposure of aquatic ecosystems, including ESA-listed species and designated critical habitat, to stressors in construction site stormwater (and CGP-allowable non-stormwater) discharges. In addition to

these measures, the ESA Eligibility Criteria process and incorporation of NMFS' expertise in the NOI review process, provide additional barriers to adverse exposures of ESA-listed species and designated critical habitat under NMFS' jurisdiction. In light of the CGP's minimization of exposure to stressors, NMFS concludes in Section 9 that EPA's re-issuance of the 2017 CGP is not likely to jeopardize any listed or proposed species under NMFS's jurisdiction that are the subject of this consultation, or destroy or adversely modify any designated critical habitat of such species.

However, assessment of the CGP as a permitting program requires in depth specific consideration of how EPA's implementation of the permit identifies and addresses potential risks posed by CGP-authorized discharges. This assessment is intended to optimize implementation of the permit for the protection of ESA-listed species and designated critical habitat by identifying elements that may require special attention in order to avoid or minimize incidental take resulting from EPA's action. On October 27, 2015, NMFS asked EPA staff to provide responses to seven questions related to how the CGP is specifically structured to prevent or mitigate harmful exposures and identify and address implementation and compliance issues that may affect ESA-listed species and designated critical habitat under NMFS' jurisdiction. This analysis reviews EPA's responses to these questions, followed by NMFS own perspective and conclusion. It is important to restate here, NMFS has not previously completed formal consultation on the CGP, so NOI were not transmitted to NMFS Regional Offices for review over the 2012 CGP term, as has been the case for the 2011 and 2016 Pesticides General Permits and the 2015 Multisector General Permit. For these permits, EPA consulted with NMFS and arranged for NMFS review of the NOI to be authorized. All of the 2012 CGP NOI were transmitted to NMFS for review on October 25, 2016, in preparation for consultation on the 2017 CGP. Evaluation of the 2012 CGP NOI provided valuable insight to the agencies on how to optimize implementation of the permit.

Question 1. Scope - Has the general permit been structured to reliably estimate the probable number, location, and timing of the discharges that would be authorized by the permitting program that may affect ESA-listed species/designated critical habitat?

From EPA's response:

> *EPA can provide a very general projection of the number, location and timing of dischargers that may seek authorization under the draft permit based upon data on the existing 2012 CGP. However, because EPA has no advance knowledge of when construction projects are scheduled to become active in the future, the draft CGP cannot precisely estimate the number, location and timing of discharges from these construction activities.*
>
> *EPA's draft CGP is instead structured to ensure that any discharge from an eligible construction project, no matter where it is located within areas where EPA is the permitting authority and regardless of the timing of the discharge, meets the minimum technology and water quality-based effluent limits and ensures protection of endangered species.*

NMFS' opinion: An understanding of the scope of an action is necessary to understand the potential aggregate effects of authorized discharges from multiple construction activities and the degree to which they may overlap in space and time or produce sequential disturbances within a watershed where ESA-listed species and designated critical habitat under NMFS' jurisdiction occur. Our review of the NOI filed under the 2012 CGP provided general insight into the expected number, location, and timing of CGP-authorized activities. Based on data collected over the 2012 CGP permit term, the variability among NOI filings for construction activities appears to be somewhat predictable in terms of the relative distribution and abundance of activities (Figure 12). However, the NOI for the 2012 CGP entries for identifying outfall locations were free text fields, so the information provided did not allow mapping of the precise locations of activities, so the spatial aggregate impact of CGP authorizations of discharges from multiple construction sites cannot readily be evaluated.

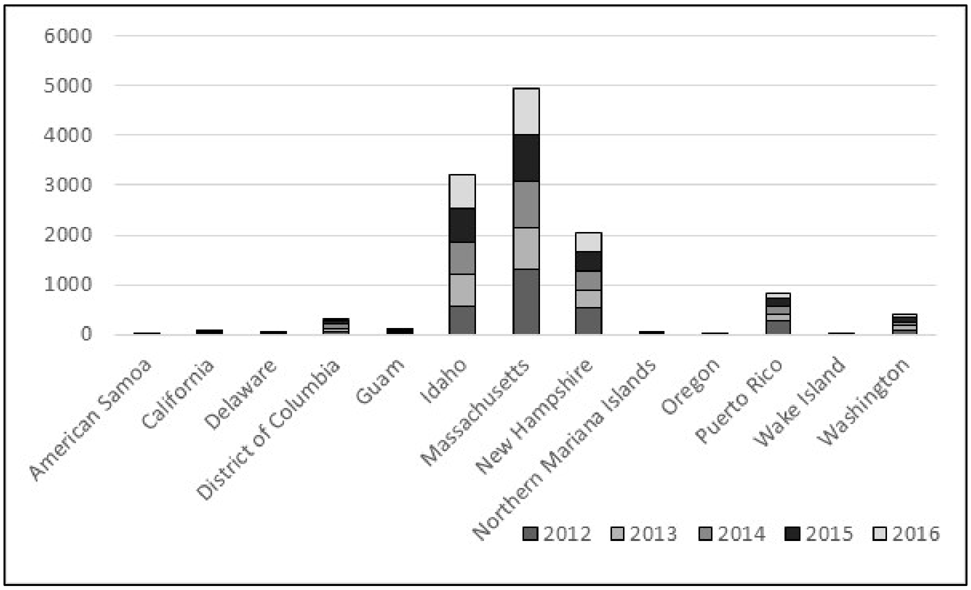

Figure 12. Relative number of authorized construction activities among states examined in this opinion between 2012 and 2016.

These data also had predictable patterns in timing, with construction peaks in the spring and summer for northern climates (e.g., Idaho, Massachusetts), but no apparent seasonal pattern for the warmer climates of Puerto Rico or the Pacific Islands. These are imprecise estimates because some construction activities may not start automatically after authorization. Further, patterns in construction activities may be influenced by economic conditions, natural disasters, and initiatives like the Fixing America's Surface Transportation Act or the FAST Act.

Discharges from construction activities to be authorized by the CGP are not concurrent and are not permanent. For these reasons, the aggregate impacts posed by the 2017 CGP authorizations of stormwater discharges multiple construction activities will be variable, evolving over time as the permit term progresses. Monitoring will be required to identify and mitigate emerging situations where aggregate impacts in a specific area with overlapping construction periods, taken together, potentially create adverse conditions for ESA-listed species.

NMFS concludes that the probable number, location, and timing of the discharges authorized by the 2017 CGP cannot be precisely forecasted. Our review of the NOI submitted under the 2012 CGP indicates these NOI do provide a general overview of what can be expected over the next 2017 permit term. Given the nature of the activities authorized by the permit, the implications of aggregate impacts of these authorizations requires monitoring during the permit term progresses to ensure that taken together, aggregate impacts that potentially create adverse conditions for ESA-listed species and their designated critical habitat are not

emerging. The 2017 CGP incorporates such monitoring through NMFS review of the NOI during the permit term.

Question 2. Stressors - Has the general permit been structured to reliably estimate the physical, chemical, or biotic stressors that are likely to be produced as a direct or indirect result of the discharges that would be authorized (that is, the stressors produced by the actual discharges to waters of the U.S.)?

From EPA's response:

> *The general permit is structured to ensure that aquatic ecosystems and endangered species are protected from stressors likely to be produced by discharges associated with construction and construction-related activities. As with the 2012 CGP, the draft permit incorporates the technology-based effluent limitation guidelines developed for construction and development sites at 40 CFR part 450, including stormwater controls and adaptive management provisions, along with more stringent water quality-based effluent limitations. The draft permit will also prohibit discharges of several pollutant stressors, including toxic or hazardous substances.... EPA has made a determination that, absent any information demonstrating otherwise, compliance with the proposed conditions of the draft permit will be sufficient to control stormwater discharges to meet water quality standards. If the operator or EPA becomes aware or determines that stormwater discharges are not being controlled as necessary to meet applicable standards, the permit will require corrective action and documentation. In the draft permit, EPA may insist that the operator impose additional water quality-based, site-specific stormwater controls in order to meet standards or require coverage under an individual permit if information indicates that water quality standards are not met due to insufficiently controlled stormwater discharges from a site covered under the CGP.*

NMFS' opinion: The EPA's response did not identify the specific stressors expected in construction stormwater discharges that are authorized under the 2017 CGP and did not acknowledge the measures incorporated into the permit at section 1.1.9 to address the use of toxic cationic flocculants. The CGP applies the effluent limitations in the construction and development rule specifying measures to address construction related issued such as erosion and sediment controls, minimization of compaction, soil stabilization, and pollution prevention. In addition to prohibiting the discharges of toxic or hazardous substances, the 2017 CGP requires that construction operators intending to use toxic cationic flocculating agents submit their NOI only after authorization in which the applicable EPA Regional Office determines that appropriate controls and implementation procedures are in place, and that discharges will not cause an exceedance of water quality standards. Forty-four out of the 208 NOI reporting the use of treatment chemicals under the 2012 CGP provided uninformative statements or, instead of identifying flocculants intended for use, identified pesticides, fertilizers, and agents used to treat hazardous discharges (see Section 8.2.2.2). This suggests that the NOI form may require clarifying instructions so that EPA is better able to identify the flocculating agents used for discharges authorized under the 2017 CGP. Among those 2012 NOI flocculating agents are infrequently used (i.e., in 208 out of more than 23,000 NOI) and among those flocculating agents that could be identified, nontoxic agents are most frequently employed.

NMFS concludes that the CGP is not structured to precisely identify all the stressors to ESA-listed species and/or critical habitat that are likely to be produced as a direct or indirect result of discharge authorization. The NOI does not require identification of construction-associated materials other than flocculating agents. Such substances include pesticides and products for the management of soil contaminated by legacy pollutants. In order to avoid adverse effects or minimize take, it will be necessary, during NMFS' review of 2017 CGP NOI for sites that may affect ESA-listed species and designated critical habitat, to request additional information on pollutants, other than sediment and flocculating agents, that may occur in stormwater discharges. In addition, based on our review of the 2012 CGP NOI, the 2017 NOI form could provide more useful information if clarifying text was added to ensure that EPA is more fully informed of what substances may be discharged with construction site stormwater. As provided further in Section 12, the Incidental Take Statement includes measures and Terms and Conditions that will improve the information provided in NOIs, including changes to NOI instructions, monitoring and evaluation of NOI responses, and outreach to permittees.

Question 3. Overlap - Has the general permit been structured to reliably estimate whether or to what degree specific endangered or threatened species or designated critical habitat are likely to be exposed to potentially harmful impacts that the proposed permit would authorize?

From EPA's response:

> *... Among the determinations that will be required to be made prior to obtaining permit coverage, operators will be required to determine if listed threatened or endangered species or their designated critical habitat(s) are likely to occur in the site's action area. If ESA-listed species and/or critical habitat are likely to occur in the action area, the operator will be required to do one or more of the following to assess whether species are located in the action area and whether there are likely to be adverse effects to such species: conduct visual inspections; conduct a formal biological survey; and/or if required and applicable, conduct an environmental assessment under NEPA. If an operator determines that ESA-listed species and/or critical habitat could exist in the action area, they will be required to assess whether discharges or discharge-related activities are likely to adversely affect listed threatened or endangered species or designated critical habitat. The operator will be required to complete this determination before submission of an NOI and provide documentation in the SWPPP... For all criteria, operators will be required to specify the basis for their selection and, if required, provide documentation for the basis for their determination with the NOI form and certify this information using EPA's standard certification provisions. Permittees will also be required to provide sufficient documentation in the SWPPP to justify and support their determination that they satisfy the requirements of the applicable criterion. The draft permit will require the operators to provide their NOI to both EPA and the Services* [meaning the USFWS and NMFS] *for a 14-day review before coverage begins; EPA can, with or without putting a hold on the NOI, notify the discharger during this 14-day time period of the need for additional information before coverage begins.*

NMFS' opinion: The ability of EPA to identify exposures of ESA-listed species to hazardous levels of stressors authorized for discharge by the 2017 CGP relies on permit applicants' accurate identification of the presence of such species, and subsequently, the direct or indirect incorporation of NMFS' expertise (i.e., through the eligibility criteria scenarios) to supply the necessary analytical methodology to evaluate the potential exposures.

The 2017 CGP suggests that visual inspection may be particularly suitable for urbanized areas or industrial parks "where there is little or no natural habitat." Id. NMFS is not convinced that CGP operators are qualified to make determinations about the absence of ESA-listed species/designated critical habitats based on "visual inspection" – especially where the ESA-listed species are aquatic species whose presence or absence may be difficult to detect and whose presence may vary by time, season, life-cycle state, etc. For example, while portions of the Potomac, Piscataquois, Connecticut, and York Rivers are urbanized and appear to be without habitat, ESA-listed sturgeon species spawn in these waters and may not be easy to see via visual inspection based on their behavior and life-history characteristics. In addition, substrate for spawning and interstitial refugia among gravel and cobble are key to the successful hatch and survival of larvae, and that can also exist and not be easily seen via visual inspection. These conclusions are based on past experience with the Multisector General Permit where incorrect Criterion A certifications were common and permit applicants frequently neglected to work with NMFS when species/designated critical habitat under NMFS' jurisdiction were potentially exposed to discharges. The presumption on the part of EPA also appears to be that "visual inspection" may suffice where the activity is far from occupied habitat. This is only appropriate when the action area as a whole is correctly identified and located far from occupied habitat. The CGP needs to ensure that the permittee will take the proper steps, using all available information, to determine whether ESA-listed species/designated critical habitat may be present in the "action area.

The 2017 CGP also suggests that this presence/absence determination could be made through a "formal biological survey." This is preferable to an amateur "visual inspection," but some standards should be stated for what constitutes an acceptable "biological survey." While NMFS intends to provide a spatial overlap webmap to improve accuracy of this process, EPA is still relying on self-reporting, likely by an untrained regulated entity, on the presence of ESA-listed species, so potential remains for intentional or unintentional failure to identify the presence of ESA-listed species in an action area. Issues with self-reporting became evident upon NMFS review of the 2012 CGP NOI basis statements supporting ESA Eligibility Criteria selections, and supporting documentation, that relied on information resources that are not applicable to Federally-listed endangered and threatened species, were not relevant to the criterion selected, or were non responses (e.g., NOI entry of "none").

The 2017 CGP incorporates NMFS' expertise in the review of NOI is to help detect incorrect certifications and cases in which ESA-listed species and/or designated critical habitat are likely to be exposed to potentially harmful discharges that the proposed permit would authorize. Based on NMFS' experience with prior general permits, the EPA's reliance on self-certification of the presence or absence of ESA-listed species and applicability of ESA Eligibility Criteria by operators is expected to result in errors and thus, without NMFS' review, would result in gaps in identifying and addressing discharges that may result in exposures to harmful levels of stressors for such species. Measures and Terms and Conditions to further improve the reliability of NOIs and respond to any insufficient NOIs are provided in the Incidental Take Statement (Section 12).

Question 4. Monitoring/Feedback - Has the general permit been structured to identify, collect, and analyze information about authorized actions that may have exposed endangered or threatened species or designated critical habitat to stressors at concentrations, intensities, durations, or frequencies that are known or suspected to produce physical, physiological, behavioral, or ecological responses that have potential individual or cumulative adverse consequences for individual organisms or essential features of designated critical habitat?

From EPA's response:

> *...EPA also has tools available to address any situation where changes to address unanticipated circumstances are necessary, including, but not limited to, the use of adaptive management and other tools under EPA's standard permit conditions.*

NMFS' opinion: The 2017 CGP's intent is that all discharges either be not likely to adversely affect ESA-listed species (NLAA) or covered by by other ESA section 7 consultations (i.e., as provided for in the ESA Eligibility Criteria scenarios). However, given the large number of authorized activities, it is foreseeable that unanticipated events and unplanned-for discharges will occur on some occasions. The 2017 CGP has procedures for corrective actions to address such circumstances. The corrective action measures in the 2017 CGP requires dischargers to address repairs, water quality standard exceedences, prohibited discharges and other issues immediately or within certain deadlines, document the corrective actions, and maintain a report for each corrective action on site. However, this information is not reported to the EPA, but must be provided on request. There are no procedures for reporting corrective actions specifically for adverse incidents potentially affecting ESA-listed species or designated critical habitat under NMFS' jurisdiction. There are, however, reporting requirements under the Standard Permit Conditions specified in Appendix I of the 2017 CGP. These are consistent with general permit provisions under 40 CFR 122.41. An operator must report any noncompliance which may endanger health or the environment directly to the EPA Regional Office within 24 hours from the time the event is identified, with a written explanation within five days describing the noncompliance, its cause; the period of noncompliance; if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. In addition, an operator must notify EPA of physical alterations or additions that can be defined as a "new source," could significantly change the nature or increase the quantity of pollutants discharged, or changes which may result in noncompliance with permit requirements.

NMFS concludes that, while conditions requiring corrective actions are not automatically reported to and tracked by EPA, the 2017 CGP incorporates EPA's general permit provisions requiring operators to report any noncompliance which may endanger health or the environment. NMFS and EPA take this to include incidents which may have resulted in exposures of ESA-listed species and/or designated critical habitat to hazardous levels of stressors that may result in adverse effects. It is NMFS' expectation that the EPA will notify the appropriate NMFS Regional Office in the event that an affected area is occupied by ESA-listed species/designated critical habitat under NMFS' jurisdiction.

Question 5. Responses of Listed Resources - Does the general permit have 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 the discharges to 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 stressors from discharges at concentrations, intensities, durations, or frequencies that could produce physical, physiological, behavioral, or ecological responses, given their pre-existing demographic and ecological condition?

From EPA's response:

> *The draft general permit does not have a detailed analytical methodology that considers the specifics enumerated above. The general permit, and specifically the ESA-related procedures and eligibility criteria in Appendix D of the draft permit, are designed to ensure that discharges are not likely to adversely affect ESA-listed species or critical habitat.*

NMFS' opinion: The 2017 CGP ESA Eligibility Criteria are intended to directly or indirectly incorporate NMFS' expertise to supply the necessary analytical methodology to evaluate whether ESA-listed species and designated critical habitat under NMFS' jurisdiction may become exposed to and respond adversely to planned discharges. However, as noted previously, issues with self-reporting, indicating an absence of NMFS' expertise, became evident in our review of basis statements in the 2012 NOI supporting ESA Eligibility Criteria selections and documentation that relied on information resources that are not applicable to Federally-listed endangered and threatened species, were not relevant to the criterion selected, or were non-responses. However, NMFS' review of the NOI over the 2017 CGP term provides an opportunity to correct such errors and integrate appropriate expertise into the project plan.

NMFS concludes that, because the basis statements and accompanying documentation for NOI under the 2012 CGP identified individual cases where NMFS' expertise was absent where it was needed, the 2012 permit did not reliably apply an analytical methodology that considered the ecology and vulnerability of ESA-listed species and/or designated critical habitat under NMFS' jurisdiction. The 2017 CGP meets this requirement through its mechanism for NMFS to review NOI and flag those that need changes to meet NLAA. It will be necessary for NMFS to consider the sufficiency of the basis statements during the review the NOI over the 2017 permit term.

Question 6. Compliance - Does the general permit have a mechanism to reliably determine whether or to what degree operators have complied with the conditions, restrictions or mitigation measures the proposed permit requires when they discharge to waters of the United States?

From EPA's response:

> ***...****the general permit itself includes mechanisms for compliance assurance, including adaptive management and reporting conditions. In addition, the draft permit provides for inspections and enforcement, as well as provisions allowing EPA to modify and/or terminate coverage.*

NMFS' opinion: The EPA must have an effective means of oversight to know or be able to determine reliably whether dischargers are complying with the conditions, restrictions or mitigation measures the proposed general permit requires. A search of the EPA's Enforcement and Compliance History Online database (ECHO) indicated that ECHO did not contain inspection and compliance data for all of the CGP NOI filed over the 2012 permit term.[12] For example, a search for the permit type "stormwater construct" in Massachusetts returned only 4 results, when 5,000 NOI had been filed in that state over the 2012 CGP permit term. Gaps in ECHO NOI data are apparently unique to the 2012 CGP, as examination of the ECHO data for the 2015 Multisector General permit for industrial stormwater discharges indicated that the database did contain information from all NOI filed under this general permit. The gap in 2012 CGP NOI is likely because the EPA's eReporting rule requiring submittal of electronic NOI was not signed until October 25, 2015.

Given the expected gaps for 2012 CGP NOI, the information in ECHO cannot produce a confident estimate of the number of inspections conducted by EPA over the 2012 CGP term. This is, however, the best data we have available to us. A query of ECHO identifying the number of EPA-led inspections of construction stormwater permits identified 295 sites with inspections. This amounts to 1.2 percent of 2012 CGP inspected. Again, this is an uncertain estimate given expected gaps in the database for CGP entries.

Other than filing an NOI 15 days prior to authorization under the 2017 CGP, no other routine reporting to the EPA is required under the 2017 CGP. Reports for self-inspections and corrective actions are maintained on-site and are to be made available to the EPA representative in the event of an inspection. Inspection rates are therefore an important tool for EPA to identify compliance rates with respect to implementation of the SWPPPs and any corrective measures needed over the permit term. Given the gaps in CGP-specific inspection and compliance data for the 2012 CGP permit term, NMFS reviewed ECHO data on EPA-issued individual and general permits from other NPDES-permitted sources such as industrial and municipal wastewater, stormwater, and confined animal feeding operations. These are taken as surrogate indicators of compliance performance for EPA-issued CGP permits. NMFS acknowledges that the CGP-authorized discharges differ from these sources, but in the absence of inspection and compliance data, they are the best available indicator for this aspect of permit performance. Data for this analysis were accessed September 4, 2016. Among permits issued by EPA, current data indicate

[12] Accessed by NMFS on April 2, 2016. ECHO contains information provided in NOI along with permit type, facility identification information, inspection history, compliance status, compliance history, and noncompliance types.

that dischargers with individual permits were more likely to be inspected than dischargers covered under general permits (90 percent versus 17 percent). Observed noncompliance rates (e.g., effluent violations, reporting violations) were higher among inspected permits, and highest among individual permit holders (Table 7).

To ensure that noncompliance rates among inspected permits were not inflated by inspections made in response to reporting violations or reported effluent exceedences (i.e., for-cause inspections), a reanalysis of these data excluded those permits with inspections coded as “case development,” “diagnostic,” or “non-compliance rates.” Very few inspections for cause were identified among the data. The results of this second analysis did not indicate that for-cause inspections inflated noncompliance rates. The occurrence of noncompliance among dischargers that are not inspected is identified through required reporting indicating effluent exceedences, methods violations, extraordinary discharge incidents, and through failures to meet reporting requirements. The CGP does not have such reporting requirements, making inspections all the more important. Overall, noncompliance among inspected dischargers is higher than for uninspected dischargers, but, when inspected, dischargers with EPA-issued general permits are less likely to be found in noncompliance than dischargers with EPA-issued individual permits. This could reflect the dominance of industrial and sanitary wastewater dischargers among individual permits and a systematic exclusion of dischargers with problematic discharges from coverage under the EPA’s various general permits.

Table 7. Noncompliance rates among inspected and uninspected dischargers with EPA-issued permits with and without inspections made in response to violations.

Permit Type	Noncompliance Rate Among Inspected Dischargers (inspections for cause excluded)	Noncompliance Rate Among Uninspected Dischargers
EPA-issued General Permit	20 percent (20 percent)	4 percent
EPA-Issued Individual Permit	67 percent (64 percent)	33 percent

Previous investigations of general permits have examined the reliability of self-identification for permit coverage and self-reporting for permit violations from those covered under the Multisector General Permit for stormwater discharges from industrial sites. One investigation reported grossly incomplete compliance with State and EPA administered storm water general permits 10 years after implementation (Duke and Augustenborg, 2006). However, researchers also determined that general permits administered by EPA attained higher compliance rates than State administered general permits. Another study found a compliance rate of 10 percent under Florida’s State wide general permit. Only 14 of the 136 industries examined which should have filed an NOI did so (Cross and Duke 2008).

Given the findings the analysis reaffirming the importance of inspections in detecting violations and the expectation that while the work of Duke and Augustenborg (2006) may generally reflect the behavior of a subset of dischargers expecting coverage under the CGP, NMFS expects that the EPA cannot ensure compliance with the protective provisions of NPDES CGP.

EPA conducted a compliance study of a subset of SWPPPs (referenced on page 40 of the biological evaluation). Regardless of the ESA Eligibility Criteria selected, a CGP applicant is required to include supporting documentation for the Criterion selected in the site SWPPP and to allow EPA access to the SWPPPs during an inspection (2017 CGP section 4.8.3). EPA requested SWPPPs from 368 construction site permit applicants to evaluate compliance with ESA documentation requirements and received SWPPPs from 286 of these permit applicants, 22 of which were unreadable because they were not written in English or were provided on unreadable electronic media (e.g., corrupt flash drives). EPA's determined that 65% of the SWPPPs it did receive contained insufficient supporting documentation (Table 1). Because not all permit applicants complied with EPA's request, NMFS does not know whether this compliance rate represents the entire population of CGP activities because permit applicants who know their SWPPP contains inadequate information are less likely to comply with a request for a copy of the SWPPP from EPA.

Table 8. Results of EPA's SWPPP ESA documentation compliance analysis.

Document Quality	Criterion A	Criterion B	Criterion C	Criterion D	Criterion E	Criterion F	Total
Above Satisfactory ESA documentation	29	0	4	3	1	1	38
Satisfactory ESA documentation	47	0	2	1	2	0	52
Below Satisfactory ESA documentation	90	0	17	0	0	1	108
Unsatisfactory ESA documentation	41	0	12	2	2	0	57
Other (unreadable)	22	0	8	0	1	0	31
Total	229	0	43	6	6	2	

Considering the quality of the SWPPPs, EPA concluded that:

> *This evaluation does suggest that the 2012 CGP may not be as clear as it could be with regard to what ESA eligibility documentation is required in the SWPPP, which could explain why there were many facilities that did not meet EPA's expectations for satisfactory documentation. A potential improvement for the next permit could be to include a checklist of CGP requirements, including ESA eligibility. EPA could also streamline and improve the language in Appendix D so that permit applicants better understand their eligibility and related documentation requirements.*

NMFS concludes that EPA is not likely to know or be able to reliably determine whether or to what degree dischargers comply with the conditions, restrictions, or mitigation measures required under the 2017 CGP because SWPPPS and the self-inspection and corrective action reports are not transmitted to EPA for review. Further, on-site inspection rates of CGP authorized dischargers, where such reports could be reviewed, appear to be minimal. The degree of compliance is of particular concern because the EPA's 2012 SWPPP compliance review indicated high rates of inadequate documentation. The CGP does incorporate NMFS' expertise in addressing SWPPP compliance through NMFS' review of NOI, a process that would allow NMFS to request and evaluate those portions of SWPPPs that are relevant to the protection of ESA-listed species and designated critical habitat under NMFS' jurisdiction.

Question 7. Adequacy of Controls - Does the general permit have a mechanism to prevent or minimize endangered or threatened species or designated critical habitat from being exposed to stressors from discharges: a) at concentrations, durations, or frequencies that are potentially harmful to individual listed organisms, populations, or the species, or; b) to ecological consequences that are potentially harmful to individual listed organisms, populations, the species or essential features of designated critical habitat?

From EPA's response:

> *The draft permit contains technology-based effluent limitations, including stormwater control requirements, with which the discharger is required to comply, along with more stringent water quality-based effluent limitations. These requirements are combined with the ESA-related eligibility criteria that will require permittees to document the basis for their determination. Finally, the permit contains administrative provisions that allows EPA to address specific areas of concern.*

NMFS' opinion: The control measures specified within the 2017 CGP, and the Construction and Development Rule it references (40 CFR part 450) specify best practices for the minimization of construction impact and pollution prevention. It includes measures for corrective actions in cases where these practices fail or are found to be inadequate to meet water quality standards. However, the responsibility to identify and implement the necessary mechanisms is placed on the operator that filed the NOI as all reporting requirements placed on CGP operators do not include the submittal of self-inspection and corrective action reports to EPA. The EPA only reviews these reports in the event of an inspection. Given the issues already identified with self-certification under the ESA Eligibility Criteria and the apparent absence of site inspections by EPA, NMFS is not convinced that mechanisms to prevent or minimize harmful exposures to ESA-listed species and/or designated critical habitat will be reliably employed by dischargers or that the EPA would become aware when corrective action to restore controls are needed, but not employed by the operator. It is encouraging that, among inspected EPA-issued general permit holders, compliance rates are relatively high (Table 7). In addition, incorporation of the reporting requirements under the Standard Permit Conditions means that any noncompliance which may endanger health or the environment must be reported within 24 hours.

NMFS concludes that, while the permit provides control mechanisms for the prevention or minimization of harmful exposures of ESA-listed species and designated critical habitat under NMFS' jurisdiction, taken with results of EPA's SWPPP compliance review, the importance of inspections in identifying compliance issues for general permits (see Table 7), and the apparent limited site inspections by EPA under the CGP, successful implementation of these controls under the 2017 CGP is very uncertain. Meanwhile, successful implementation of the permit's ESA Eligibility Criteria under the 2017 CGP would incorporate NMFS' expertise in evaluating the effectiveness of planned controls, but does not allow for confirmation of control effectiveness or the evaluation of self-inspection and any corrective action reports.

9 INTEGRATION AND SYNTHESIS

EPA proposes to reissue the CGP for Stormwater Discharges Associated with Construction. Under the 2012 CGP, EPA-authorized discharges from over 23,000 construction activities The proposed action, in the absence of successful implementation of the ESA Eligibility Criterion process, is likely to adversely affect species and designated critical habitats listed in

Table 2. Here, we integrate information presented in this opinion.

The Risk Analysis (Section 8.2) in this opinion establishes that in the absence of the protective measures in the CGP, exposures of ESA-listed species and designated critical habitat to stressors discharged in construction stormwater resulting in adverse effects may occur. Our analysis of the CGP as a Permitting Program (Section 8.3) evaluates the measures in the permit intended to prevent or minimize risks to ESA-listed species and designated critical habitat. These include discharge control measures, SWPPP, effluent limits, inspection, and reporting requirements that work together to minimize exposure of aquatic ecosystems, including ESA-listed species and designated critical habitat, to stressors in construction site stormwater (and CGP-allowable non-stormwater) discharges. In addition to these measures, the ESA Eligibility Criteria process and incorporation of NMFS' expertise in the NOI review process, provide additional barriers to adverse exposures of ESA-listed species and designated critical habitat under NMFS' jurisdiction. The CGP also includes the ESA Eligibility Criteria and incorporation of NMFS' expertise through review of submitted NOI. Successful implementation of the permit, and in particular, these the ESA Eligibility Criteria procedure and the incorporation of NFMS' expertise in reviewing NOI, is required if the EPA is to ensure that measures have been or will be put in place that minimize any risk posed by CGP-authorized discharges to ESA-listed species and their designated critical habitat. In light of these factors, we conclude that the effects of EPA's re-issuance of the 2017 CGP, when considered together with the current status of the species, the environmental baseline, and cumulative effects, is not likely to jeopardize any listed or proposed species under NMFS's jurisdiction that are the subject of this consultation, or destroy or adversely modify any designated critical habitat of such species. For example, the status of the species section on salmonids (Section 6.4) describes the importance of maintaining riparian vegetation to stabilize bank soils and capture fine sediment in runoff to maintain a functional channel bottom substrate for the development of salmonid eggs and alevins. Part 2.2.1 of the CGP requires permittees to provide and maintain natural buffers and/or equivalent erosion and sediment controls when a water of the U.S. is located within 50 feet of the site's earth disturbances. Technical guidance on how to achieve this goal is provided in Appendix G of the CGP. We also considered the regional sediment quality indices reported by the Coastal Condition Assessment (USEPA 2015b) and parts of the country where sediment is a prominent cause of water quality impairments (see the *Environmental Baseline* Section 7.1.2). Our cumulative effects section identified activities which degrade water quality that will continue into the future. These include conversion of natural lands and agriculture. Nationally, water quality in over 11,000 miles of rivers, streams, and coastline are impaired by sediment resulting from construction activity, not all of which has been and will be subject to EPA's CGP. Agriculture contributed to the impairment of nearly 84,000 miles of rivers, streams, and coastline (USEPA 2016). The CGP places controls on the incremental contribution of sediments by eligible construction projects within EPA's permitting authority.

Our analysis also assesses whether, and to what degree, EPA structured the CGP permitting program to establish processes that address adverse effects to ESA-listed species to avoid or minimize any adverse effects or taking resulting from authorized discharges. We addressed this issue by answering seven questions addressing the scope, stressors, overlap, monitoring and feedback, responses, compliance, and adequacy of controls. As a result of this analysis, a number of additional measures beyond those included in EPA's proposed action are included in the Reasonable and Prudent Measures and Terms and Conditions in the Incidental Take Statement in Section 12. The following summarizes NMFS' conclusions.

First, NMFS concluded that the EPA could not reliably estimate the probable number, location, and timing of the discharges authorized by the 2017 CGP. Such information cannot be precisely forecasted. The NOI submitted under the 2012 CGP provides general overview of what can be expected over the next 2017 permit term. Given the nature of the activities authorized by the permit, the implications of aggregate impacts of these authorizations will need to be monitored as the permit term progresses to ensure that, taken together, aggregate impacts that potentially create adverse conditions for ESA-listed species are not emerging. The EPA's ability to estimate the probable number, location, and timing of the discharges authorized by the 2017 CGP that may affect ESA-listed species/designated critical habitat relies on the incorporation of NMFS' expertise through the ESA Eligibility Criteria process and NMFS' review of submitted NOI.

Second, NMFS concluded that the CGP is not structured to identify all the stressors that are likely to be produced as a direct or indirect result of discharge authorization. The NOI does not require identification of construction-associated materials other than flocculating agents. Such substances include pesticides and products for the management of soil contaminated by legacy pollutants. It will be necessary, during review of NOI for sites that may affect ESA-listed species and designated critical habitat, to request additional information on pollutants other than sediment and flocculating agents that may occur in stormwater discharges. In addition, based on observations of the 2012 CGP NOI, the 2017 NOI form would provide more useful information if clarifying text was added to ensure that EPA is aware of what substances may be discharged with construction site stormwater. The EPA's ability to identify all the stressors that are likely to be produced as a direct or indirect result of discharge authorization and may affect ESA-listed species/designated critical habitat relies on the incorporation of NMFS' expertise through the ESA Eligibility Criteria process and NMFS' review of submitted NOI.

Third, NMFS concluded that the 2017 CGP is not structured to reliably estimate whether or to what degree specific endangered or threatened species or designated critical habitat are likely to be exposed to potentially harmful impacts that the proposed permit would authorize. Based on experience with prior general permits, the EPA's reliance on self-certification of the presence or absence of ESA-listed species and applicability of ESA Eligibility Criteria by permit applicants is expected to result in errors and thus, gaps in addressing discharges that may result in exposures to harmful levels of stressors for such species. It will be necessary to review NOI for incorrect certifications. The EPA's ability to reliably estimate whether or to what degree ESA-listed species/designated critical habitat are likely to be exposed to potentially harmful impacts that the proposed permit would authorize relies on the incorporation of NMFS' expertise through the ESA Eligibility Criteria process under the 2017 CGP and NMFS' review of submitted NOI.

Fourth, NMFS concludes that, because incidents requiring corrective measures are not reported to and tracked by EPA, the 2017 CGP itself does not incorporate monitoring and feedback mechanism that will provide EPA information about authorized actions that may have resulted in exposures of ESA-listed species or designated critical habitat to hazardous levels of stressors that may result in adverse effects. The EPA's monitoring and feedback mechanisms for the protection of ESA-listed species/designated critical habitat relies on the incorporation of the standard permit conditions through Appendix I of the CGP that require an operator to report any noncompliance which may endanger health or the environment directly to the EPA Regional Office within 24 hours from the time the event is identified.

Fifth, NMFS concludes that, because the basis statements and accompanying documentation for NOI under the 2012 CGP indicated an absence of NMFS' expertise where it was needed, the 2012 CGP did not consistently apply an analytical methodology that considers the ecology and vulnerability of ESA-listed species and designated critical habitat under NMFS' jurisdiction. The EPA's ability to apply the analytical methodology needed to protect ESA-listed species/designated critical habitat relies on the incorporation of NMFS' expertise through the ESA Eligibility Criteria process under the 2017 CGP and NMFS' review of submitted NOI.

Sixth, NMFS concludes that EPA is not likely to know or be able to reliably determine whether or to what degree dischargers comply with the conditions, restrictions, or mitigation measures required under the 2017 CGP because SWPPPS and the self-inspection and corrective action reports are not transmitted to EPA for review. Further, on-site inspection rates of CGP authorized dischargers, where such reports could be reviewed, appear to be minimal. The degree of compliance is problematic because the EPA's 2012 SWPPP compliance review indicated high rates of inadequate documentation. While the CGP incorporates the standard permit conditions that establish noncompliance as a violation of the CWA with applicable penalties and requires reporting of noncompliance, these requirements represent extreme cases and do not cover small incremental discharge issues captured through routine inspection, monitoring, and corrective actions.

Seventh, NMFS concluded that, while the permit provides control mechanisms for the prevention or minimization of harmful exposures of ESA-listed species and designated critical habitat under NMFS' jurisdiction, taken with results of EPA's SWPPP compliance review, the importance of inspections in identifying compliance issues for general permits (see Table 7), and the limited site inspections by EPA under the CGP, successful implementation of these controls under the 2017 CGP is uncertain. Meanwhile, successful implementation of the permit's ESA Eligibility Criteria would incorporate NMFS' expertise in the evaluating the effectiveness of planned controls, but uncertainty exists because the permit does not allow for confirmation of control effectiveness evaluation of self-inspection and corrective action reports.

10 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 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.

During this consultation, NMFS searched for information on future state, tribal, local or private actions that were reasonably certain to occur in the action area. NMFS conducted electronic searches of business journals, trade journals and newspapers using electronic search engines. Those searches produced no evidence of future private action in the action area that would not require Federal authorization or funding and is reasonably certain to occur. As a result, at the spatial and temporal scale of this action, NMFS is not aware of any specific actions of this kind that are likely to occur in the action area during the near future.

The future intensity of specific non-Federal activities in the action area is molded by difficult-to-predict future economy, funding levels for restoration activities, and individual investment decisions. However, due to their additive and long-lasting nature, the adverse effects of non-Federal activities that are stimulated by general resource demands, and driven by changes in human population density and standards of living, are likely to compound in the future. Specific human activities that may influence water quality and contribute to declines in the abundance, range, and habitats of ESA-listed species or the conservation value of designated critical habitat in the action area include the following: urban and suburban development; shipping; infrastructure development; water withdrawals and diversion; recreation, including off-road vehicles and boating; expansion of agricultural and grazing activities, including alteration or clearing of native habitats for domestic animals or crops; and introduction of non-native species which can alter native habitats or out-compete or prey upon native species.

Activities which degrade water quality will continue into the future. These include conversion of natural lands, land use changes from low impact to high impact activities, water withdrawals, pesticide pollution from agricultural applications and irrigation water return, effluent discharges, the progression of climate change, the introduction of nonnative invasive species, and the introduction of contaminants. Nationally, water quality in over 11,000 miles of rivers, streams, and coastline are impaired by sediment resulting from construction activity. Agriculture contributed to the impairment of nearly 84,000 miles of rivers, streams, and coastline (USEPA 2016).

Under Section 303(c) of the CWA individual states are required to adopt water quality standards to restore and maintain the chemical, physical, and biological integrity of the nation's waters. EPA must approve of state water quality standards and this approval is subject to ESA section 7 consultation. While some of the stressors associated with non-federal activities which degrade water quality will be directly accounted for in section 7 consultations between NMFS and EPA, some may be accounted for only indirectly, while others may not be accounted for at all. In particular, many non-point sources of pollution, which are not subject to CWA NPDES permit and regulatory requirements, have proven difficult for states to monitor and regulate. Non-point source pollution have been linked to loss of aquatic species diversity and abundance, coral reef degradation, fish kills, seagrass bed declines and toxic algal blooms (Gittings et al. 2013). Non-point sources of pollution are expected to increase as the human population continues to grow. States will need to address increases in non-point source pollution in the future to meet the state's approved water quality standards and designated water body use goals.

10.1 Climate Change

Climate change is discussed in both the baseline section of this opinion and in the cumulative effects because it is a current and ongoing circumstance that is not subject to consultation, yet influences environmental quality and the effects of the action, currently and in the future. NMFS's policy guidance with respect to climate change when evaluating an agencies' action is to project climate effects over the timeframe of the action's direct and indirect effects. It will usually be the case that consideration is not limited to only the duration of the specified activity, but also to its continuing effects for the foreseeable future. For example, where a construction activity is the subject of consultation, we must consider not only the effects caused from the construction itself, but also the effects of the resulting structure once completed. Similarly, in the case of consultations on permits or other authorizations that are likely to be renewed, it can be appropriate to analyze the project over some period of time beyond the initial authorization period to the fullest extent possible (based on the information available and the ability to predict impacts with an acceptable degree of accuracy).

While the CGP covers a short 5-year term over which the interaction of climate change on the direct and indirect effects of the action itself cannot be effectively monitored, the permit is renewed every 5 years. Given the challenges of monitoring and controlling non-point source pollution and accounting for all the potential stressors and effects on ESA-listed species, chronic stormwater discharges will continue to result in aggregate impacts. As climate change proceeds, precipitation rates will change (Figure 13), and the frequency of heavy rainfall events, where stormwater control upsets are more likely, is expected to increase nationwide Figure 14. Interaction of climate change effects on precipitation with the aggregate of the built environment resulting from construction activities with CGP-authorized discharges will require NMFS to apply sustained attention to aggregate effects beyond the permit term of a given iteration of the CGP.

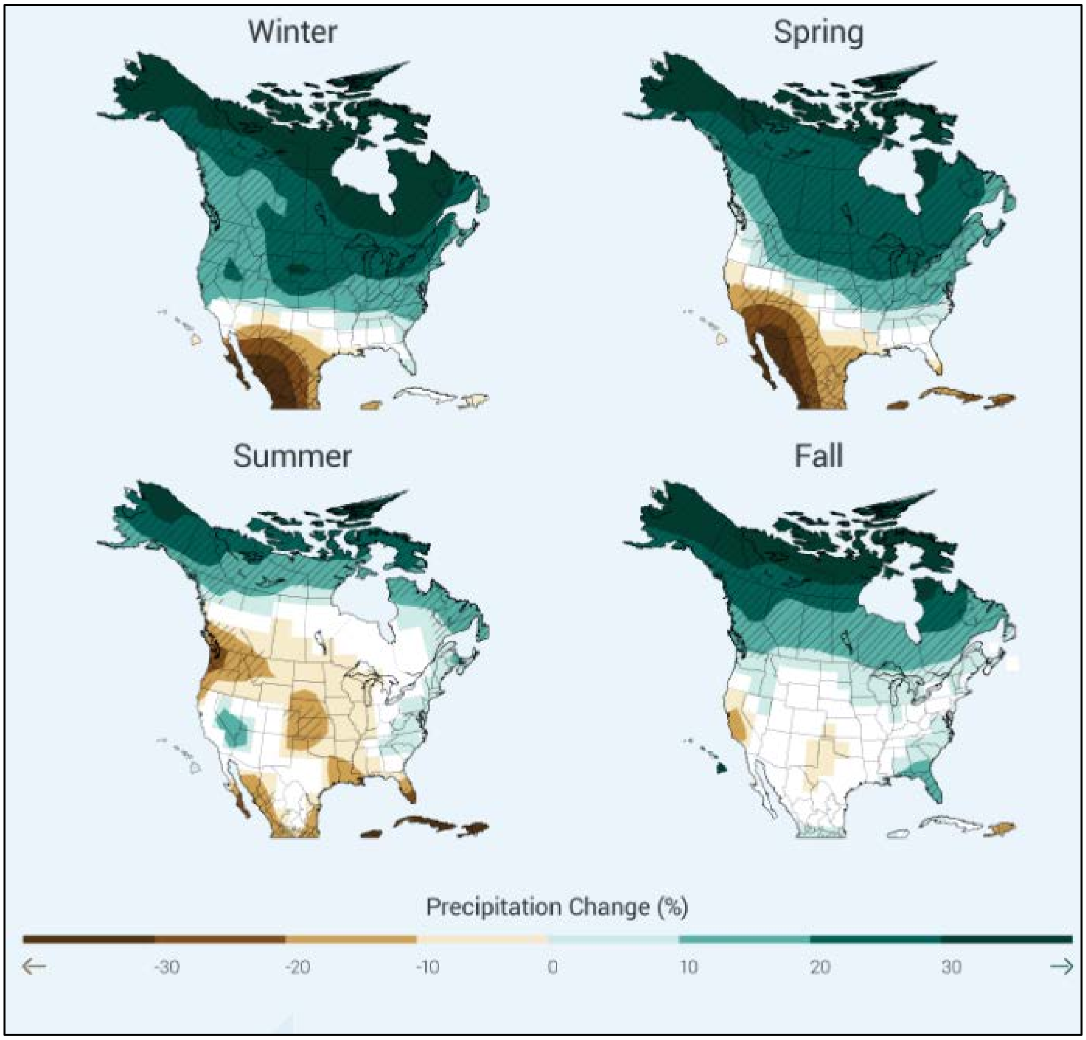

Figure 13. Seasonal precipitation change for 2071-2099 (compared to 1970-1999).[13]

[13] Assumes existing emissions rate increases. Hatched areas are projected changes that are significant and consistent among models, unhatched areas indicate projected changes do not differ from natural variability. (Figure source: NOAA NCDC / CICS-NC). http://nca2014.globalchange.gov/report/our-changing-climate/precipitation-change

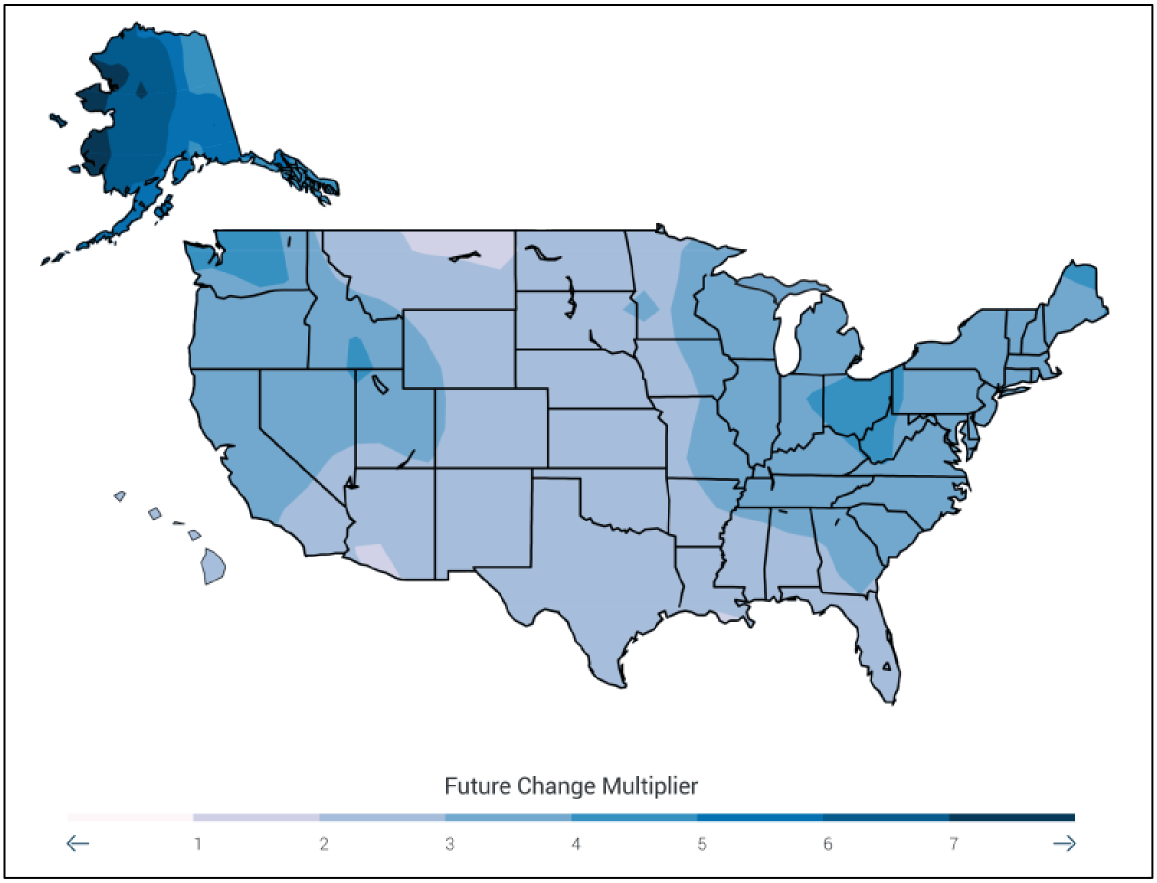

Figure 14. Increase in frequency of extreme daily precipitation events for 2081-2100 (compared to 1981-2000).[14]

[14] http://nca2014.globalchange.gov/report/our-changing-climate/precipitation-change

11 CONCLUSION

After placing the current status of ESA-listed species, the environmental baseline, the potential effects of the action, and the cumulative effects of concurrent and future nonfederal actions in context of the action's measures that prevent or minimize potential exposures to harmful stressors, the temporary nature of construction activities, prior implementation of the CGP, and the incorporation of NMFS' expertise through the ESA Eligibility Criteria Procedure, it is our biological opinion that EPA has insured that its action is not likely to jeopardize any listed or proposed species under NMFS' jurisdiction that are the subject of this consultation.

After placing the current status of the designated critical habitat, the environmental baseline, the potential effects of the action's measures that prevent or minimize potential exposures to harmful stressors, its prior implementation, the temporary nature of construction activities, prior implementation of the CGP, and the incorporation of NMFS' expertise through the ESA Eligibility Criteria Procedure, it is our biological opinion that EPA has insured that its action, as described in this opinion, is not likely to destroy or adversely modify designated critical habitat that is the subject of this consultation.

12 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption (see below). Take is defined as to: "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct." Harass is defined by the NMFS as *"Create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering."* Harm is further defined as *"an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering."* Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the Terms and Conditions of this ITS.

The basis for take of ESA-listed species anticipated under CGP authorized actions is assessed in the effects section of the opinion, including a detailed explanation of the conditions under which stormwater discharges result in take. Engagement of NMFS expertise through the CGP ESA Eligibility Criteria procedure and the Terms and Conditions listed below is expected to eliminate or minimize take. Given the scope, complexity, wide geographic reach and uncertainty of the type, frequency, location and intensity of stormwater discharges authorized by the 2017 CGP, NMFS, however, is unable to specify an amount or extent of take in terms of numbers of individuals or units of habitat for the entire extent of individual permit authorizations made under the CGP permitting program. In some instances, the amount of incidental take anticipated from CGP-authorized activities has already been addressed in an earlier, site-specific process. Specifically, take of a threatened or endangered species resulting from discharges or discharge-related activities under the CGP may have already been authorized or exempted when:

1. Take has been authorized through a separate permit pursuant to ESA section 10(a)(1)(A) for research or to enhance the survival or propagation of an endangered or threatened species or pursuant to ESA section and 10(a)(1)(B) exempting incidental "take" of endangered species or threatened species, both cases certifying under CGP eligibility criterion F, or

2. Take is exempted through an ITS included in an opinion for discharges authorized under the 2017 CGP for the construction operation under consideration. Specifically, certification of ESA eligibility under Criterion B can be met through a successfully completed section 7 consultation by another site operator while certifying eligibility under Criterion E requires successful completion of a section 7 consultation with the operator filing the NOI.

Accordingly, the amount or extent of any incidental take has been or will be more fully assessed and addressed at a site-specific level for those construction activities that are certified under the 2017 CGP's ESA Eligibility Criterion B, in cases where another operator completed formal consultation for activities in the action area, Criterion E in cases where the operator filing the NOI completed formal consultation for activities in the action area, or Criterion F for take authorized under an ESA section 10 permit.

However, the authorization of stormwater discharges under the 2017 CGP is anticipated to cause incidental take of ESA-listed species under NMFS' jurisdiction that has not been previously authorized or exempted under Criteria B, E, or F. Due to uncertainty about the type, frequency, location and intensity of stormwater discharges authorized by the CGP, this permitting consultation does not address individual actions that the general permit would authorize. We focus instead on whether EPA's 2017 CGP is written to prevent or minimize take resulting from individual discharges. Incidental take under the 2017 CGP cannot be accurately quantified or monitored as a number of individuals because the action area includes large areas over which EPA has permitting authority and the exact location, composition, time, and frequency of the individual discharges that will be authorized under the 2017 CGP are unknown. We are therefore not able to quantify how many individuals of each species and life stage exist in affected waters, especially considering that the numbers of individuals vary with the season, environmental conditions, and changes in population size due to recruitment and mortality over the course of a year. In addition, currently we have no means to determine which deaths or injuries in populations across the entire range of the ESA-listed species and designated critical habitat covered in this opinion would be due to the discharges authorized under the 2017 CGP versus other environmental stressors, competition, and predation.

Because we cannot directly quantify the amount of anticipated take, NMFS identifies, as a surrogate for the allowable extent of take, the ability of this action to proceed without any adverse incident that is attributed to discharges in accordance with the 2017 CGP in waters where ESA-listed species under NMFS' jurisdiction occur. The association of take with the surrogate of adverse incident occurrences relates to the expectation that effects on individuals of ESA-listed species and essential features of designated critical habitat may be difficult to detect. For example, it is difficult to detect avoidance or altered behavior, delayed mortality, tissue damage, energetically costly stress responses (e.g., mucus secretion), burial of eggs, juveniles, or colonizing substrate. In addition, detection of direct mortality can be obscured by co-occurring events such as scavenging, decay, or submergence.

An adverse incident is an incident that is considered attributable to a 2017 CGP authorized discharge, and has resulted in unusual or unexpected levels of discharges of sediment or pollutants that is within the range of an ESA-listed species or may affect ESA-listed species. An incident is considered attributable to a 2017 CGP authorized discharge if that discharge is known to have occurred prior to, and near or upstream of the incident and there is evidence that stormwater from the construction site caused the incident. Evidence includes, but is not limited to: death, harm or harassment of listed aquatic plants or animals (for example by smothering) or damage to critical habitat that causes harm to ESA-listed species.

As discussed in the *Analysis of the CGP as a Permitting Program*, the CGP integrates standard permit conditions consistent with permit provisions required under 40 CFR 122.41 (see Appendix I of the permit). These include a requirement to report any noncompliance which may endanger health or the environment within 24 hours from the time an operator becomes aware of the circumstances, followed, within 5 days, by a written description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. This requirement to report any noncompliance which may endanger health or the environment provides a mechanism through which an adverse incident, or the opportunity to prevent an adverse incident, can be identified. Thus, adverse incidents provide a suitable surrogate for take of ESA-listed species under the CGP because (1) such incidents could involve discharges of sediments or other pollutants from construction stormwater that adversely affect individuals of ESA-listed species, as described in the opinion's effects section, and (2) EPA would be notified of the occurrence or potential for the occurrence of such incidents pursuant to the standard permit conditions consistent with 40 CFR 122.41.

The goal of each RPM below is to ensure that the potential for exposure of ESA-listed species and designated critical habitat to adverse consequences of stormwater erosion resulting from CGP-authorized discharges is accurately identified, that NMFS will receive all NOIs associated with discharges that may affect ESA-listed species and designated critical habitat under our jurisdiction, and that these NOIs will contain the necessary information that will allow NMFS to advise EPA on its authorization of such discharges with respect to EPA's obligations under the ESA. The RPMs will allow EPA to demonstrate that it is able to satisfy the requirements of section 7(a)(2) of the ESA and minimize take by: (1) tracking the number, location and timing of those discharges authorized under the 2017 CGP that may affect ESA-listed species and designated critical habitat under NMFS' jurisdiction; (2) identifying whether or to what degree specific ESA-listed species or designated critical habitat are likely to be exposed to adverse conditions resulting from authorized discharges and (3) determining whether or to what degree operators have complied with the conditions of the permit, specifically those intended to eliminate or minimize exposures of ESA-listed species and designated critical habitat to adverse conditions resulting from authorized discharges. By extension, effective identification of the potential for ESA concerns and subsequent engagement of NMFS expertise, where necessary, contributes to EPA's ability to prevent or minimize exposure of endangered or threatened species or essential features of designated critical habitat to adverse conditions (i.e., potentially harmful stressor intensities, durations, or frequencies) or potentially harmful indirect ecological consequences that could result in take (e.g., habitat structure or alterations in trophic, temperature, dissolved oxygen, or flow regime).

The RPMs described below are also designed to ensure the successful implementation of the ESA Eligibility Criteria procedure which NMFS believes will reduce or in most cases prevent the exposure of endangered or threatened species under NMFS' jurisdiction to adverse conditions resulting from 2017-CGP-authorized discharges.

13 RPMs for the 2017 CGP

The measures to avoid or minimize take described below are non-discretionary and must be undertaken by the EPA so that they become a binding condition of the EPA's 2017 CGP implementation and oversight responsibilities, as appropriate, for the exemption in section 7(a)(2) to apply. The EPA has a continuing duty to regulate the activities it authorizes which are covered by this ITS. The protective coverage of section 7(a)(2) may lapse if the EPA fails to assume and implement the Terms and Conditions. In order to monitor the impact of incidental take, the EPA must report the progress of the action to NMFS Office of Protected Resources consistent with Term & Condition 2 as specified in the ITS (50 CFR§402.14(i)(3)). The reporting requirements are established in accordance with 50 CFR 216.105 and 222.301(b).

The RPMs, with their implementing Terms and Conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action and subsequent monitoring, the allowable level of incidental take specified above is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the RPMs provided. The EPA agency must immediately provide an explanation of the causes of the taking and review with NMFS the need for possible modification of the RPMs.

NMFS believes all measures described as part of the proposed action, together with the RPMs and Terms and Conditions described below, are necessary and appropriate to minimize the likelihood of incidental take of ESA-listed species due to implementation of the proposed action.

1. The EPA must make changes and add clarifications to the NOI form, the permit, and to the species information made available to construction operators in order to increase the effectiveness of the 2017 CGP provisions for the protection of endangered and threatened species and designated critical habitat and report this information to NMFS.
2. The EPA must gather and evaluate information on the 2017 CGP authorized activities discharging to water where ESA-listed species or designated critical habitat under NMFS' jurisdiction occur, including any corrective actions that have been required of permit applicants. EPA will report this information to NMFS.
3. The EPA will provide outreach to the construction industry to improve understanding and awareness of the ESA requirements under the 2017 CGP.

14 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the EPA must comply with the following Terms and Conditions implementing the RPMs described above. These Terms and Conditions are non-discretionary to allow the exemption to apply.

14.1 Terms and Conditions for 2017 CGP RPM 1

1) The EPA will instruct operators of the steps that are necessary to modify their NOIs if their existing ESA eligibility changes.

   For instance, if an operator certified eligibility under ESA eligibility Criterion C, Criterion B through another operator's certification under Criterion C or D, or Criterion D, and that eligibility certification is later found to be incorrect, the operator is required to submit a modified NOI and undergo a 14-day review period.

   Eligibility certification could be found to be incorrect through multiple mechanisms, including EPA on-site inspections; EPA request and review of specific inspection and corrective action reports, and SWPPPs; operator self-reporting; required operator reporting of "any noncompliance which may endanger health or the environment" in accordance with standard permit conditions (see Appendix I section 12.6.1 of the permit); and public reporting of suspected noncompliance. Upon receipt of reports indicating an eligibility criterion may no longer be valid, EPA will promptly (within 15 days) notify and confer with NMFS, and make a determination as to whether a reported incident affects the continuing validity of the permittee's ESA eligibility certification. EPA will instruct operators of any steps it determines are necessary to modify their NOIs regarding their ESA eligibility. If the permittee originally certified eligibility under ESA eligibility Criteria E, EPA will also confer with NMFS regarding whether any additional steps are required under the terms of the applicable ESA section 7 consultation (such as under an applicable biological opinion). If the permittee originally certified ESA eligibility under Criterion F, then EPA will also confer with NMFS regarding whether any additional steps are required under the terms of the applicable incidental take permit.

2) In coordination with NMFS, the EPA revised the 2017 CGP NOI form to clarify the ESA Eligibility Certification Criteria, provide a mappable point location for the construction site, and basis statements that are useful for confirming criterion eligibility, improving operators understanding of the criteria, and providing guidance on appropriate documentation to support operators' selection of a criteria. These changes are expected to allow EPA to reliably monitor 2017 CGP provisions for the protection of ESA-listed species and designated critical habitat and provide NMFS with the information it needs to address any ESA related concerns, as they arise. Specifically:

   a) Within six months of final permit reissuance, EPA will submit to OMB a change to the NOI form that requires the reporting of discharge location coordinates in an easily mappable decimal form. (This will be delayed and dependent upon OMB review and approval of the NOI form. If approved, EPA will add the question onto the NOI form.)

   b) The ESA Eligibility Criteria will be stated on the form. In some cases the criteria were reworded to clarify intent of the criterion (e.g., Criterion B applies only to the eligibility certification of another operator under the 2017 CGP in the same action area)

c) Instructions will be provided on what information is needed in the basis statement to confirm eligibility under each ESA Eligibility Certification Criterion

d) The revised form will replace the form in the current draft 2017 CGP and any revisions to wording of the ESA Eligibility Criteria arrived at (e.g., specifying 2017 CGP in Criterion B) will be included in the final 2017 CGP and the final Appendix D for the 2017 CGP. The revised form is provided in Appendix C of this opinion

e) EPA will add a requirement for operators to provide discharge latitude/longitude information in their NOIs upon completion of the Information Collection Request process for the modified NOI form. (Note: EPA anticipates this process to be completed within 1 year of permit issuance.)

3) EPA will provide a link on the 2017 CGP website to the mapping tool hosted by NMFS to assist operators in correctly identifying NMFS' resources of concern that overlap with the operators' action area.

4) EPA will include the following in Appendix D of the permit:

> "NMFS will, within 14 days of submission of the NOI, advise EPA whether it believes the planned discharges meet the eligibility criteria of not likely to adversely affect NMFS Listed Resources of Concern, whether the eligibility criterion could be met with additional conditions; or whether the eligibility criterion is not met. With respects to ESA issues, EPA recognizes NMFS expertise and will carefully consider NMFS' determination in identifying eligibility for authorization, either with or without additional conditions. In the event NMFS has placed a hold on your NOI, EPA will notify you as to whether your discharges are authorized or whether an individual permit will be required. If you do not hear from EPA within 14 days, you may assume that your discharge is authorized without further conditions."

5) EPA will provide the following information on its CGP website regarding the notification requirements for permittees should an adverse incident to ESA-listed species or designated critical habitat result from a construction stormwater discharge.

> "Notwithstanding any of the other corrective action trigger and notification requirements, if an Operator becomes aware of an adverse incident affecting a Federally-listed threatened or endangered species or its federally designated critical habitat, which may have resulted from a discharge from the Operator's construction site, in addition to the obligation to notify EPA (see Appendix I of the CGP), it is in the best interest of the Operator to immediately notify NMFS if the case involves an anadromous or marine species under NMFS' jurisdiction. This notification should be made by telephone and e-mail addresses, to the contacts listed on EPA's website at [web address to be provided], immediately upon the Operator becoming aware of the adverse incident, and should include at least the following information:
>
> The caller's name and telephone number
>
> Operator name and mailing address
>
> The name of the affected species
>
> How and when the Operator became aware of the adverse incident

Description of the location of the adverse incident

Description of the adverse incident and

Description of any steps the Operator has taken or will take to alleviate the adverse impact to the species

Additional information on federally-listed threatened or endangered species and federally-designated critical habitat is available from NMFS (www.nmfs.noaa.gov) for anadromous or marine species. Note: In an adverse incident affecting Federally-listed threatened or endangered species or designated critical habitat, the Operator should leave the affected organisms alone, make note of any circumstances likely causing the death or injury, note the location and number or extent of aquatic organisms involved and, if possible, take photographs. In some circumstances, the Operator may be asked to carry out instructions provided by the NMFS to collect specimens or take other measures to ensure that evidence intrinsic to the specimen is preserved."

14.2 Terms and Conditions for 2017 CGP RPM 2

1) The EPA will provide NMFS with all available 2017 CGP NOI data on an annual basis. This information will be provided in the form of an electronic spreadsheet listing of the NOI data, similar to that provided by EPA during pre-consultation, including, at a minimum, the latitude and longitudes of the construction site discharge points (when these data points have been added, as noted above), estimated area to be disturbed, estimated start and completion dates of the construction project, ESA criterion selection, and the basis statement supporting each ESA criterion selection. However, a spreadsheet may not be necessary if EPA makes complete, up to date NOI data and any associated inspection and compliance information available on the Enforcement Compliance History Online database in the same manner it has made the NOI and compliance data available as a "water program area" for industrial stormwater permits.

2) The EPA will conduct a compliance evaluation between years 1 and 2 of the 2017 CGP and report its findings to NMFS. The following are required actions as part of the evaluation and report:

   a) EPA will request NOIs, SWPPPs, and copies of any correspondence between EPA and/or NMFS field office staff and the construction operator from a representative sample of construction sites covered under the 2017 CGP, which will include NOIs and SWPPPs from areas NMFS has identified to be of particular concern, which include:

      i) Puerto Rico: Along coastal areas, the island of Culebra

      ii) Washington: Along Puget Sound; tributaries to eastern Puget Sound, from the Puyallup River north; mainstem Columbia River; and tributaries to the Upper and Lower Yakima River within ESA designated critical habitat

      iii) Idaho: Along the Snake River, Salmon River and all tributaries, Clearwater River and all tributaries (excluding the North Fork above the Dworshak Dam), and the Grande Ronde River

      iv) New England: Within watersheds accessible to anadromous species, Piscataqua River, Cocheco River to Cocheco River number 2 dam, Merrimack River to

Lawrence, Connecticut River to Turners Falls dam, along coastal waters of Cape Cod Bay.

v) Any additional waters identified by NMFS after the date this opinion was signed and prior to EPA's document request to the permit applicants. EPA will contact NMFS 1 month prior to initiating document requests to verify whether permits from additional areas of concern need to be included in the request.

b) These materials will be evaluated for compliance with the eligibility certification requirements of the CGP, including:

i) The type and frequency of incorrect ESA eligibility certifications, based on the availability of NMFS mapping resources; and

ii) The quality of the basis statements and attachments supporting ESA eligibility certifications.

c) EPA will also request copies of corrective action reports from the construction sites in (a), above, and assess them for compliance with the applicable permit requirements. Copies of these corrective action reports will be made available as part of the report presented to NMFS.

d) EPA will also report on any "hold" requests placed during the reporting period, and will provide, for construction activities certifying under Criterion C, a brief description of any instances where a reviewing field or regional office of NMFS initially noted, in writing to a EPA Regional Office, that the proposal did not appear to support coverage under the 2017 CGP. The description shall include how the concerns were addressed, and will specify whether the reviewing field or regional office provided confirmation that any additional information and/or changes (including but not limited to additional BMPs) to the NOI or SWPPP, if provided, were sufficient to address the concerns.

e) EPA will also collect information on any NOIs that indicated construction work was undertaken in response to an "emergency-related project" to determine whether this assertion was proper.

f) The report will include EPA's assessment of:

i) The overall effectiveness of the 2017 CGP provisions as determined by the evaluation in paragraph 2(b) above.

ii) Identification of the waterbodies with multiple operators who have selected criterion B through F.

iii)

g) EPA will meet with NMFS one month after transmittal of the report to discuss the results and determine if modifications to the CGP's implementation may need to be considered.

i) EPA will provide future information and/or coordination regarding unexpected developments if the reviewing NMFS Regional Office requests it. For example, NMFS may want to review any additional control measure reports for a site that has experienced significant events, such as fire or extreme weather events, potentially affecting stormwater control measures and stormwater constituents.

ii) EPA and NMFS will identify actions that can be taken alone, or in coordination with NMFS, to address any issues identified with the implementation of the permit over the past permitting year.

14.3 Terms and Conditions for 2017 CGP RPM 3

1) The EPA will develop, in coordination with NMFS, ESA-targeted outreach on the 2017 CGP that will include:
   - During the first year of the permit term, conduct outreach to the regulated community to raise awareness of obligations to file for coverage under the 2017 CGP and expectations for coverage under the 2017 CGP;
   - Twice per year, hold an ESA-targeted coordination call between EPA Headquarters and regional staff and NMFS staff to discuss expectations and any concerns related to implementing the ESA-related provisions of the 2017 CGP;
   - Within 2 years of permit issuance[15], EPA will:
     - Post online Spanish language version of the SWPPP Template and the small lot construction template;
     - Post online Spanish language pamphlet or fact sheet on suggested BMPs that can be used to control stormwater discharges from construction sites that are of concern to ESA-listed species and/or critical habitat in close proximity to Puerto Rico coastal areas (e.g., private road construction); and
     - Conduct compliance assistance presentations to the construction industry in Puerto Rico focusing on the 2017 CGP requirements.

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[15] By agreement between EPA and NMFS, this deadline may be delayed if there are reasons beyond the control of EPA to cause a delay, such as the lack of funds or an appeal of the permit.

15 CONSERVATION RECOMMENDATIONS

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

The following conservation recommendations would provide information for future consultation involving EPA's issuance and implementation of the 2017 CGP:

1) Coordinate with NMFS to develop and maintain a list of receiving waters where Criterion A has been selected in error in previous permit cycles and crosscheck requests for coverage under Criterion A against this list to avoid inadvertent errors in criterion selection as NOIs are submitted. As additional receiving waters are identified where ESA-listed species and/or designated critical habitat are likely to occur either through notification by NMFS or through other means (e.g., the EPA's proposed review of a representative sample of Criterion A facilities), the list and crosscheck should be expanded accordingly
2) In order to encourage completeness and consistency among SWPPPs for individual projects, modify the current SWPPP template for construction operators.
3) Coordinate with NMFS on the development of the next draft CGP permit prior to publication in the Federal Register for public comment. This will allow EPA to incorporate recommended actions designed to protect ESA-listed species and designated critical habitat at an early stage and receive public comment on these actions
4) Maintain informal dialogue with NMFS on ongoing EPA general permits
5) Coordinate with NMFS on the development of mechanisms and strategies to address ESA concerns for emergency related projects (e.g., Emergency specific ESA Eligibility Criterion, standard operating procedures, notification mechanisms, etc).
6) In order to keep NMFS' Endangered Species Division informed of actions minimizing or avoiding adverse effects, or benefiting ESA-listed species or their habitats, the EPA should notify the NMFS Office of Protected Resources of any of these conservation recommendations they implement by contacting their Headquarters Office at the address listed on the cover letter to this document
7) EPA and NMFS will begin discussions on modifications for the next iteration of the permit. For example: adding ESA considerations to corrective action triggers.

16 REINITIATION NOTICE

This concludes formal consultation on the EPA's issuance of the CGP. As provided in 50 CFR 402.16, reinitiation of formal consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and:

1) If the amount or extent of taking specified in the ITS is exceeded.
2) If new information reveals effects of the action that may affect ESA-listed species or designated critical habitat in a manner or to an extent not previously considered.
3) If the identified action is subsequently modified in a manner that causes an effect to the ESA-listed species or designated critical habitat that was not considered in the opinion; or
4) If a new species is listed or critical habitat is designated that may be affected by the identified action.

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APPENDIX A

COMPREHENSIVE STATUS OF THE SPECIES AND DESIGNATED CRITICAL HABITAT

During the consultation we identify those endangered or threatened species or designated critical habitat that may be affected by the proposed action. For a proposed action to be determined to not likely adversely affect species or designated critical habitat, all the effects of that action must be expected to be discountable, insignificant, or completely beneficial. Discountable effects are those that are extremely unlikely to occur. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or designated critical habitat.

1 *Species and Critical Habitat Not Likely to be Adversely Affected*

For this opinion, we determined that exposures to construction stormwater discharges authorized under USEPA's CGP would be extremely unlikely for those species that do not frequent near coastal waters where USEPA has permitting authority (i.e., effects would be discountable). Therefore, USEPA's the CGP is not likely to adversely affect the following species:

- blue whale (*Balaenoptera musculus*, endangered)
- false killer whale (*Pseudorca crassidens*, endangered)
- fin whale (*Balaenoptera physalus*, endangered)
- sei whale (*Balaenoptera borealis*, endangered)
- sperm whale (*Physeter macrocephalus*, endangered)
- Humpback Whale (*Megaptera novaeangliae*, endangered)
- North Atlantic Right Whale (*Eubalaena glacialis*) and designated critical habitat (endangered)
- Scalloped Hammerhead (*Sphyrna lewini*) Eastern Pacific DPS (endangered)
- Scalloped Hammerhead (*Sphyrna lewini*) Central and Southwest Atlantic DPS (endangered)
- Bocaccio (*Sebastes paucispinis)*
- Yelloweye Rockfish (*Sebastes ruberrimus*)
- Canary Rockfish (*Sebastes pinniger*)

The USEPA is the permitting authority on Indian Country lands within range of Gulf sturgeon (threatened) and smalltooth sawfish (endangered), but these lands are inland. While these species may be exposed to CGP-authorized discharges, such exposures are expected to be insignificant given the dilution and settling that would occur before reaching the waters they occupy. USEPA does not have permitting authority in waters where white and black abalone (both endangered) occur or where the Carolina DPS and south Atlantic DPS of Atlantic sturgeon (both endangered) occur. For these species, exposures to stormwater discharges authorized under the CGP are extremely unlikely (i.e., effects would be discountable), therefore USEPA's CGP is not likely to adversely affect these species.

1.1 Species and Designated Critical Habitat Considered in this Opinion

The ESA-listed species and designated critical habitats which occur within the action area that fall under NMFS' jurisdiction and may be exposed to the construction stormwater discharges and experience direct or indirect effects of those exposures are identified in Table 1 and Table 2.

Table 1. Endangered and threatened species and designated critical habitat under NMFS' jurisdiction considered in this opinion.

Species	ESA Status	Designated Critical Habitat	Recovery Plan
Marine Mammals – Cetaceans			
Southern Resident Killer Whale *(Orcinus orca)*	E – 70 FR 69903	71 FR 69054	73 FR 4176
Salmonids			
Chinook salmon (*Oncorhynchus tshawytscha*)			
California Coastal DPS	T – 64 FR 50393	70 FR 52488	– –
Central Valley Spring-run DPS	T – 64 FR 50393	70 FR 52488	79 FR 42504
Lower Columbia River DPS	T – 64 FR 14308	70 FR 52630	78 FR 41911
Upper Columbia River Spring-run DPS	E – 64 FR 14308	70 FR 52630	72 FR 57303
Puget Sound DPS	T – 64 FR 14308	70 FR 52630	72 FR 2493
Sacramento River Winter-run DPS	E – 59 FR 440	58 FR 33212	79 FR 42504
Snake River Fall-run DPS	T – 59 FR 42529	58 FR 68543	– –
Snake River Spring/summer-run DPS	T – 59 FR 42529	64 FR 57399	– –
Upper Willamette River DPS	T – 64 FR 14308	70 FR 52630	76 FR 52317b
Chum salmon (*Oncorhynchus keta*)			
Columbia River DPS	T – 64 FR 14507	70 FR 52630	78 FR 41911
Hood Canal Summer-run DPS	T – 64 FR 14507	70 FR 52630	72 FR 29121
Coho salmon (*Oncorhynchus kisutch*)			
Central California Coast DPS	E – 61 FR 56138	65 FR 7764	– –
Oregon Coast DPS	T – 63 FR 42587	73 FR 7816	78 FR 41911
Southern Oregon & Northern California Coasts DPS	T – 62 FR 24588	64 FR 24049	– –

Species	ESA Status	Designated Critical Habitat	Recovery Plan
Lower Columbia River DPS	T – 70 FR 37160	81 FR 9251	78 FR 41911
Sockeye Salmon (*Oncorhynchus nerka*)			
Ozette Lake DPS	T – 64 FR 14528	70 FR 52630	74 FR 24706
Snake River DPS	E – 56 FR 58619	58 FR 68543	– –
Steelhead Trout (*Oncorhynchus mykiss*)			
California Central Valley DPS	T – 71 FR 834	70 FR 52488	79 FR 42504
Central California Coast DPS	T – 71 FR 834	70 FR 52488	– –
South-Central California Coast DPS	T – 71 FR 834	70 FR 52488	– –
Southern California DPS	E – 71 FR 834	70 FR 52488	– –
Northern California DPS	T – 71 FR 834	70 FR 52488	– –
Lower Columbia River DPS	T – 71 FR 834	70 FR 52630	74 FR 50165
Middle Columbia River DPS	T – 71 FR 834	70 FR 52630	– –
Upper Columbia River DPS	T – 74 FR 42605	70 FR 52630	72 FR 57303
Upper Willamette River DPS	T – 71 FR 834	70 FR 52630	76 FR 52317b
Snake River Basin DPS	T – 71 FR 834	70 FR 52630	– –
Puget Sound DPS	T – 72 FR 26722	81 FR 9251	– –
Atlantic Salmon (*Salmo salar*)	E – 74 FR 29344	74 FR 29300	70 R 75473
Gulf of Maine DPS			
Non-Salmonid Anadromous Species			
Eulachon (*Thaleichthys pacificus*)	T – 75 FR 13012	76 FR 65323	– –
Shortnose Sturgeon (*Acipenser brevirostrum*)	E – 32 FR 4001	– –	63 FR 69613
Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)			
Gulf of Maine DPS	T – 77 FR 5880	81 FR 35701 (Proposed)	– –
New York Bight DPS	E - 77 FR 5880		

Species	ESA Status	Designated Critical Habitat	Recovery Plan
Chesapeake Bay DPS			
Green Sturgeon, (*Acipenser medirostris*) Southern DPS	T – 71 FR 17757	74 FR 52300	– –
Marine Fish			
Nassau grouper (*Epinephelus striatus*)	T – 79 FR 51929		
Sea Turtles			
Green Turtle *(Chelonia mydas)* North Atlantic DPS	E – 43 FR 32800	63 FR 46693	63 FR 28359
Hawksbill Turtle *(Eretmochelys imbricata*)	E – 35 FR 8491	63 FR 46693	57 FR 38818
Kemp's Ridley Turtle *(Lepidochelys kempii)*	E – 35 FR 18319	– –	75 FR 2496
Olive Ridley Turtle (*Lepidochelys olivacea*)			
Pacific Coast of Mexico breeding populations	E – 43 FR 32800	– –	63 FR 28359
all other populations	T – 43 FR 32800		
Leatherback Turtle (*Dermochelys coriacea*)	E – 35 FR 8491	44 FR 17710	63 FR 28359
Loggerhead Turtle (*Caretta carettaCaretta caretta*)			
Northwest Atlantic and North Pacific DPS	E – 76 FR 58868	79 FR 39856	63 FR 28359
Corals			
Elkhorn Coral (*Acropora palmata*)	T – 71 FR 26852	73 FR 72210	80 FR 12146
Staghorn Coral (*Acropora cervicornis*)			

Species	ESA Status	Designated Critical Habitat	Recovery Plan
Coral Species *Mycetophyllia ferox* The *Orbicella:* *O.faveolata* O. franksi *O. annularis* Pillar *(Dendrogyra cylindrus)* *The Acropora* *A. globiceps, A. jacquelineae* *A. lokani, A. pharaonis* *A. retusa, A. rudis* *A. speciose, A. tenella* *Anacropora spinosa* *Euphyllia paradivisa* *Isopora crateriformis* *Montipora australiensis* *Pavona diffluens* *Porites napopora* *Seriatopora aculeata*	T – 79 FR 54122	– –	– –

Table 2. Physical and biological features of designated critical habitat that are essential to the conservation of the species (DPS or Evolutionarily Significant Units – ESUs). Water quality and biological features which may be affected by stormwater are in boldface.

Species DPS or ESU	Physical or Biological Features Essential for the Conservation of the Species
Invertebrates	
Elkhorn Coral & Staghorn Coral	**Substrate of suitable quality** and availability to support successful larval settlement and recruitment, and reattachment and recruitment of fragments
Reptiles	
Green Turtle Florida & Mexico Pacific coast breeding colonies; all other areas	Activities requiring special management considerations include: • Vessel traffic • Coastal construction • Point and non-point source pollution • Fishing activities • Dredge and fill activities • Habitat restoration
Hawksbill Turtle	
Leatherback Turtle	• Activities identified as modifying CH include: recreational boating ◦ swimming, ◦ sandmining (see 77 FR 32909 for the 6/4/2012 determination on Sierra Club's petition to revise the CH) • **Forage species, primarily Scyphomedusae (*Chrysaora*, *Aurelia*, *Phacellophora*, and *Cyanea*) of sufficient condition, distribution, diversity, and abundance to support individual as well as population growth, reproduction, and development** • Migratory pathway conditions to allow for safe and timely passage and access to/from/within high use foraging areas

Species DPS or ESU	Physical or Biological Features Essential for the Conservation of the Species
Marine Mammals	
Killer Whale - Southern Resident	• Water quality to support growth and development; • Forage species of sufficient quantity, quality and availability to support individual growth, reproduction and development, as well as overall population growth; and • Passage conditions to allow for migration, resting, and foraging.
Marine and anadromous fish other than Pacific salmonids	
Green Sturgeon - Southern	Freshwater areas: • Abundant prey items for larval, juvenile, subadult, and adult life stages. • Substrate type or size (i.e., structural features of substrates) • 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. • Water quality, including temperature, salinity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages. • A migratory pathway necessary for the safe and timely passage of Southern DPS fish within riverine habitats and between riverine and estuarine habitats (e.g., an unobstructed river or dammed river that still allows for safe and timely passage). • **Deep (≥5 m) holding pools for both upstream and downstream holding of adult** or subadult fish, with adequate water quality and flow to maintain the physiological needs of the holding adult or subadult fish. • Sediment quality (i.e., chemical characteristics) necessary for normal behavior, growth, and viability of all life stages. Estuarine areas: • Abundant prey items within estuarine habitats and substrates for juvenile, subadult, and adult life stages. • Within bays and estuaries adjacent to the Sacramento River (i.e., the Sacramento-San Joaquin Delta and the Suisun, San Pablo, and San Francisco bays), sufficient flow into the bay and estuary to allow adults to successfully orient to the incoming flow and migrate upstream to spawning grounds. • Water quality, including temperature, salinity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages. • A migratory pathway necessary for the safe and timely passage of Southern DPS fish within estuarine habitats and between estuarine and riverine or marine habitats. • A diversity of water depths necessary for shelter, foraging, and migration of juvenile, subadult, and adult life stages. • Sediment quality (i.e., chemical characteristics) necessary for normal behavior, growth, and viability of all life stages. This includes sediments free of elevated levels of contaminants Coastal Marine Areas: • A migratory pathway necessary for the safe and timely passage of Southern DPS fish within marine and between estuarine and marine habitats. • Coastal marine waters with adequate dissolved oxygen levels and acceptably low levels of contaminants (e.g., pesticides, PAHs, heavy metals that may disrupt

Species DPS or ESU	Physical or Biological Features Essential for the Conservation of the Species
	the normal behavior, growth, and viability of subadult and adult green sturgeon). • Abundant prey items for subadults and adults, which may include benthic invertebrates and fish.
Atlantic sturgeon - Gulf of Maine - New York Bight - Chesapeake Bay	• Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0 to 0.5 parts per thousand range) for settlement of fertilized eggs, refuge, growth, and development of early life stages • Aquatic habitat with a gradual downstream salinity gradient of 0.5 to 30 parts per thousand and soft substrate (e.g., sand, mud) downstream of spawning sites for juvenile foraging and physiological development • Water of appropriate depth and absent physical barriers to passage (e.g., locks, dams, reservoirs, gear, etc.) between the river mouth and spawning sites necessary to support: (1) Unimpeded movement of adults to and from spawning sites; (2) seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and (3) staging, resting, or holding of subadults or spawning condition adults. Water depths in main river channels must also be deep enough (e.g., ≥1.2 m) to ensure continuous flow in the main channel at all times when any sturgeon life stage would be in the river • Water, especially in the bottom meter of the water column, with the temperature, salinity, and oxygen values that, combined, support: (1) Spawning; (2) annual and interannual adult, subadult, larval, and juvenile survival; and (3) larval, juvenile, and subadult growth, development, and recruitment (e.g., 13 °C to 26 °C for spawning habitat and no more than 30° C for juvenile rearing habitat, and 6 mg/L dissolved oxygen for juvenile rearing habitat)
Eulachon - Southern	• Freshwater spawning and incubation sites with water flow, quality, and temperature conditions and substrate supporting spawning and incubation, and with migratory access for adults and juveniles. • A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of freshwater discharge over time) that supports spawning, and survival of all life stages. • Water quality suitable for spawning and viability of all eulachon life stages. Sublethal concentrations of contaminants affect the survival of aquatic species by increasing stress, predisposing organisms to disease, delaying development, and disrupting physiological processes, including reproduction. • Suitable water temperatures, within natural ranges, in eulachon spawning reaches. • Spawning substrates for eulachon egg deposition and development. • Freshwater and estuarine migration corridors associated with spawning and incubation sites that are 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. • Safe and unobstructed migratory pathways for eulachon adults to pass from the ocean through estuarine areas to riverine habitats in order to spawn, and for larval eulachon to access rearing habitats within the estuaries and juvenile and adults to access habitats in the ocean. • A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of freshwater discharge over time) that supports spawning migration and outmigration of larval eulachon from spawning sites. • Water quality suitable for survival and migration of spawning adults and larval eulachon. • Water temperature suitable for survival and migration.

<table>
<tr><th>Species
DPS or ESU</th><th>Physical or Biological Features Essential for the Conservation of the Species</th></tr>
<tr><td></td><td>• Prey resources to support larval eulachon survival.
• Nearshore and offshore marine foraging habitat with water quality and available prey, supporting juveniles and adult survival.
• Prey items, in a concentration that supports foraging leading to adequate growth and reproductive development for juveniles and adults in the marine environment.
• Water quality suitable for adequate growth and reproductive development.</td></tr>
<tr><td colspan="2">Pacific Salmonids</td></tr>
<tr><td>Chum Salmon
- Columbia River
- Hood Canal summer run
Sockeye
- Lake Ozette
Chinook Salmon
- Puget Sound
- Lower Columbia River
- Upper Willamette River
Steelhead
- Upper Columbia River
- Snake River
- Middle Columbia River
- Upper Willamette River
- Lower Columbia River
- Puget Sound
Coho Salmon
- Lower Columbia River</td><td>• Freshwater spawning sites with water quantity and quality conditions and substrate supporting 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 and mobility;
  ○ Water quality and forage supporting juvenile development;
  ○ 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.
  ○ Freshwater migration corridors free of obstruction and excessive predation 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;
• Estuarine areas free of obstruction and excessive predation with:
  ○ Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh & saltwater;
  ○ Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels;
  ○ Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.
• Nearshore marine areas free of obstruction and excessive predation 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.
• Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.</td></tr>
<tr><td>Coho Salmon
- Central California Coast
- Southern Oregon/Northern California Coast</td><td>Within the range of both ESUs, the species' life cycle can be separated into 5 essential habitat types:
• juvenile summer and winter rearing areas;
• juvenile migration corridors;
• areas for growth and development to adulthood;
• adult migration corridors; and
• spawning areas.
Essential features of coho designated critical habitat include adequate: Substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, safe passage</td></tr>
<tr><td>Steelhead
- Puget Sound</td><td>• Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.</td></tr>
</table>

Species DPS or ESU	Physical or Biological Features Essential for the Conservation of the Species
Coho Salmon - Lower Columbia River	• 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. • 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. • 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. • 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. • Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.
Coho Salmon - Oregon Coast	• Freshwater spawning sites with water quantity and quality conditions and substrate supporting 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 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. • 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. • 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. • 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. • Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.
Chinook Salmon - Snake River fall-run - Snake River spring/summer run	juvenile rearing areas include adequate: spawning gravel, water quality, water quantity , water temperature, cover/shelter, food, riparian vegetation, space **juvenile and adult migration corridors are the same as for Snake River sockeye salmon
Sockeye Salmon - Snake River	spawning and juvenile rearing areas: spawning gravel, water quality, water quantity, water temperature, food, riparian vegetation, access, juvenile migration corridors:substrate, water quality, water quantity, water temperature,

Species DPS or ESU	Physical or Biological Features Essential for the Conservation of the Species
	water velocity, cover/shelter, food, riparian vegetation, space, safe passage conditions **adult migration corridor has the same essential features, excluding "food"**

The following sections describe the status of species that occur in the action area and the threats to those species and where applicable, their designated critical habitat.

2 *CETACEANS*

2.1 Southern Resident Killer Whale

Status. We used information available in the final rule, the 2012 Status Review (NMFS 2013) and the 2011 Stock Assessment Report to summarize the status of this species. The Southern Resident killer whale DPS was listed as endangered in 2005 in response to the population decline from 1996 to 2001, small population size, and reproductive limitations (i.e., few reproductive males and delayed calving). This species occurs in the inland waterways of Puget Sound, Strait of Juan de Fuca, and Southern Georgia Strait during the spring, summer and fall. During the winter, they move to coastal waters primarily off Oregon, Washington, California, and British Columbia.

The most recent abundance estimate for the Southern Resident DPS is 87 whales in 2012. This represents an average increase of 0.4 percent annually since 1982 when there were 78 whales. Population abundance has fluctuated during this time with a maximum of approximately 100 whales in 1995 (NMFS 2013). As compared to stable or growing populations, the DPS reflects a smaller percentage of juveniles and lower fecundity (NMFS 2014) and has demonstrated weak growth in recent decades.

Life history. Southern Resident killer whales are geographically, matrilinearly, and behaviorally distinct from other killer whale populations. The DPS includes three large, stable pods (J, K, and L), which occasionally interact (Parsons et al. 2009). Most mating occurs outside natal pods, during temporary associations of pods, or as a result of the temporary dispersal of males (Pilot et al. 2010). Males become sexually mature at 10 – 17 years of age. Females reach maturity at 12 – 16 years of age and produce an average of 5.4 surviving calves during a reproductive life span of approximately 25 years. Mothers and offspring maintain highly stable, life-long social bonds, and this natal relationship is the basis for a matrilineal social structure. They prey upon salmonids, especially Chinook salmon (Hanson et al. 2010).

Threats. Current threats to its survival and recovery include: contaminants, vessel traffic, and reduction in prey availability. Chinook salmon populations have declined due to degradation of habitat, hydrology issues, harvest, and hatchery introgression; such reductions may require an increase in foraging effort. In addition, these prey contain environmental pollutants (e.g., flame retardants; PCBs and DDT). These contaminants become concentrated at higher trophic levels and may lead to immune suppression or reproductive impairment.

The inland waters of Washington and British Columbia support a large whale watch industry, commercial shipping, and recreational boating; these activities generate underwater noise, which may mask whales' communication or interrupt foraging. The factors that originally endangered the species persist throughout its habitat: contaminants, vessel traffic, and reduced prey. The DPS's resilience to future perturbation is reduced as a result 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. NMFS is currently conducting a status review prompted by a petition to delist the DPS based on new information, which indicates that there may be more paternal gene flow among populations than originally detected (Pilot et al. 2010).

Designated critical habitat. The designated critical habitat consists of approximately 6,630 km^2 in three areas: The Summer Core Area in Haro Strait and waters around the San Juan Islands; Puget Sound; and the Strait of Juan de Fuca. It provides the following physical and biological features: water quality to support growth and development; forage species of sufficient quantity, quality and availability to support individual growth, reproduction and development, as well as overall population growth; and inter-area passage conditions to allow for migration, resting, and foraging.

3 Pacific Salmonids

The Pacific salmonid species have similar life histories, habitat needs, and threats. These are discussed in the sections below, before proceeding to describing the essential features of critical habitat for each species. In May 2016, NOAA Fisheries' West Coast Region completed a five-year status review of all 28 West Coast salmon and steelhead species listed under the ESA (Table 3). Some species, such Oregon Coast coho salmon, mid-Columbia steelhead and Hood Canal chum, rebounded from the lows of past decades. Highly endangered Snake River sockeye have benefitted from a captive broodstock program while Snake River steelhead populations are steady. The California drought and unusually high ocean and stream temperatures over the 5-year period hit many populations hard. In the case of Sacramento River winter-run Chinook salmon, for example, drought conditions and high stream temperatures reduced the 2015 survival of juvenile fish in the first stretch of river to just three percent.

Since 1997 NMFS promulgated a total of 29 limits to the ESA section 9(a) take prohibitions for 21 threatened Pacific salmon and steelhead ESUs or Distinct Populations Segments (DPSs)(62 FR 38479, July 18, 1997; 65 FR 42422, July 10, 2000; 65 FR 42485, July 10, 2000; 67 FR 1116, January 9, 2002; 73 FR 7816, February 11, 2008). 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). NMFS took this action to provide appropriate flexibility to ensure that fisheries and artificial propagation programs are managed consistently with the conservation needs of threatened salmon and steelhead. 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. Throughout this section discussing listed salmonids, we use the word "species" to apply to DPSs and ESUs.

Table 3. Summary of Current ESA Listing Status, Recent Trends and Summary of Conclusions for the Most Recent Five-year Review for Pacific Salmonids (Northwest Fisheries Science Center 2015, Williams et al. 2016).

Species	ESU/DPS	Five-Year Review Risk Trend	ESA Listing Status
Chinook	UpperColumbiaspring	Stable	Endangered
	SnakeRiverspring/summer	Stable	Threatened
	SnakeRiverfall	Improving	Threatened
	UpperWillamettespring	Declining	Threatened
	LowerColumbia	Stable/Improving	Threatened
	PugetSound	Stable/Declining	Threatened
	CaliforniaCoastal	Mixed	Threatened
	CentralValleySpring	Decreasedriskofextinction	Threatened
	SacramentoRiverwinter	Increasedriskofextinction	Endangered
Coho	LowerColumbia	Stable/Improving	Threatened
	OregonCoast	Improving	Threatened
	SouthernOregon/NorthernCalifornia	Mixed	Threatened
	CentralCaliforniaCoast	Mixed	Endangered
Sockeye	SnakeRiver	Improving	Endangered
	LakeOzette	Stable	Threatened
Chum	HoodCanalsummer	Improving	Threatened
	ColumbiaRiver	Stable	Threatened
Steelhead	UpperColumbia	Improving	Threatened
	SnakeRiver	Stable/Improving	Threatened
	MiddleColumbia	Stable/Improving	Threatened
	UpperWillamette	Declining	Threatened
	LowerColumbia	Stable	Threatened
	PugetSound	Stable	Threatened
	NorthernCalifornia	Mixed	Threatened
	CentralCaliforniaCoast	Uncertain	Threatened
	SouthCentralCalifornia	Declining	Threatened
	SouthernCalifornia	Uncertain	Endangered

The most recent status review for Atlantic salmon was published in 2006 (Fay et al. 2006). This review stated that fewer than 1,500 adults have returned to spawn each year since 1998. The Population Viability Analysis estimates of the probability of extinction for the Gulf of Mexico DPS of Atlantic Salmon ranges from 19 percent to 75 percent within the next 100 years, even with the continuation of current levels of hatchery supplementation. The abundance was estimated at 1,014 individuals in 2007, the most recent year for which abundance records are available.

3.1 Salmonid Life Histories

Salmonids exhibit either an ocean-type or stream-type behavior. Ocean-type migrate to the ocean within their first year of life (sub-yearlings). Stream-type salmonids usually migrate to sea at a larger size, after months or years of freshwater rearing. Stream-type salmonids of the genus *Oncorhynchus* include steelhead, coho, and most types of Chinook and sockeye salmon. Stream type salmonids depend more on freshwater conditions than on favorable estuarine conditions. All Pacific salmon species are semelparous (i.e., they die after spawning) and exhibit obligatory anadromy (i.e., there are no recorded landlocked or naturalized freshwater populations; they must spend portions of their lives in both salt and freshwater habitats). Atlantic salmon and some southern populations of steelhead are iteroparous, being capable of returning to the ocean after spawning and returning to freshwaters to spawn again after recovery.

3.2 Threats to Salmonids

Specifically, during all freshwater life stages, salmonids require cool water that is free of contaminants. Water free of contaminants supports survival, growth, and maturation of salmon and the abundance of their prey. In addition to affecting survival, growth, and fecundity, contaminants can disrupt normal behavior necessary for successful migration, spawning, and juvenile rearing. Sufficient forage is necessary for juveniles to maintain growth that reduces freshwater predation mortality, increases overwintering success, initiates smoltification, and increases ocean survival. Natural riparian cover such as submerged and overhanging large wood and aquatic vegetation provides shelter from predators, shades freshwater to prevent increase in water temperature, provides nutrients from leaf litter, supports production of insect prey, and creates important side channels. Riparian vegetation stabilizes bank soils and captures fine sediment in runoff, which maintains functional channel bottom substrate for development of eggs and alevins.

The process of smoltification enables salmon to adapt to the ocean environment. Environmental factors such as exposure to chemicals including heavy metals and elevated water temperatures can affect the smoltification process, not only at the interface between fresh water and saltwater, but higher in the watershed as the process of transformation begins long before fish enter saltwater (Wedemeyer et al. 1980).

The three major threats to Atlantic salmon identified in the listing rule also threaten Pacific salmonids: dams, regulatory mechanisms related to dams, and low marine survival. In addition, a number of secondary threats were identified, including threats to habitat quality and accessibility, commercial and recreational fisheries, disease and predation, inadequacy of regulatory mechanisms related to water withdrawal and water quality, aquaculture, artificial propagation, climate change, competition, and depleted fish communities.

3.3 Salmonids

The action area for this consultation overlaps with designated critical habitat for all Pacific salmonids. NMFS has identified features of designated critical habitat that are essential to the conservation of the species. Many of these features specific to each life stage (e.g., migration, spawning, rearing, and estuary, see Table 2) are common for each species. To fully understand the conservation role of these habitats, specific physical and biological habitat features (e.g., water temperature, water quality, forage, natural cover, etc.) were identified for each life stage.

3.3.1 Chinook Salmon

Life history. There are 9 ESA-listed Chinook salmon ESUs. Chinook are the largest of the Pacific salmon and prefer streams that are deeper and larger than those used by other Pacific salmon species. Chinook salmon ESUs exhibit either "stream-type" or "ocean-type" life histories. Stream-type Chinook salmon reside in freshwater for a year or more following emergence before migrating to salt water. Stream-type ESUs normally return in late winter and early spring (spring-run) as immature adults and reside in deep pools during summer before spawning in fall. Ocean-type Chinook salmon migrate to the ocean within their first year and usually return as full mature adults in fall (fall-run) and spawn soon after river entry. (Healey 1991).

Temperature and stream flow can significantly influence the timing of migrations and spawning, as well as the selection of spawning habitat (Geist et al. 2008, Hatten et al. 2009). All Chinook salmon are semelparous (i.e. they die after spawning). Fall-run Chinook salmon generally spawn in the mainstem of larger rivers and are less dependent on flow, although early autumn rains and a drop in water temperature often provide cues for movements to spawning areas. Spring-run Chinook salmon take advantage of high flows from snowmelt to access the upper reaches of rivers. Chinook salmon primarily feed on small invertebrates and vertebrates, with the diet of adult oceanic Chinook salmon comprised primarily of fish.

Designated Critical Habitat. Designated critical habitat for the Puget Sound, Lower Columbia River, and Upper Willamette River ESUs for Chinook salmon identify features essential to the conservation of the species and sites necessary to support one or more Chinook salmon life stage(s). These features essential to the conservation of the species are detailed in Table 2 and include biological elements that are vulnerable to the stressors of the action. These include water quality conditions that support spawning and incubation, larval and juvenile development, and physiological transitions between fresh and saltwater. The features essential to the conservation of the species also include aquatic invertebrate and fish forage species and water quality to support juvenile and adult development, growth, and maturation, and natural cover of riparian and nearshore vegetation and aquatic vegetation. Designated critical habitat for the Snake River fall-run and Snake River spring/summer run Chinook salmon generically designates water quality, food, and riparian vegetation features essential to the conservation of the species.

3.3.2 Chum Salmon

Life history. In general, North American chum salmon migrate north along the coast in a narrow coastal band that broadens in southeastern Alaska. Chum salmon usually spawn in the lower reaches of rivers during summer and fall. Redds are dug in the mainstem or in side channels of rivers from just above tidal influence to nearly 100 km from the sea. Juveniles use shallow, low flow habitats for rearing that include inundated mudflats, tidal wetlands and their channels, and sloughs. The duration of estuarine residence for chum salmon juveniles are known for only a few estuaries. Observed residence time ranges from 4 to 32 days, with about 24 days as the most common.

Immature chum salmon disperse over the North Pacific Ocean and maturing adults return to the home streams usually at two to five years of age, and in some cases up to seven years (Bigler 1985). This ocean-type life history means that the survival and growth for juvenile chum salmon depends less on freshwater conditions than on favorable estuarine conditions. Chum salmon feed on a variety of prey organisms depending upon life stage and size. In freshwater Chum salmon feed primarily on small invertebrates; in saltwater, their diet consists of copepods, tunicates, mollusks, and fish.

Designated Critical Habitat. Areas designated as critical habitat are important for the species' overall conservation by protecting quality growth, reproduction, and feeding. features essential to the conservation of the species for both chum salmon ESUs include freshwater spawning, rearing, and migration areas; estuarine and 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.

3.3.3 Coho Salmon

Life History. 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. Coho salmon exhibit a stream-type life history. Most coho salmon enter rivers between September and February. In many systems, coho salmon wait to enter until fall rainstorms have provided the river with sufficiently strong flows and depth. Coho salmon spawn from November to January, and occasionally into February and March. Some spawning occurs in third-order streams, but most spawning activity occurs in fourth- and fifth-order streams with gradients of 3 percent or less. After fry emerge in spring they disperse upstream and downstream to establish and defend territories with weak water currents such as backwaters and shallow areas near stream banks. Juveniles rear in these areas during the spring and summer. In early fall juveniles move to river margins, backwater, and pools. During winter juveniles typically reduce feeding activity and growth rates slow down or stop. By March of their second spring, juveniles feed heavily on insects and crustaceans and grow rapidly before smoltification and outmigration (Olegario 2006), spending only a short time (one to three days) in the estuary with little feeding (Thorpe 1994, Miller and Sadro 2003). After entering the ocean, immature coho salmon initially remain in nearshore waters close to the parent stream. Along the Oregon/California coast, coho salmon primarily return to rivers to spawn as three-year olds, having spent approximately 18 months rearing in fresh water and 18 months in salt water. In some streams, a smaller proportion of males may return as two-year olds. The presence of two-year old males can allow for substantial genetic exchange between brood years. The relatively fixed three-year life cycle exhibited by female coho salmon limits demographic interactions between brood years. This makes coho salmon more vulnerable to environmental perturbations than salmonids that exhibit overlapping generations, i.e., the loss of a coho salmon brood year in a stream is less likely to be reestablished by females from other brood years than for other Pacific salmon.

Coho salmon feed on a variety of prey organisms depending upon life stage and size. While at sea, coho salmon tend to eat fish including herring, sand lance, sticklebacks, sardines, shrimp and surf smelt. While in estuaries and in fresh water coho salmon are significant predators of Chinook, pink, and chum salmon, as well as aquatic and terrestrial insects. Smaller fish, such as fry, eat chironomids, plecoptera and other larval insects, and typically use visual cues to find their prey.

Designated Critical Habitat. The essential features of designated critical habitat for the Central California Coast and Southern Oregon/Northern California Coast coho salmon ESUs that are vulnerable to the stressors of the action are generically identified as water quality, food, and riparian vegetation. The essential features of designated critical habitat for the Lower Columbia River and Oregon Coast ESUs are more detailed. They include water quality conditions supporting spawning, incubation and larval development, water quality and forage supporting juvenile development; and natural cover of riparian and aquatic vegetation, water quality conditions supporting juvenile and adult physiological transitions between fresh- and saltwater, and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation (Table 2).

3.3.4 Sockeye Salmon

Life History. Most sockeye salmon exhibit a lake-type life history (i.e., they spawn and rear in or near lakes), though some 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 (<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.

Designated Critical Habitat. The essential features of designated critical habitat for Lake Ozette sockeye ESU that are potentially affected by the stressors of the action include water quality conditions and forage species supporting spawning, incubation, development, growth, maturation, physiological transitions between fresh and saltwater, and natural cover of riparian and nearshore vegetation and aquatic vegetation. The essential features of designated critical habitat for Snake River sockeye potentially affected by the stressors of the action are identified generically as water quality, food, and riparian vegetation (Table 2).

3.3.5 Steelhead Trout (Eleven ESUs)

Life History. Steelhead have a longer run time than other Pacific salmonids and do not tend to travel in large schools. They can be divided into two basic run-types: the stream-maturing type (summer steelhead) and the ocean-maturing type (winter steelhead). Summer steelhead enter fresh water as sexually immature adults between May and October (Nickelson et al. 1992, Busby et al. 1996) and hold in cool, deep pools during summer and fall before moving to spawning sites as mature adults in January and February (Barnhart 1986, Nickelson et al. 1992). Winter steelhead return to fresh water between November and April as sexually mature adults and spawn shortly after river entry (Nickelson et al. 1992, Busby et al. 1996). Steelhead typically spawn in small tributaries rather than large, mainstem rivers and spawning distribution often overlaps with coho salmon, though steelhead tend to prefer higher gradients (generally two to seven percent, but up to 12 percent or more) and their distributions tend to extend further upstream than coho salmon. Summer steelhead commonly spawn higher in a watershed than do winter steelhead, sometimes even using ephemeral streams from which juveniles are forced to emigrate as flows diminish. Fry usually inhabit shallow water along banks and stream margins of streams (Nickelson et al. 1992) and move to faster flowing water such as riffles as they grow. Some older juveniles move downstream to rear in larger tributaries and mainstem rivers (Nickelson et al. 1992). In Oregon and California, steelhead may enter estuaries where sand bars create low salinity lagoons. Migration of juvenile steelhead to these lagoons occurs throughout the year, but is concentrated in the late spring/early summer and in the late fall/early winter periods (Shapovalov and Taft 1954, Zedonis 1992). Juveniles rear in fresh water for one to four years, then smolt and migrate to the ocean in March and April (Barnhart 1986). Steelhead typically reside in marine waters for two or three years prior to returning to their natal streams to spawn as four or five-year olds. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death (Busby et al. 1996). Females spawn more than once more commonly than males, but rarely more than twice before dying (Nickelson et al. 1992). Iteroparity is also more common among southern steelhead populations than northern populations (Busby et al. 1996).

Steelhead feed on a variety of prey organisms depending upon life stage, season, and prey availability. In freshwater juveniles feed on common aquatic stream insects such as caddisflies, mayflies, and stoneflies but also other insects (especially chironomid pupae), zooplankton, and benthic organisms (Pert 1993 , Merz 2002). Older juveniles sometimes prey on emerging fry, other fish larvae, crayfish, and even small mammals, though these are not a major food source (Merz 2002). The diet of adult oceanic steelhead is comprised primarily of fish and squid (Light 1985, Burgner et al. 1992).

Designated Critical Habitat. The essential features of designated critical habitat for all steelhead DPSs that are potentially affected by the stressors of the action include water quality conditions and/or forage species supporting spawning, incubation, development, growth, maturation, physiological transitions between fresh and saltwater, and natural cover of riparian and nearshore vegetation and aquatic vegetation (Table 2).

3.3.6 Atlantic Salmon, Gulf of Maine Distinct Population Segment

Status. The Gulf of Maine DPS of Atlantic salmon was first listed as endangered in response to population decline caused by many factors, including overexploitation, degradation of water quality, and damming of rivers, all of which remain persistent threats. The species' listing currently includes all anadromous Atlantic salmon whose freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, and wherever these fish occur in the estuarine and marine environment. The USFWS has jurisdiction over this species in freshwater, so the NMFS' jurisdiction is limited to potential CGP-authorized discharges from the coastal lands belonging to the Passamoquoddy Tribe at Pleasant Point. The most recent status review for Atlantic salmon was published in 2006 (Fay et al. 2006).

In 2015, NMFS announced a new program to focus and redouble its efforts to protect some of the species that are currently among the most at risk of extinction in the near future with the goal of reversing their declining trend so that the species will become a candidate for recovery in the future. Atlantic salmon is one of the eight species identified for this initiative (NMFS 2015b). These species were identified as among the most at-risk of extinction based on three criteria (1) endangered listing, (2) declining populations, and (3) are considered a recovery priority #1. A priority #1 species is one whose extinction is almost certain in the immediate future because of a rapid population decline or habitat destruction, whose limiting factors and threats are well understood and the needed management actions are known and have a high probability of success, and is a species that is in conflict with construction or other developmental projects or other forms of economic activity.

Life History. Adult Atlantic salmon in the Gulf of Maine typically spawn in early November and juveniles spend approximately two years feeding on small invertebrates and occasionally small vertebrates in freshwater until they weigh approximately two ounces and are six inches in length. Smoltification (the physiological and behavioral changes required for the transition to salt water) usually occurs at age two for this DPS after which the species migrates more than 4,000 km in the open ocean to reach feeding areas in the Davis Strait between Labrador and Greenland. Adult salmon feed opportunistically and their diet is composed primarily of other fish. The majority (90 percent) spend two winters at sea before reaching maturity and returning to their natal rivers, with the remainder spending one or three winters at sea. At maturity, Gulf of Maine DPS salmon typically weigh between 8 to 15 pounds and average 30 inches in length.

Designated Critical Habitat. The designated critical habitat includes all anadromous Atlantic salmon streams whose freshwater range occurs in watersheds from the Androscoggin River northward along the Maine coast northeastward to the Dennys River, and wherever these fish occur in the estuarine and marine environment. The features essential to the conservation of the species identified within freshwater and estuarine habitats of the occupied range of the Gulf of Maine DPS include sites for spawning and incubation, juvenile rearing, and migration. Designated critical habitat and features essential to the conservation of the species were not designated within marine environments because of the limited of the physical and biological features that the species uses during the marine phase of its life.

4 NON-SALMONID ANADROMOUS FISH

4.1 Southern Pacific Eulachon

Status. Eulachon are small smelt native to eastern North Pacific waters from the Bering Sea to Monterey Bay, California, or from 61º N to 31º N (Hart and McHugh 1944, Eschmeyer et al. 1983, Minckley et al. 1986, Hay and McCarter 2000). Eulachon that spawn in rivers south of the Nass River of British Columbia to the Mad River of California comprise the southern population of Pacific eulachon. This species status is classified as “at moderate risk of extinction throughout all of its range” (Gustafson 2010) based upon timing of runs and genetic distinctions (Hart and McHugh 1944, McLean et al. 1999, Hay and McCarter 2000, McLean and Taylor 2001, Beacham et al. 2005). Based on a number of data sources, the 2016 Status Review Update for eulachon reports that the spawning population has increased between 2011 and 2015 and that of the size of some sub-populations is larger than originally estimated in 2010 (Gustafson et al. 2016). The status update does not recommend a change in status because it is too early to tell whether recent improvements in the southern DPS of eulachon will persist. Recent poor ocean conditions taken with given variability inherent in wild populations suggest that population declines may again become widespread in the upcoming return years.

Life Cycle. Adult eulachon are found in coastal and offshore marine habitats (Allen et al. 1988, Hay and McCarter 2000, Willson et al. 2006). Larval and post larval eulachon prey upon phytoplankton, copepods, copepod eggs, mysids, barnacle larvae, worm larvae, and other eulachon larvae until they reach adult size (WDFW and ODFW 2001). The primary prey of adult eulachon are copepods and euphausiids, malacos, tracans, and cumaceans (Smith and Saalfeld 1955, Barraclough 1964, Drake and Wilson 1991, Sturdevant et al. 1999, Hay and McCarter 2000).

Although primarily marine, eulachon return to freshwater to spawn. Adult eulachon have been observed in several rivers along the west coast (Odemar 1964, Minckley et al. 1986, Emmett et al. 1991, Jennings 1996, Wright 1999, Hay and McCarter 2000, Larson and Belchik 2000, Musick et al. 2000, WDFW and ODFW 2001, Moyle 2002). For the southern population of Pacific eulachon, most spawning is believed to occur in the Columbia River and its tributaries as well as in other Oregonian and Washingtonian rivers (Emmett et al. 1991, Musick et al. 2000, WDFW and ODFW 2001). Eulachon take less time to mature and generally spawn earlier in southern portions of their range than do eulachon from more northerly rivers (Clarke et al. 2007).

Spawning is strongly influenced by water temperatures, so the timing of spawning depends upon the river system involved (Willson et al. 2006). In the Columbia River and further south, spawning occurs from late January to March, although river entry occurs as early as December (Hay and McCarter 2000). Further north, the peak of eulachon runs in Washington State is from February through March while Alaskan runs occur in May and river entry may extend into June (Hay and McCarter 2000). Females lay eggs over sand, course gravel or detritial substrate. Eggs attach to gravel or sand and incubate for 30 to 40 days after which larvae drift to estuaries and coastal marine waters (Wydoski and Whitney 1979).

Eulachon generally die following spawning (Scott and Crossman 1973). The maximum known lifespan is 9 years of age, but 20 to 30 percent of individuals live to 4 years and most individuals survive to 3 years of age, although spawning has been noted as early as 2 years of age (Wydoski and Whitney 1979, Barrett et al. 1984, Hugg 1996, Hay and McCarter 2000, WDFW and ODFW 2001). The age distribution of spawners varies between river and from year-to-year (Willson et al. 2006).

Threats. The Biological Review Team 2010 assessment of the status of the southern DPS of eulachon ranked climate change impacts on ocean conditions as the most serious threat to the persistence of eulachon in all four subareas of the DPS: Klamath River, Columbia River, Fraser River, and British Columbia coastal rivers south of the Nass River. Climate change impacts on freshwater habitat and eulachon bycatch in offshore shrimp fisheries were also ranked in the top four threats in all subareas of the DPS. Dams and water diversions in the Klamath and Columbia rivers and predation in the Fraser and British Columbia coastal rivers filled out the last of the top four threats (Gustafson 2010).

Designated Critical Habitat. The designated critical habitat for the southern population of Pacific eulachon includes freshwater creeks and rivers and their associated estuaries, comprising approximately 539 km (335 mi) of habitat. The physical or biological features potentially affected by the stressors of the action include water quality conditions supporting spawning and incubation, larval and adult mobility, and abundant prey items supporting larval feeding after the yolk sac is depleted, and nearshore and offshore marine foraging habitat with water quality and available prey, supporting juveniles and adult survival. Eulachon prey on a wide variety of species including crustaceans such as copepods and euphausiids (Hay and McCarter 2000, WDFW and ODFW 2001), unidentified malacostracans (Sturdevant et al. 1999), cumaceans (Smith and Saalfeld 1955) mysids, barnacle larvae, and worm larvae (WDFW and ODFW 2001).

4.2 Shortnose Sturgeon

Status. We used information available in the Shortnose Sturgeon Recovery Plan (NMFS 1998), the 2010 NMFS Biological Assessment (SSSRT 2010), and the listing document to summarize the status of the species. Shortnose sturgeon were listed as endangered throughout its range on March 11, 1967 pursuant to the Endangered Species Preservation Act of 1966. Shortnose sturgeon remained on the list as endangered with enactment of the ESA in 1973. Shortnose sturgeon occur along the Atlantic Coast of North America, from the Saint John River in Canada to the Saint Johns River in Florida. The Shortnose Sturgeon Recovery Plan describes 19 shortnose sturgeon populations that are managed separately in the wild. Two additional geographically separated populations occur behind dams 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). While shortnose sturgeon spawning has been documented in several rivers across its range (including but not limited to: Kennebec River, Maine, Connecticut River, Hudson River, Delaware River, Pee Dee River, South Carolina, Savannah, Ogeechee, and Altamaha rivers, Georgia), status for many other rivers remain unknown.

Life History. Sturgeon are a long-lived species, taking years to reach sexual maturity. Male shortnose sturgeon tend to sexually mature earlier than females, and sturgeon residing in more northern latitudes reach maturity later than those at southerly latitudes. Sturgeon are broadcast spawners, with females laying adhesive eggs on hard bottom, rocky substrate at upstream, freshwater sites. When the males arrive at the spawning site, they broadcast sperm into the water column to fertilize the eggs. Despite their high fecundity, sturgeon have low recruitment.

Spawning periodicity varies by species and sex, but there can be anywhere from 1 to 5 years between spawning, as individuals need to rebuild gonadal material. There is difficulty in definitively assessing where and how reliably spawning occurs. Presence of eggs, age-1 juveniles and capture of “ripe” adults moving upstream (i.e., likely on a spawning run) serve as strong indicators, but due to their life history and the impacts sturgeon populations have taken, there are additional hurdles to successful spawning. Because sturgeon are iteroparous, and populations in some areas so depleted, eggs deposited at the spawning grounds may not be fertilized if males do not arrive at the spawning grounds that year.

Hatching occurs approximately 94-140 hours after egg deposition, and larvae assume a bottom-dwelling existence. The yolksac larval stage is completed in about 8-12 days, during which time larvae move downstream to rearing grounds over a 6-12 day period. Size of larvae at hatching and at the juvenile stage varies by species. During the daytime, larvae use benthic structure (e.g., gravel matrix) as refugia. Juvenile sturgeon continue to move further downstream into brackish waters, and eventually become residents in estuarine waters for months or years.

Generally, sturgeon are benthic omnivores, feeding on benthic invertebrates that are abundant in the substrate in that area. Shortnose sturgeon forage over sandy bottom, and eat benthic invertebrates like amphipods.

Juvenile shortnose generally move upstream during spring and summer and downstream for fall and winter; however, these movements usually occur above the salt- and freshwater interface. During summer and winter, adult shortnose sturgeon inhabit freshwater reaches of rivers and streams influenced by tides. During summer, at the southern end of its range, shortnose sturgeon congregate in cool, deep, areas of rivers taking refuge from high temperatures. Adult shortnose sturgeon prefer deep, downstream areas with soft substrate and vegetated bottoms, if present. Because they rarely leave their natal rivers, shortnose sturgeon are considered to be freshwater amphidromous (i.e. adults spawn in freshwater but regularly enter saltwater habitats during their life).

Threats. The viability of sturgeon populations is highly sensitive to juvenile mortality resulting in lower numbers of sub-adults recruiting into the adult breeding population. This relationship caused Secor et al. (2002) to conclude sturgeon populations can be grouped into two demographic categories: populations having reliable (albeit periodic) natural recruitment and those that do not. The shortnose sturgeon populations without reliable natural recruitment are at more risk. Several authors have also demonstrated that sturgeon populations generally, and shortnose sturgeon populations in particular, are much more sensitive to adult mortality than other species of fish. Sturgeon populations cannot survive fishing related mortalities exceeding five percent of an adult spawning run and they are vulnerable to declines and local extinction if juveniles die from fishing related mortalities (Secor et al. 2002).

The 1998 recovery plan for shortnose sturgeon (NMFS 1998) identify Habitat degradation or loss (resulting, for example, from dams, bridge construction, channel dredging, and pollutant discharges), and mortality (for example, from impingement on cooling water intake screens, dredging, and incidental capture in other fisheries) as principal threats to the species' survival. Introductions and transfers of indigenous and nonindigenous sturgeon, intentional or accidental, may threaten wild shortnose sturgeon populations by imposing genetic threats, increasing competition for food or habitat, or spreading diseases. Sturgeon species are susceptible to viruses enzootic to the west coast and fish introductions could further spread these diseases. Shortnose sturgeon populations are at risk from incidental bycatch, loss of habitat, dams, dredging and pollution. These threats are likely to continue into the future. We conclude that the shortnose sturgeon’s resilience to further perturbation is low.

Designated critical habitat. No critical habitat has been designated for shortnose sturgeon.

4.3 Atlantic Sturgeon

Status. The range of Atlantic sturgeon includes the St. John River in Canada, to St. Johns River in Florida. USEPA has NPDES permitting authority throughout New Hampshire, Massachusetts, the District of Columbia, Federally operated facilities in Delaware and Tribal lands in Connecticut, Rhode Island, New York, North Carolina, and 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). The Gulf of Maine, New York Bight, and Chesapeake Bay DPSs are those potentially affected by the 2016 CGP.

Life history. Although the Atlantic sturgeon DPSs are genetically distinct, their life history characteristics are the same and are discussed together. As Acipensieriformes, Atlantic sturgeon are anadromous and iteroparus. Like shortnose sturgeon, male Atlantic sturgeon tend to sexually mature earlier than females, and sturgeon residing in more northern latitudes reach maturity later than those at southerly latitudes. Evidence of Atlantic sturgeon spawning has been found in many of the same rivers as shortnose sturgeon (see discussion above). Atlantic sturgeon eggs are between 2.5-3.0 mm, and larvae are about 7 mm long upon hatching. Generally, sturgeon are benthic omnivores, feeding on benthic invertebrates that are abundant in the substrate in that area. Atlantic sturgeon commonly eat polychaetes and isopods.

As juveniles, Atlantic sturgeon migrate downstream from the spawning grounds into brackish water. Unlike shortnose sturgeon, subadult Atlantic sturgeon (76-92cm) may move out of the estuaries and into coastal waters where they can undergo long range migrations. At this stage in the coastal waters, individual subadult and adult Atlantic sturgeon originating from different DPSs will mix, but adults return to their natal river to spawn.

Threats. Of the stressors evaluated in the 2007 status review (ASSRT 2007), bycatch mortality, water quality, lack of adequate state and/or Federal regulatory mechanisms, and dredging activities were most often identified as the most significant threats to the viability of Atlantic sturgeon populations. Additionally, some populations were affected by unique stressors, such as habitat impediments (e.g., Cape Fear and Santee-Cooper rivers) and apparent ship strikes (e.g., Delaware and James rivers).

Designated critical habitat. The proposed designated critical habitat for Atlantic sturgeon includes tidally-affected accessible waters of coastal estuaries where the species occurs. The essential features of the proposed designated critical habitat for the Atlantic sturgeon DPSs within these rivers do not include plant or animal life that may be affected by the stressors of the action.

From north to south, the rivers and waterways that make up the spatial extent of designated critical habitat are detailed in Table 3.

Table 4. River systems in the action area that are included in proposed designated critical habitat for Atlantic sturgeon.

Distinct Population Segment	River/Waterway		
Gulf of Maine	Penobscot Piscataqua	Kennebec Merrimack	Androscoggin
New York Bight	Connecticut Housatonic Delaware	Housatonic	Hudson
Chesapeake Bay	Susquehanna York James	Potomac Mattaponi	Rappahannock Pamunkey

4.4 Green Sturgeon

Status. We used information available in the 2002 Status Review and Status Review Updates (BRT 2005, Adams et al. 2007, NMFS 2015a), and the proposed and final listing rules to summarize the status of the species. The Southern DPS of green sturgeon is listed as threatened. On June 2, 2010, NMFS issued a 4 (d) Rule for the Southern DPS, applying certain take prohibitions. The most recent 5-year status review was published in August of 2015. 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, coastal and Central Valley populations, and the spawning population in the Sacramento River, California (Adams et al. 2007).

The 2015 status update indicates that DPS structure of the North American green sturgeon has not changed and that many of the principle factors considered when listing Southern DPS green sturgeon as threatened are relatively unchanged. Loss of spawning habitat and bycatch in the white sturgeon commercial fishery are two major causes for the species decline. Spawning in the Feather River is encouraging and the decommissioning of Red Bluff Diversion Dam and breach of Shanghai Bench makes spawning conditions more favorable. The prohibition of retention in commercial and recreational fisheries has eliminated a known threat and likely had a very positive effect on the overall population, although recruitment indices are not presently available.

Life history. As members of the family Acipenseridae, green sturgeon share similar reproductive strategies and life history patterns with other sturgeon species; see discussion for shortnose sturgeon above. The Sacramento River is the location of the single, known spawning population for the green sturgeon Southern DPS (Adams et al. 2007). Green sturgeon have relatively large eggs compared to other sturgeon species (4.34 mm) and grow rapidly, reaching 66 mm in three weeks. Generally, sturgeon are benthic omnivores, feeding on benthic invertebrates that are abundant in the substrate in that area. Little is known specifically about green sturgeon foraging habits; generally, adults feed upon invertebrates like shrimp, mollusks, amphipods and even small fish, while juveniles eat opossum shrimp and amphipods. Juvenile green sturgeon spend 1-3 years in freshwater, disperse widely in the ocean, and return to freshwater as adults to spawn (about age 15 for males, age 17 for females).

Threats. The 2015 status review (NMFS 2015a) for the southern DPS of green sturgeon indicates that many of the principle factors considered when listing Southern DPS green sturgeon as threatened are relatively unchanged. Current threats to the Southern DPS include entrainment by water projects, contaminants, incidental bycatch and poaching. Given the small population size, the species’ life history traits (e.g., slow to reach sexual maturity), and that the threats to the population are likely to continue into the future, the Southern DPS is not resilient to further perturbations. The spawning area for the species is still small, as the species still encounters impassible barriers in the Sacramento, Feather and other rivers that limit their spawning range. Entrainment threat includes stranding in flood diversions during high water events.

Designated critical habitat. Designated critical habitat for the Southern DPS of green sturgeon was designated includes coastal U.S. marine waters within 60 fathoms deep from Monterey Bay, California to Cape Flattery, Washington, including the Strait of Juan de Fuca, and numerous coastal rivers and estuaries: see the Final Rule for a complete description. Essential features identified in this designation that may be affects by the stressors of the action include acceptably low levels of contaminants (e.g., pesticides, PAHs, heavy metals that may disrupt the normal behavior, growth, and viability of subadult and adult green sturgeon) and abundant prey items (benthic invertebrates and fish) for subadults and adults.

4.5 Nassau Grouper

Status. The Nassau grouper (*Epinephelus striatus*) is primarily a shallow-water, insular fish species found from inshore to about 330 feet (100 m) 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 not known from the Gulf of Mexico except at Campeche Bank off the coast of the Yucatan Peninsula, at Tortugas, and off Key West. Adults are generally found near coral reefs and rocky bottoms while juveniles are found in shallower waters in and around coral clumps covered with macroalgae and over seagrass beds. Their diet is mostly fishes and crabs, with diet varying by age/size. Juveniles feed mostly on crustaceans, while adults (>30 cm; 11.8 in) forage mainly on fish. The Nassau grouper usually forages alone and is not a specialized forager.

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."

Life History. Nassau grouper exhibit no sexual dimorphism in body shape or color. The species passes through a juvenile bisexual phase, with gonads consisting of both immature spermatogenic and immature ovarian tissue, before maturing directly as male or female. The minimum age at sexual maturity is between four and eight years when reaching a size of 400-500 mm standard length (Olsen and LaPlace 1979, Bush et al. 2006). The major determinant of maturity appears to be size rather than age, as fish raised in captivity reached maturity at 27-28 months (Tucker and Woodward 1994).

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). 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.

Designated critical habitat. Critical habitat has not been designated for this species.

5 *SEA TURTLES*

Sea turtles share the common threats described below.

Bycatch: Fishing is the primary anthropogenic threat to sea turtles in the ocean. Fishing gear entanglement potentially drowns or seriously injures sea turtles. Fishing dredges can crush and entrap turtles, causing death and serious injury. Infection of entanglement wounds can compromise health. The development and operation of marinas and docks in inshore waters can negatively impact nearshore habitats. Turtles swimming or feeding at or just beneath the surface of the water are particularly vulnerable to boat and vessel strikes, which can result in serious propeller injuries and death.

Marine Debris: Ingestion or entanglement in marine debris is a cause of morbidity and mortality for sea turtles in the pelagic (open ocean) environment (Stamper et al. 2009). Consumption of non-nutritive debris also reduces the amount of nutritive food ingested, which then may decrease somatic growth and reproduction (McCauley and Bjorndal 1999). Marine debris is especially problematic for turtles that spend all or significant portions of their life cycle in the pelagic environment (e.g., leatherbacks, juvenile loggerheads, and juvenile green turtles).

Habitat Disturbance: Sea turtle nesting and marine environments are facing increasing impacts through structural modifications, sand nourishment, and sand extraction to support widespread development and tourism (Lutcavage et al. 1997, Bouchard et al. 1998, Hamann et al. 2006, Maison 2006, Hernandez et al. 2007, Santidrián Tomillo et al. 2007, Patino-Martinez 2013).

These factors decrease the amount of nesting area available to nesting females, and may evoke a change in the natural behaviors of adults and hatchlings through direct loss of and indirect (e.g., altered temperatures, erosion) mechanisms (Ackerman 1997, Witherington et al. 2003, 2007). Lights from developments alter nesting adult behavior and are often fatal to emerging hatchlings as they are drawn to light sources and away from the sea (Witherington and Bjorndal 1991, Witherington 1992, Cowan et al. 2002, Deem et al. 2007, Bourgeois et al. 2009).

Beach nourishment also affects the incubation environment and nest success. Although the placement of sand on beaches may provide a greater quantity of nesting habitat, the quality of that habitat may be less suitable than pre-existing natural beaches. Constructed beaches tend to differ from natural beaches in several important ways. They are typically wider, flatter, more compact, and the sediments are more moist than those on natural beaches (Nelson et al. 1987) (Ackerman 1997, Ernest and Martin 1999). Nesting success typically declines for the first year or two following construction, even when more nesting area is available for turtles (Trindell et al. 1998, Ernest and Martin 1999, Herren 1999). Likely causes of reduced nesting success on constructed beaches include increased sand compaction, escarpment formation, and changes in beach profile (Nelson et al. 1987, Grain et al. 1995, Lutcavage et al. 1997, Steinitz et al. 1998, Ernest and Martin 1999, Rumbold et al. 2001). Compaction can inhibit nest construction or increase the amount of time it takes for turtles to construct nests, while escarpments often cause female turtles to return to the ocean without nesting or to deposit their nests seaward of the escarpment where they are more susceptible to frequent and prolonged tidal inundation. In short, sub-optimal nesting habitat may cause decreased nesting success, place an increased energy burden on nesting females, result in abnormal nest construction, and reduce the survivorship of eggs and hatchlings. In addition, sand used to nourish beaches may have a different composition than the original beach; thus introducing lighter or darker sand, consequently affecting the relative nest temperatures (Ackerman 1997, Milton et al. 1997).

In addition to effects on sea turtle nesting habitat, anthropogenic disturbances also threaten coastal foraging habitats, particularly areas rich in seagrass and marine algae. Coastal habitats are degraded by pollutants from coastal runoff, marina and dock construction, dredging, aquaculture, oil and gas exploration and extraction, increased under water noise and boat traffic, as well as structural degradation from excessive boat anchoring and dredging (Francour et al. 1999, Lee Long et al. 2000, Waycott et al. 2005).

Pollutants: Conant (2009) included a review of the impacts of marine pollutants on sea turtles: marine debris, oil spills, and bioaccumulative chemicals. Sea turtles at all life stages appear to be highly sensitive to oil spills, perhaps due to certain aspects of their biology and behavior, including a lack of avoidance behavior, indiscriminate feeding in convergence zones, and large pre-dive inhalations (Milton and Lutz 2003). Milton et al. (2003) state that the oil effects on turtles include increased egg mortality and developmental defects, direct mortality due to oiling in hatchlings, juveniles and adults, and impacts to the skin, blood, salt glands, and digestive and immune systems. Vargo et al. (1986) reported that sea turtles would be at substantial risk if they encountered an oil spill or large amounts of tar in the environment. In a review of available information on debris ingestion, Balazs (1985) reported that tar balls were the second most prevalent type of debris ingested by sea turtles. Physiological experiments showed that sea turtles exposed to petroleum products may suffer inflammatory dermatitis, ventilator disturbance, salt gland dysfunction or failure, red blood cell disturbances, immune response, and digestive disorders (Vargo et al. 1986, Lutcavage et al. 1995).

Natural Threats: A number of threats are common to all sea turtles.[1] Predation is a primary natural threat. While cold stunning is not a major concern for leatherback sea turtles, which can tolerate low water temperatures, it is considered a major natural threat to other sea turtle species. Disease is also a factor in sea turtle survival. Fibropapillomatosis (FP) tumors are a major threat to green turtles in some areas of the world and is particularly associated with degraded coastal habitat. Scientists have also documented FP in populations of loggerhead, olive ridley, and flatback turtles, but reports in green turtles are more common. Large tumors can interfere with feeding and essential behaviors, and tumors on the eyes can cause permanent blindness. FP was first described in green turtles in the Florida Keys in the 1930s. Since then it has been recorded in many green turtle populations around the world. The effects of FP at the population level are not well understood. The sand-borne fungal pathogens *Fusarium falciforme* and *F. keratoplasticum* capable of killing greater than 90 percent of sea turtle embryos they infect, threatening nesting productivity under some conditions. These pathogens can survive on decaying organic matter and embryo mortality rates attributed to fusarium were associated with clay/silt nesting areas compared to sandy areas (Sarmiento-Ramırez et al. 2014).

Climate Change. While impacts to sea turtle nesting habitat is under the jurisdiction of the USFWS, nesting impacts affect the size and structure of the breeding populations that occur in the sea, where NMFS has jurisdiction of the protection of sea turtle species. Conant's (2009) review describes the potentially extensive impacts of climate change on all aspects of a sea turtle's life cycle, as well as impact the abundance and distribution of prey items. Rising sea level is one of the most certain consequences of climate change (Titus and Narayanan 1995), and will result in increased erosion rates along nesting beaches. This could particularly affect areas with low-lying beaches where sand depth is a limiting factor, as the sea will inundate nesting sites and decrease available nesting habitat (Fish et al. 2005, Baker et al. 2006). The loss of habitat because of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Baker et al. 2006). On some undeveloped beaches, shoreline migration will have limited effects on the suitability of nesting habitat. The Bruun rule specifies that during a sea level rise, a typical beach profile will maintain its configuration but will be translated landward and upward (Rosati et al. 2013). However, along developed coastlines, and especially in areas where erosion control structures have been constructed to limit shoreline movement, rising sea levels will cause severe effects on nesting females and their eggs. Erosion control structures can result in the permanent loss of dry nesting beach or deter nesting females from reaching suitable nesting sites (Council 1990). Nesting females may deposit eggs seaward of the erosion control structures potentially subjecting them to repeated tidal inundation. Non-native vegetation often out competes native species, is usually less stabilizing, and can lead to increased erosion and degradation of suitable nesting habitat. Exotic vegetation may also form impenetrable root mats that can prevent proper nest cavity excavation, invade and desiccate eggs, or trap hatchlings.

5.1 Leatherback Sea Turtle

[1] See hyperlink to NMFS information on sea turtles: http://www.nmfs.noaa.gov/pr/species/turtles/threats.htm, updated June 16, 2014

Status. 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 global population of adult females has declined over 70 percent in less than one generation, from an estimated 115,000 adult females in 1980 to 34,500 adult females in 1995 (Pritchard 1982, Spotila et al. 1996). There may be as many as 34,000 – 94,000 adult leather backs in the North Atlantic, alone (TEWG 2007), but dramatic reductions (> 80 percent) have occurred in several populations in the Pacific, which was once considered the stronghold of the species (Sarti Martinez 2000). The 2013 five-year review (NMFS and USFWS 2013b) reports that the East Pacific and Malaysia leatherback populations have collapsed, yet Atlantic populations generally appear to be stable or increasing. Many explanations have been provided to explain the disparate population trends, including fecundity and foraging differences seen in the Pacific, Atlantic, and Indian Oceans. Since the last 5-year review, studies indicate that high reproductive output and consistent and high quality foraging areas in the Atlantic Ocean have contributed to the stable or recovering populations; whereas prey abundance and distribution may be more patchy in the Pacific Ocean, making it difficult for leatherbacks to meet their energetic demands and lowering their reproductive output. Both natural and anthropogenic threats to nesting and marine habitats continue to affect leatherback populations, including the 2004 tsunami in the Indian Ocean, 2010 oil spill in the U.S. Gulf of Mexico, logging practices, development, and tourism impacts on nesting beaches in several countries.

In 2015, NMFS announced a new program to focus and redouble its efforts to protect some of the species that are currently among the most at risk of extinction in the near future with the goal of reversing their declining trend so that the species will become a candidate for recovery in the future. The leatherback sea turtle is one of the eight species identified for this initiative (NMFS 2015b). These species were identified as among the most at-risk of extinction based on three criteria (1) endangered listing, (2) declining populations, and (3) are considered a recovery priority #1. A priority #1 species is one whose extinction is almost certain in the immediate future because of a rapid population decline or habitat destruction, whose limiting factors and threats are well understood and the needed management actions are known and have a high probability of success, and is a species that is in conflict with construction or other developmental projects or other forms of economic activity.

Life history. Estimates of age at maturity ranges from 5 to 29 years (Spotila et al. 1996, Avens et al. 2009). Females nest every 1 to 7 years. Natal homing, at least within an ocean basin, results in reproductive isolation between five broad geographic regions: eastern and western Pacific, eastern and western Atlantic, and Indian Ocean. Leatherback sea turtles migrate long, transoceanic distances between their tropical nesting beaches and the highly productive temperate waters where they forage, primarily on jellyfish and tunicates. These gelatinous prey are relatively nutrient-poor, such that leatherbacks must consume large quantities to support their body weight (James et al. 2005, Wallace et al. 2006).

Designated critical habitat. On March 23, 1979, leatherback designated critical habitat was identified adjacent to Sandy Point, St. Croix, U.S. Virgin Islands from the 183 m isobath to mean high tide level between 17° 42’12” N and 65°50’00” W. 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 support significant designated critical habitat deterioration. On January 20, 2012, NMFS issued a final rule to designate additional designated critical habitat for the leatherback sea turtle. This designation includes approximately 43,798 km^2 stretching along the California coast from Point Arena to Point Arguello east of the 3000 m depth contour; and 64,760 km^2 stretching from Cape Flattery, Washington to Cape Blanco, Oregon east of the 2,000 m depth contour. The designated areas comprise approximately 108558 km^2 of marine habitat and include waters from the ocean surface down to a maximum depth of 80 m. They were designated specifically because of the occurrence of forage species, primarily jellyfish, of sufficient condition, distribution, diversity, abundance and density necessary to support individual as well as population growth, reproduction, and development of leatherbacks.

5.2 Hawksbill Sea Turtle

Status. The hawksbill sea turtle has a sharp, curved, beak-like mouth. It has a circumglobal distribution throughout tropical and, to a lesser extent, subtropical oceans. The hawksbill turtle was once abundant in tropical and subtropical regions throughout the world. Over the last century, this species has declined in most areas and stands at only a fraction of its historical abundance. According to the 2013 status review (NMFS and USFWS 2013a), nesting populations in the eastern Pacific, and the Nicaragua nesting population in the western Caribbean appears to have improved. However, the trends and distribution of the species throughout the globe largely is unchanged. Although greatly depleted from historical levels, nesting populations in the Atlantic in general are doing better than in the Indian and Pacific Oceans. In the Atlantic, more population increases have been recorded in the insular Caribbean than along the western Caribbean mainland or the eastern Atlantic. In general, hawksbills are doing better in the Indian Ocean (especially the southwestern and northwestern Indian Ocean) than in the Pacific Ocean. The situation for hawksbills in the Pacific Ocean is particularly dire, despite the fact that it still has more nesting hawksbills than in either the Atlantic or Indian Oceans.

Life history. Hawksbill sea turtles reach sexual maturity at 20 to 40 years of age. Females return to their natal beaches every 2 to 5 years to nest (an average of 3 to 5 times per season). Clutch sizes are large (up to 250 eggs). Sex determination is temperature dependent, with warmer incubation producing more females. Hatchlings migrate to and remain in pelagic habitats until they reach approximately 22 to 25 cm in straight carapace length. As juveniles, they take up residency in coastal waters to forage and grow. As adults, hawksbills use their sharp beak-like mouths to feed on sponges and corals.

Designated critical habitat. On September 2, 1998, NMFS established designated critical habitat for hawksbill sea turtles around Mona and Monito Islands, Puerto Rico. 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.

5.3 Kemp's Ridley Sea Turtle

Status. The Kemp's ridley is the smallest of all sea turtle species and considered to be the most endangered sea turtle, internationally. The species was first listed under the Endangered Species Conservation Act and listed as endangered under the ESA since 1973.(Zwinenberg 1977, Groombridge 1982, TEWG 2000). According to the 2015 status review (NMFS and USFWS 2013a), population growth rate (as measured by numbers of nests) stopped abruptly after 2009. Given the recent lower nest numbers, the population is not projected to grow at former rates. An unprecedented mortality in subadult and adult females post-2009 nesting season may have altered the 2009 age structure and momentum of the population, which had a carryover impact on annual nest numbers in 2011-2014. The results indicate the population is not recovering and cannot meet recovery goals unless survival rates improve. The Deep Water Horizon oil spill that occurred at the onset of the 2010 nesting season and exposed Kemp's ridleys to oil in nearshore and offshore habitats may have been a factor in fewer females nesting in subsequent years, however this is still under evaluation. The long-term impacts from the Deep Water Horizon oil spill and response to the spill (e.g., dispersants) to sea turtles are not yet known. Given the Gulf of Mexico is an area of high-density offshore oil exploration and extraction, future oil spills are highly probable and Kemp's ridleys and their habitat may be exposed and injured. Commercial and recreational fisheries continue to pose a substantial threat to the Kemp's ridley despite measures to reduce bycatch. Kemp's ridleys have the highest rate of interaction with fisheries operating in the Gulf of Mexico and Atlantic Ocean than any other species of turtle.

Life history. Adult Kemp's ridley sea turtles have an average straight carapace length of 2.1 ft (65 cm). Females mature at 12 years of age. The average remigration is 2 years. Nesting occurs from April to July in large arribadas, primarily at Rancho Nuevo, Mexico. Females lay an average of 2.5 clutches per season. The annual average clutch size is 97 – 100 eggs per nest. The nesting location may be particularly important because hatchlings can more easily migrate to foraging grounds in deeper oceanic waters, where they remain for approximately 2 years before returning to nearshore coastal habitats. Juvenile Kemp's ridley sea turtles use these nearshore coastal habitats from April through November, but move towards more suitable overwintering habitat in deeper offshore waters (or more southern waters along the Atlantic coast) as water temperature drops. Adult habitat largely consists of sandy and muddy areas in shallow, nearshore waters less than 120 ft (37 m) deep, although they can also be found in deeper offshore waters. As adults, Kemp's ridleys forage on swimming crabs, fish, jellyfish, mollusks, and tunicates.

Designated critical habitat. Critical habitat has not been designated for this species.

5.4 Olive Ridley Sea Turtle

Status. 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. 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). The status review, indicates that, based on the current number of olive ridleys nesting in Mexico, three populations appear to be stable (Mismaloya, Tlacoyunque, and Moro Ayuta), two increasing (Ixtapilla, La Escobilla) and one decreasing (Chacahua). Elsewhere in the eastern Pacific, the large scale synchronized nesting populations (i.e., arribada) have declined since the 1970s. Nesting at some arribada beaches continues to decline (e.g., Nancite in Costa Rica) and is stable or increasing at others (e.g., Ostional in Costa Rica). There are too few data available from solitary nesting beaches to confirm the declining trend that has been described for numerous countries throughout the region including El Salvador, Guatemala, Costa Rica, and Panama. Recent at-sea estimates of density and abundance of the olive ridley in the Pacific show a yearly estimate of 1.39 million (Confidence Interval: 1.15 to 1.62 million), which is consistent with the increases seen on nesting beaches as a result of protection programs that began in the 1990s.

Western Atlantic arribada nesting populations are currently very small. The Suriname olive ridley population is currently small and has declined by more than 90 percent since the late

1960s. However, nesting is reported to be increasing in French Guiana. The other nesting population in Brazil, for which no long-term data are available, is small, but increasing. In the eastern Atlantic, long-term data are not available and thus the abundance and trends of this population cannot be assessed at this time. In the northern Indian Ocean, arribada nesting populations are still large, but trend data are ambiguous and major threats continue. Declines of solitary nesting olive ridleys have been reported in Bangladesh, Myanmar, Malaysia, Pakistan, and southwest India.

Designated critical habitat. Critical habitat has not been designated for this species.

5.5 Loggerhead Sea Turtle

Status. Based on the 2009 status review, the loggerhead sea turtle is distinguished from other turtles by its large head and powerful jaws. The North Pacific Ocean DPS ranges throughout tropical to temperate waters in the North Pacific. Based on the 2009 status review (Conant et al. 2009), for three of five DPSs with sufficient data (Northwest Atlantic Ocean, South Pacific Ocean, and North Pacific Ocean), analyses indicate a high likelihood of quasi-extinction. Similarly, threat matrix analysis indicated that all other DPSs have the potential for a severe decline in the future.

North Pacific Ocean Loggerhead sea turtle DPS life history. Mean age at first reproduction for female loggerhead sea turtles is 30 years (SD = 5). Females lay an average of three clutches per season. The annual average clutch size is 112 eggs per nest. The average remigration interval is 2.7 years. Nesting occurs primarily on Japanese beaches, where warm, humid sand temperatures incubate the eggs. Temperature determines the sex of the turtle during the middle of the incubation period. Turtles spend the post-hatchling stage in pelagic waters. The juvenile stage is spent first in the oceanic zone (Kuroshio Extension Bifurcation Region) and later in the neritic zone (i.e., coastal waters) in the eastern and central Pacific. Coastal waters in the eastern and western North Pacific provide important foraging habitat, inter-nesting habitat, and migratory habitat for adult loggerheads.

Northwest Atlantic Ocean Loggerhead sea turtle DPS Life History. Mean age at first reproduction for female loggerhead sea turtles is 30 years (SD = 5). Mating occurs in the spring, and eggs are laid throughout the summer. Northwest Atlantic females lay an average of five clutches per season. The annual average clutch size is 115 eggs per nest. The average remigration interval is 3.7 years (Tucker 2010). Nesting occurs primarily on beaches along the Southeastern Coast of the United States, from southern Virginia to Alabama. Additional nesting occurs on beaches throughout the Gulf of Mexico and Caribbean Sea. Temperature determines the sex of the turtle during the middle of the incubation period. Post- hatchling loggerheads from southeast United States nesting beaches may linger for months in waters just off the nesting beach or become transported by ocean currents within the Gulf of Mexico and North Atlantic, where they become associated with Sargassum habitats, driftlines, and other convergence zones. The juvenile stage is spent first in the oceanic zone (e.g., waters around the Azores, Madeira, Morocco, and the Grand Banks off Newfoundland) and later in the neritic zone (i.e., continental shelf waters) from Cape Cod Bay, Massachusetts, south through Florida, the Caribbean, and the Gulf of Mexico. Neritic stage juveniles often inhabit relatively enclosed, shallow water estuarine habitats with limited ocean access. Juveniles are omnivorous and forage on crabs, mollusks, jellyfish and vegetation at or near the surface (Dodd 1988). Adults inhabit shallow water habitats with large expanses of open ocean access, as well as continental shelf waters. Sub-adult and adult loggerheads prey on benthic invertebrates such as mollusks and decapod crustaceans in hard bottom, coastal habitats.

Northwest Atlantic Ocean Loggerhead sea turtle DPS Designated Ccritical Habitat. The final designated critical habitat for the Northwest Atlantic Ocean loggerhead DPS within the Atlantic Ocean and the Gulf of Mexico includes 36 occupied marine areas within the range of the Northwest Atlantic Ocean DPS. These areas contain one or a combination of nearshore reproductive habitat, winter area, breeding areas, and migratory corridors.

5.6 Green Sea Turtle

Status. The green sea turtle is the largest of the hardshell marine turtles, growing to a weight of 350 lb (159 kg) and a straight carapace length of greater than 3.3 ft (1 m). It has a circumglobal distribution, occurring throughout nearshore tropical, subtropical, and, to a lesser extent, temperate waters. The species was separated into two listing designations: endangered for breeding populations in Florida and the Pacific coast of Mexico, and threatened in all other areas throughout its range. On August 1, 2012, NMFS found that a petition to identify the Hawaiian population of green turtle as a DPS, and to delist the DPS, may be warranted. In April 2016, we removed the range-wide and breeding population listings of the green sea turtle, and in their place, listed eight DPSs as threatened and 3 DPSs as endangered. Among these, only the North Atlantic DPS occurs in waters where USEPA has permitting authority.

Life history throughout range. Age at first reproduction for females is 20 - 40 years. They lay an average of three nests per season with an average of 100 eggs per nest. The remigration interval (i.e., return to natal beaches) is 2 – 5 years. Nesting occurs primarily on beaches with intact dune structure, native vegetation, and appropriate incubation temperatures during summer months. 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. During this life stage, green sea turtles feed close to the surface on a variety of marine algae and other life associated with drift lines and debris. Adult turtles exhibit site fidelity and migrate hundreds to thousands of kilometers from nesting beaches to foraging areas. Green sea turtles spend the majority of their lives in coastal foraging grounds, which include open coastlines and protected bays and lagoons. Adult green turtles feed primarily on seagrasses and algae, although they also eat jellyfish, sponges, and other invertebrate prey.

Status. Once abundant in tropical and subtropical waters, globally, green sea turtles exist at a fraction of their historical abundance, as a result of over-exploitation. The North Atlantic DPS is characterized by geographically widespread nesting with eight sites having high levels of abundance (i.e., <1,000 nesters). Nesting is reported in 16 countries and/or U.S. Territories at 73 sites. This region is data rich and has some of the longest running studies on nesting and foraging turtles anywhere in the world. All major nesting populations demonstrate long-term increases in abundance. The prevalence of FP has reached epidemic proportions in some parts of the North Atlantic DPS.

The extent to which this will affect the long-term outlook for green turtles in the North Atlantic DPS is unknown and remains a concern, although nesting trends across the DPS continue to increase despite the high incidence of the disease. There are still concerns about future risks, including habitat degradation (particularly coastal development), bycatch in fishing gear, continued turtle and egg harvesting, and climate change.

Designated critical habitat. On September 2, 1998, NMFS designated critical habitat for green sea turtles, which include coastal waters surrounding Culebra Island, Puerto Rico. Seagrass beds surrounding Culebra provide important foraging resources for juvenile, subadult, and adult green sea turtles. Additionally, coral reefs surrounding the island provide resting shelter and protection from predators. This area provides important developmental habitat for the species.

6 *CORALS*

Status. There are currently 22 coral species listed as threatened under the ESA, 16 of which occur in the action area (Table 3). Information from the listings and status reports (ABRT 2005) were used to summarize the status of these species

Table 3: Threatened coral species occurring in the CGP action area.

Threatened Corals	Currently Known in These U.S. Geographic Areas			
Caribbean Waters: Puerto Rico				
Acropora cervicornis (Staghorn)*and designated critical habitat*	X			
Acropora palmata (Elkhorn) *and designated critical habitat*	X			
Mycetophyllia ferox	X			
Dendrogyra cylindrus	X			
Orbicella annularis	X			
Orbicella faveolata	X			
Orbicella franksi	X			
Pacific Waters				
	Guam	**Northern Mariana Islands**	**Pacific Remote Island Areas**	**American Samoa**
Acropora globiceps	X	X	X	X
Acropora jacquelineae				X
Acropora retusa	X		X	X
Acropora rudis				X
Acropora speciosa			X	X
Euphyllia paradivisa				X
Isopora crateriformis				X
Pavona diffluens	X	X		X
Seriatopora aculeata	X			

Life history. The threatened coral species include true stony corals (class Anthozoa, order Scleractinia), the blue coral (class Anthozoa, order Helioporacea), and fire corals (class Hydrozoa, order Milleporina). All threatened species are reef-building corals, because they secrete massive calcium carbonate skeletons that form the physical structure of coral reefs.

Reef-building coral species are capable of rapid calcification rates because of their symbiotic relationship with single-celled dinoflagellate algae, zooxanthellae, which occur in great numbers within the host coral tissues. Zooxanthellae photosynthesize during the daytime, producing an abundant source of energy for the host coral that enables rapid growth. At night, polyps extend their tentacles to filter-feed on microscopic particles in the water column such as zooplankton, providing additional nutrients for the host coral. In this way, reef-building corals obtain nutrients autotrophically (i.e., via photosynthesis) during the day, and heterotrophically (i.e., via predation) at night.

Most coral species use both sexual and asexual propagation. Sexual reproduction in corals is primarily through gametogenesis (i.e., development of eggs and sperm within the polyps near the base). Some coral species have separate sexes (gonochoric), while others are hermaphroditic. Strategies for fertilization are by either “brooding” or “broadcast spawning” (i.e., internal or external fertilization, respectively). Brooding is relatively more common in the Caribbean, where nearly 50 percent of the species are brooders, compared to less than 20 percent of species in the Indo-Pacific. Asexual reproduction in coral species most commonly involves fragmentation, where colony pieces or fragments are dislodged from larger colonies to establish new colonies, although the budding of new polyps within a colony can also be considered asexual reproduction. In many species of branching corals, fragmentation is a common and sometimes dominant means of propagation.

Reef-building corals do not thrive outside of an area characterized by a fairly narrow mean temperature range (typically 25 °C-30 °C). Two other important factors influencing suitability of habitat are light and water quality.

Threats. Massive mortality events from disease conditions of corals and the keystone grazing urchin *Diadema antillarum* have precipitated widespread and dramatic changes in reef community structure. Large-scale coral bleaching reduces population viability. Coral growth rates in many areas have been declining over decades. Such reductions prevent successful recruitment as a result of reduced density. In addition, continuing coral mortality from periodic acute events such as hurricanes, disease outbreaks, and bleaching events from ocean warming have added to the poor state of coral populations and yielded a remnant coral community with increased dominance by weedy brooding species, decreased overall coral cover, and increased macroalgal cover. Iron enrichment may predispose the basin to algal growth. Finally, climate change is likely to result in the endangerment of many species as a result of temperature increases (and resultant bleaching), sea level rises, and ocean acidification.

Designated Critical Habitat. On November 26, 2008, NMFS designated critical habitat for elkhorn and 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.

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APPENDIX B

COMPREHENSIVE ENVIRONMENTAL BASELINE

1 Environmental Baseline

The *Environmental Baseline* is defined as: "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). The key purpose of the environmental baseline is to describe the natural and anthropogenic factors influencing the status and condition of ESA-listed species and designated critical habitat in the action area. Since this is a consultation on what is primarily a continuing permitting program with a large geographic scope, this environmental baseline focuses more generally on the status and trends of the aquatic ecosystems in the U.S. and the consequences of that status for listed resources. The action considered in this opinion is the CWA CGP authorization of discharge of stormwater to waters where ESA-listed species and designated critical habitat under NMFS' jurisdiction occur and non-stormwater construction related discharges that result from construction activities specified in part 1.2.2 of the 2017 CGP. For this reason, the discussion of the baseline conditions for this opinion focuses on water quality, erosive flow, along with suspended and bedded sediments.

Activities that negatively impact water quality also threaten aquatic species. The deterioration of water quality is a contributing factor that has led to the endangerment of some aquatic species under NMFS' jurisdiction. Declines in populations of ESA-listed species leave them vulnerable to a multitude of threats. Due to the cumulative effects of reduced abundance, low or highly variable growth capacity, and the loss of essential habitat, these species are less resilient to additional disturbances. In larger populations, stressors that affect only a limited number of individuals could once be tolerated by the species without resulting in population level impacts; in smaller populations, the same stressors are more likely to reduce the likelihood of survival. It is with this understanding of the *Environmental Baseline* that we consider the effects of the proposed action, including the likely effect that the 2017 CGP will have on endangered and threatened species and their designated critical habitat. Areas adjacent to or downstream from these jurisdictional areas may be indirectly affected by activities authorized under the CGP.

Based on the *Action Area*, as defined in Section 4 of the opinion, we identified the following regions and states for inclusion in the *Environmental Baseline* section of this opinion: Pacific Coast (Washington, Idaho, Oregon, and California); New England (Maine, New Hampshire, Vermont, and Massachusetts); Mid-Atlantic (District of Columbia, Delaware, and Virginia); U.S. Caribbean (Puerto Rico) and U.S. Pacific Islands (excluding Hawaii). These regions/states cover the vast majority of the proposed action area. At the regional level, our baseline assessment focused on the natural and anthropogenic threats affecting the ESA-listed species (and their habitats) within the action area for each particular region: Pacific Coast – all listed ESUs and DPSs of Pacific salmon and steelhead, eulachon, Southern DPS green sturgeon, and Southern Resident killer whale; New England – Atlantic salmon, Atlantic sturgeon (5 listed DPSs); Mid-Atlantic - Atlantic sturgeon (5 listed DPSs); Caribbean – Nassau grouper, elkhorn coral, staghorn coral, lobed star coral, boulder star coral, mountainous star coral, pillar coral, and rough cactus coral; Pacific Islands – all listed Pacific Islands coral species.

While there are some Tribal lands and federal facilities in regions or states not mentioned above, in general these areas are either very small, far removed from ESA-listed species or habitat, or not affected by the proposed action. For example, any discharges on Tribal lands in Florida would have to be transported through Everglades or Big Cypress National Parks, where they would be degraded by exposure to sunlight, microbial action and chemical processes. While all areas of overlap between ESA-listed species (and their designated critical habitat) and the CGP coverage area are evaluated in this opinion, the environmental baseline will focus specifically on the aquatic ecosystems in the regions/states (listed above) where the anticipated effects of the proposed action are considered more likely to adversely affect ESA-listed species.

The action area for this consultation covers a very large number of individual watersheds and an even larger number of specific water bodies (e.g., lakes, rivers, streams, estuaries). It is, therefore, not practicable to describe the environmental baseline and assess risk for each particular area where the CGP may authorize discharges and activities. Accordingly, this opinion approaches the environmental baseline more generally by describing the activities, conditions and stressors which adversely affect ESA-listed species and designated critical habitat. These include natural threats (e.g., parasites and disease, predation and competition, wildland fires), water quality, hydromodification projects, land use changes, dredging, mining, artificial propagation, non-native species, fisheries, vessel traffic, and climate changes. For each of these threats we start with a general overview of the problem, followed by a more focused analysis at the regional and state level for the species listed above, as appropriate and where such data are available.

Our summary of the environmental baseline complements the information provided in the Status of Listed Resources section of this opinion, and provides the background necessary to evaluate and interpret information presented in the Effects of the Proposed Action and Cumulative Effects sections to follow. We then evaluate the consequences of EPA's proposed action in combination with the status of the species, environmental baseline and the cumulative effects to determine whether EPA can insure that the likelihood of jeopardy or adverse modification of designated critical habitat will be avoided.

The quality of the biophysical components within aquatic ecosystems is affected by human activities conducted within and around coastal waters, estuarine and riparian zones, as well as those conducted more remotely in the upland portion of the watershed. Industrial activities can result in discharge of pollutants, changes in water temperature and levels of dissolved oxygen, and the addition of nutrients. In addition, forestry and agricultural practices can result in erosion, run-off of fertilizers, herbicides, insecticides or other chemicals, nutrient enrichment and alteration of water flow.

2 NATURAL THREATS

Natural mortality rates for some ESA ESA-listed species are already high due to a combination of contributing threats including parasites and/or disease, predation, water quality and quantity, wildland fire, oceanographic features and climatic variability. Natural mortality often varies for a given species depending on life stage or habitat. While species continuously co-evolve and adapt to changes in the natural environment, when combined with, and often compounded by, anthropogenic threats such natural threats can contribute significantly to the decline and endangerment of species.

2.1 Parasites and Disease

Fish disease and parasitic organisms occur naturally in the water. Many fish species are highly susceptible to parasites and disease, particularly during early life stages. Native fish have co-evolved with such organisms and individuals can often carry diseases and parasites at less than lethal levels. However, outbreaks may occur when stress from disease and parasites is compounded by other stressors such as diminished water quality, flows, and crowding (Spence and Hughes 1996, Guillen 2003). At higher than normal water temperatures salmonids may become stressed and lose their resistance to diseases (Spence and Hughes 1996). Consequently, diseased fish become more susceptible to predation and are less able to perform essential functions, such as feeding, swimming, and defending territories (McCullough 1999).

Salmonids are susceptible to numerous bacterial, viral, and fungal diseases. The more common bacterial diseases in New England waters include furunculosis, bacterial kidney disease, enteric redmouth disease, coldwater disease, and vibriosis (Olafesen and Roberts 1993), (Egusa and Kothekar 1992). There are over 30 identified parasites of Atlantic salmon including external parasites (Scott and Scott 1988, Hoffman 1999). Several species sea lice, a marine ectoparasite found in Atlantic and Pacific coastal waters, can cause deadly infestations of farm-grown salmon and may also affect wild salmon. While captive fish in aquaculture have the highest risk for transmission and outbreaks of such diseases, wild fish that must pass near aquaculture facilities are at risk of encountering both parasites and pathogens from hatchery operations. Although substantial progress has been made in recent years to reduce the risks to wild fish, this remains a potential threat.

Parasites also occur in both wild-caught and cultivated Nassau grouper, predominantly in the viscera and gonads. These include encysted larval tapeworms, nematode, isopods, and trematodes (Manter 1947, Thompson and Munro 1978).

Coral diseases are a common and significant threat affecting most or all coral species and regions to some degree, although the scientific understanding of the causes and mechanisms of coral diseases remains very poor. Disease adversely affects various coral life history events by, among other processes, causing adult mortality, reducing sexual and asexual reproductive success, and impairing colony growth. A diseased state results from a complex interplay of factors including the cause or agent (e.g., pathogen, environmental toxicant), the host, and the environment. All coral disease impacts are presumed to be attributable to infectious diseases or to poorly-described genetic defects. Coral disease often produces acute tissue loss. Other manifestations of disease in the broader sense, such as coral bleaching from ocean warming, are discussed under other the anthropogenic threats of ocean warming as a result of global climate change. Increased prevalence and severity of diseases is correlated with increased water temperatures and bleaching, which may correspond to increased virulence of pathogens, decreased resistance of hosts, or both (Bruno et al. 2007, Muller and Woesik 2012, Rogers and Muller 2012). Moreover, the expanding coral disease threat may result from opportunistic pathogens that become damaging only in situations where the host integrity is compromised by physiological stress or immune suppression. Coral resistance to disease can also be diminished by other stressors such as predation and nutrients. White band disease is thought to be the major factor responsible for the rapid loss of Atlantic Acropora due to mass mortalities. Significant population declines of star coral species have been linked to disease impacts, both with and without prior bleaching (Bruckner and Bruckner 2006, Miller et al. 2009). Disease outbreaks can persist for years in a population—star coral colonies suffering from yellow-band in Puerto Rico still manifested similar disease signs four years later (Bruckner and Bruckner 2006). Pillar coral and rough cactus coral are susceptible to extensive impacts and rapid tissue loss from white plague disease (Dustan 1977, Miller et al. 2006). The incidence of coral disease also appears to be expanding geographically in the Indo-Pacific, and there is evidence that corals with massive morphology damage are not recovering from disease events.

Although little is known about the threat of infectious diseases to killer whale populations in the wild, deaths of captive individuals have been attributed to pneumonia, systemic mycosis, other bacterial infections, and mediastinal abscesses (Gaydos et al. 2004). Marine *Brucella*, *Edwardsiella tarda*, and cetacean poxvirus, were detected in wild individuals. Marine *Brucella* and cetacean poxvirus have the potential to cause mortality in calves and marine *Brucella* has induced abortions in bottle-nose dolphins (Miller et al. 1999, Van Bressem et al. 1999). Pathogens identified from other species of toothed whales that are sympatric with the Southern Residents are potentially transmittable to killer whales (Palmer et al. 1991, Gaydos et al. 2004). Several, including porpoise morbillivirus, dolphin morbillivirus, and herpes viruses, are highly virulent and are capable of causing large-scale disease outbreaks in some related species. Killer whales are susceptible to other forms of disease, including Hodgkin’s disease and severe atherosclerosis of the coronary arteries (Roberts Jr et al. 1965, Yonezawa et al. 1989). Tumors and bone fusion have also been recorded (NMFS 2008b). Disease epidemics have never been reported in killer whales in the northeastern Pacific (Gaydos et al. 2004). No severe parasitic infestations have been reported in killer whales in the northeastern Pacific (NMFS 2008b).

2.2 Predation

Predation is a natural and necessary process in properly functioning aquatic ecosystems. In order to survive, species evolve a suite of strategies that allow them to co-exist with the numerous and diverse predators they encounter throughout their life cycle. However, natural predator-prey relationships in aquatic ecosystems have been substantially altered through the impacts of anthropogenic changes, often resulting in increased risk to populations of threatened and endangered species. High rates of predation may jeopardize viability of populations that are already experiencing significantly reduced abundance due to the cumulative effects of multiple stressors.

2.2.1 Salmonids

Salmonids are exposed to high rates of natural predation, during freshwater rearing and migration stages, as well as during ocean migration. Salmon along the U.S. west coast are prey for marine mammals, birds, sharks, and other fishes. In the Pacific Northwest, the increasing size of tern, seal, and sea lion populations in recent decades may have reduced the survival of some salmon ESUs/DPSs. Human barriers commonly aggregate fish, where they are subject to intense predation. Such locations include Ballard Locks in Seattle and the Bonneville Dam (Gustafson et al. 1997). Threatened Puget Sound Chinook adults are preferred prey (up to 78 percent of identified prey) of endangered Southern Resident killer whales during late spring to fall (Hanson et al. 2005, Ford et al. 2010). Several species of seals prey on Atlantic salmon in estuarine and marine areas and could exert a substantial impact on populations which have already been depleted due to other stressors (Cairns and Reddin 2000). Large numbers of fry and juvenile Pacific salmon are eaten by piscivorous birds such. Stream-type juveniles are vulnerable to bird predation in estuaries. Caspian terns and cormorants may be responsible for the mortality of up to 6 percent of the outmigrating stream-type juveniles in the Columbia River basin (Roby et al. 2007). Mergansers and kingfishers are likely the most important predators of Atlantic salmon in freshwater environments (Cairns and Reddin 2000). In estuarine environments, double crested cormorants are considered an important predator of smolts as they transition to life at sea because osmotic stress due to sea water entry likely enhances the predation risk at this life stage (Handeland et al. 1996). Avian predators of adult salmonids include bald eagles and osprey (Pearcy 1997). Overall freshwater fish predators native to Maine pose little threat to the Gulf of Maine DPS (Fay et al. 2006).

2.2.2 Non-salmonid Species

In estuarine and marine environments striped bass, Atlantic cod, pollock, porbeagle shark, Greenland shark, Atlantic halibut, and many other fish species have been recorded as predators of salmon at sea (Hvidsten and Møkkelgjerd 1987, Mills 1989, and Mills 1993 all cited in Fay, 2006). The primary fish predators in estuaries are probably adult salmonids or juvenile salmonids which emigrate at older and larger sizes than others (Beamish et al. 1992, Beamish and Neville 1995).

The impact of natural predation on sturgeon at various life stages is unknown. The presence of bony scutes is an effective adaptation for minimizing predation of sturgeon greater than 25 mm total length (Gadomski and Parsley 2005). Documented predators of sturgeon include sea lampreys, gar, striped bass, common carp, northern pikeminnow, channel catfish, smallmouth bass, walleye, grey seal, fallfish and sea lion (Scott and Crossman 1973, Dadswell et al. 1984, Kynard and Horgan 2002, Gadomski and Parsley 2005). Predation by non-native catfish species may also have an impact on early life stages of several Atlantic sturgeon DPSs. Pinnepeds are known predators of Southern DPS green sturgeon and populations of both Eastern DPS Steller and California sea lions have increased in recent decades (Caretta et al. 2009, NMFS 2013). Predation of North American green sturgeon by white sharks has also been documented off Central California (Klimley 1985).

Large numbers of predators commonly congregate at eulachon spawning runs (Willson et al. 2006) and was identified as a moderate threat to eulachon in the Fraser River and mainland British Columbia rivers, and a low severity threat to eulachon in the Columbia and Klamath rivers. Information on predation on Nassau grouper is lacking. Sharks were reported to attack Nassau groupers at spawning aggregations in the Virgin Islands, and there is one report of cannibalism in this species (Olsen and LaPlace 1979 cited in NMFS, 2013). Although there is currently no legal directed fishery for Nassau grouper in the U.S. and possession is prohibited, they are still caught and released as bycatch in some fisheries. Predators can have important direct and indirect impacts on coral colonies. Predation on some coral genera by many corallivorous species of fish and invertebrates (e.g., snails and seastars) is a chronic threat that has been identified for most coral life stages. Prior to settlement and metamorphosis, coral larvae experience considerable mortality (up to 90 percent or more) from predation or other factors (Goreau et al. 1981). Because newly settled corals barely protrude above the substrate, juveniles need to reach a certain size to reduce damage or mortality from impacts such as grazing, sediment burial, and algal overgrowth (Bak and Elgershuizen 1976, Sammarco 1985). Predation of coral colonies can increase the likelihood of the colonies being infected by disease, and likewise diseased colonies may be more likely to be preyed upon. Predation impacts are typically greatest when population abundances are low as, in most cases, coral predators have not been subject to the same degrees of disturbance mortality and their broad diet breadth has allowed them to persist at high levels despite decreases in coral prey (FR 79 53852). Coral exposure to predation is naturally moderated by presence of predators of the corallivores. For example, corallivorous reef fish prey on corals, and piscivorous reef fish and sharks prey on the corallivores; thus, high abundances of piscivorous reef fish and sharks moderate coral predation.

Crown-of-thorns seastar can reduce living coral cover to less than one percent during outbreaks, dramatically changing coral community structure, promoting algal colonization, and affecting fish population dynamics (FR 79 53852).

The most important predators on Atlantic *Acropora* spp. are fireworm and muricid snail. Although these predators rarely kill entire colonies, there are several possible mechanisms of indirect impact. Because they prey on the growing tips (including the apical polyps), especially of *A. cervicornis*, growth of the colony may be arrested for prolonged periods of time. Another important coral predator is the gastropod, *Coralliophila abbreviata* which feeds on a wide range of corals, but seems to be particularly damaging to *Acropora* spp. (Baums et al. 2003) . Several species of damselfish establish algal nursery gardens within branching *Acropora* spp. (Itzkowitz 1978, Sammarco and Williams 1982). Although not predators in the strict sense, damselfish nip off living coral tissue, thus denuding the skeleton to make a place for their algal gardens. As with other predators, it is likely that the impacts of damselfish are proportionally greater when population abundances of *Acropora* are already reduced due to other stressors.

2.3 Wildland Fire

Wildland fires that are allowed to burn naturally in riparian or upland areas may benefit or harm aquatic species, depending on the degree of departure from natural fire regimes. Fire is one of the dominant habitat-forming processes in mountain streams (Bisson et al. 2003). The patchy, mosaic pattern burned by fires provides a refuge for those fish and invertebrates that leave a burning area or simply spares some fish that were in a different location at the time of the fire (Murphy 2000). Although most fires are small in size, large size fires increase the chances of adverse effects on aquatic species. Large fires that burn near the shores of streams and rivers can have biologically significant short-term effects. These include increased water temperatures, ash, nutrients, pH, sediment, toxic chemicals, and loss of large woody debris (Buchwalter et al. 2004, Rinne 2004). Such fires can result in fish kills and the indirect effects of displacement as fish are forced to swim downstream to avoid poor water quality conditions (Gresswell 1999, Rinne 2004). Small fires or fires that burn entirely in upland areas also cause ash to enter rivers and increase smoke in the atmosphere, contributing to ammonia concentrations in rivers as the smoke adsorbs into the water (Gresswell 1999). The presence of ash can have indirect effects on aquatic species depending on the quantity deposited into the water. All ESA-listed salmonids rely on macroinvertebrates as a food source for at least a portion of their life histories. When small amounts of ash enter the water, there are usually no noticeable changes to the macroinvertebrate community or water quality (Bowman and Minshall 2000). When significant amounts of ash are deposited into rivers, the macroinvertebrate community density and composition may be moderately to drastically reduced for a full year, with milder long-term effects lasting 10 years or more (Minshall et al. 2001, Buchwalter et al. 2004). Larger fires can also indirectly affect fish by altering water quality. Ash and smoke contribute to elevated ammonium, nitrate, phosphorous, potassium, and pH, which can remain elevated for up to four months after forest fires (Buchwalter et al. 2003). Within the action area for this opinion, wildland fires of the size and proximity to aquatic ecosystems that may result in adverse effects on ESA-listed species are concentrated in the Pacific Coast region.

2.4 Oceanographic Features and Climatic Variability

Oceanographic conditions and natural climatic variability may affect Pacific salmonids within the action area. There is evidence that Pacific salmon abundance may have fluctuated for centuries as a consequence of dynamic oceanographic conditions (Beamish and Bouillon 1993, Finney et al. 2002, Beamish et al. 2009). Sediment cores reconstructed for 2,200-year records have shown that Northeastern Pacific fish stocks have historically been regulated by these climate regimes (Finney et al. 2002). The long-term pattern of the Aleutian low pressure system corresponds with historical trends in salmon catches, copepod production, and other climatic indices, indicating that climate and the marine environment play an important role in salmon production. Pacific salmon abundance and corresponding worldwide catches tend to be large during naturally-occurring periods of strong Aleutian low pressure causing stormier winters and upwelling, positive Pacific decadal oscillation , and an above average Pacific circulation index (Beamish et al. 2009). Periods of increasing Aleutian low pressure correspond with periods of high pink and chum salmon production and low coho and Chinook salmon production (Beamish et al. 2009). The abundance and distribution of salmon and zooplankton also relate to shifts in North Pacific atmospheric and oceanic climate (Francis and Hare 1994). Over the past century, regime shifts have occurred as a result of the North Pacific's natural climate regime. Reversals in the prevailing polarity of the Pacific Decadal Oscillation occurred around 1925, 1947, 1977, and 1989 (Mantua et al. 1997, Hare and Mantua 2000). The reversals in 1947 and 1977 correspond to dramatic shifts in salmon production regimes in the North Pacific Ocean (Mantua et al. 1997). Poor environmental conditions for salmon survival and growth may be more prevalent with projected increases in ocean warming and acidification. Anthropogenic climate change (discussed in more detail below) may exacerbate the effects that natural oceanographic conditions and climatic variability have on ESA-listed species, although the synergistic effects of these combined stressors is largely unknown at this time.

3 ANTHROPOGENIC THREATS

The quality of the biophysical components within aquatic ecosystems is affected by human activities conducted within and around coastal waters, estuarine and riparian zones, as well as those conducted more remotely in the upland portion of the watershed. Industrial activities can result in discharge of pollutants, changes in water temperature and levels of dissolved oxygen, and the addition of nutrients. In addition, forestry and agricultural practices can result in erosion, run-off of fertilizers, herbicides, insecticides or other chemicals, nutrient enrichment and alteration of water flow. Chemicals such as chlordane, DDE, DDT, dieldrin, PCBs, cadmium, mercury, and selenium settle to the river bottom and are later consumed by benthic feeders, such as macroinvertebrates, and then work their way higher into the food web (e.g., to sturgeon and sea turtles). Some of these compounds may affect physiological processes and impede a fish's ability to withstand stress, while simultaneously increasing the stress of the surrounding environment by reducing dissolved oxygen, altering pH, and altering other physical properties of the water body. Coastal and riparian areas are also heavily impacted by development and urbanization resulting in storm water discharges, non-point source pollution and erosion. Section 2.1 *Status of Aquatic Ecosystem Health* describes the health status and trends of the U.S. coastal zone, rivers, streams and wetlands in the geographic areas covered by the PGP that overlap with ESA-listed species under NMFS' jurisdiction. Section 1.2.2 focuses specifically on the effects of pesticides on aquatic ecosystems as is relevant to the proposed action in this opinion. Sections 2.3 through 2.8

describe other anthropogenic stressors and threats that result in both direct and indirect adverse effects on ESA-listed species and their critical habitats within the action area. These include hydromodification projects (dams, channelization, and water diversion), dredging, mining, population growth and land use changes, artificial propagation, non-native species introductions, direct harvest and bycatch, vessel related stressors (strikes, noise, harassment), and climate change.

3.1 Population Growth, Development and Land Use Changes

In 2013, the U.S. Census Bureau estimated the U.S. population to be more than 315 million people. Increases in population growth and density over the last 100 years have resulted in dramatic changes to the natural landscape of the U.S. Most modern metropolitan areas encompass many different land covers and uses (Hart 1991), Land-use changes due to human activities represent a major factor in terms of habitat and water quality changes that, in turn, influence plant and animal abundance and distribution (Mac et al. 1998). Flather C.H. et al. (1998) identified habitat loss and alien species as the two most widespread threats to endangered species, affecting more than 95 percent and 35 percent of ESA-listed species, respectively. Localized anthropogenic effects within small watersheds may lead to cumulative changes which influence estuarine and coastal waters. For example, nutrient runoff from farmland and input by wastewater treatment plants to a large river system could influence the natural dissolved oxygen regime in an entire estuary. Changes in land use over the past few centuries have increased the occurrence and significance of water quality problems, particularly stormwater runoff from non-point source pollution and hydrological modification.

Between the 1780s and 1980s, 30 percent of the nation's wetlands had been destroyed (Dahl 1990), and, declines have continued. From 1982 to 1987, the wetland area throughout the conterminous U.S. declined by 1.1 percent, with approximately 13,800 acres of wetlands were lost per year between 2006 and 2009 (Dahl 2011). While this loss is significantly less than that experienced in the previous decades (Figure 4), based on historical estimates, about 72 percent of U.S wetlands have already been lost (Dahl 2011).

In estuaries of the Pacific northwest for example, diking and filling activities likely have reduced estuaries' salmon-rearing capacity. Historical changes in population structure and salmon life histories may prevent salmon from making full use of improved productive capacity of estuarine habitats resulting from recent restoration efforts (LCFRB 2004, Bottom et al. 2005, Fresh et al. 2005, NMFS 2006).

Many of our nation's rivers and streams have also been altered by dams, stream channelization, and dredging to stabilize water levels in rivers or lakes. When examining the impacts of large dams alone, it is estimated that 75,000 large dams have modified at least 600,000 miles of rivers across the country (IWSRCC 2017). Wetland habitats have been drained to make land available for agriculture, filled to make land available for residential housing, commerce, and industry, diked to control mosquitoes, or flooded for water supply. The net effect of human-altered hydrology (1) creates conditions which increase stormwater runoff, transporting land based pollutants into surface waters (2) reduces the filtration of stormwater runoff through wetlands prior to reaching surface waters (3) has reduced the spatial extent and quality of available habitat and (3) has reduced the connectivity among rivers and streams which is necessary for anadromous species to complete their migratory lifecycles.

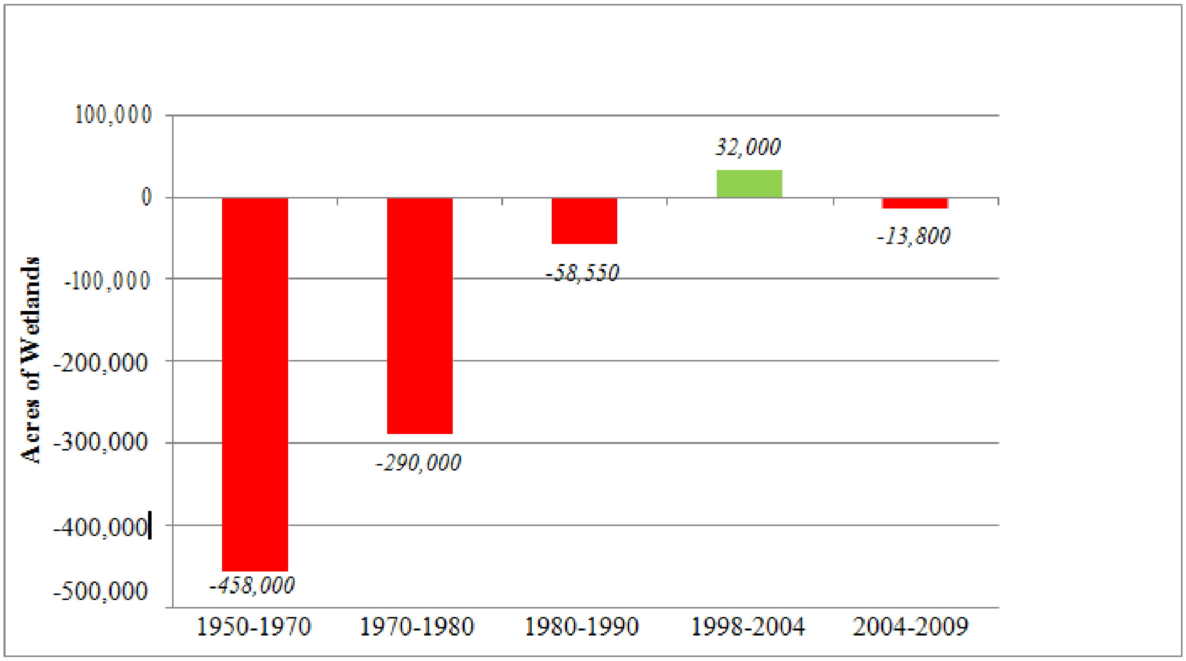

Figure 1. Average annual net wetland acreage loss and gain estimates for the conterminous U.S. (Taken from Dahl 2011)

Average annual net wetland acreage loss and gain estimates for the conterminous U.S. (Taken from Dahl 2011)

Efforts to create and restore wetlands and other aquatic habitats by agencies of Federal, State, and local governments, non- governmental organizations, and private individuals have reduced the rate at which these ecosystems have been destroyed or degraded, but many aquatic habitats continue to be lost each year. The expansion of urban/suburban metropolitan areas accounted for 48 percent of wetland decline (Brady and Flather 1994). Urban land use increased from 1.3 percent (29 million acres) in 1964 to 2.9 percent (66 million acres) in 1997 (Lubowski et al. 2006). The type of land use in a stream catchment and along the stream margins substantially influences that waterbody's physical, chemical, and biological quality (Diana et al. 2006). Urban land use adversely affects stream and water quality, especially when present in critical amounts and close to the stream channel (Diana et al. 2006). Increased impervious surface area increases surface runoff, one of the major concerns of urban land use, and commonly causes degradation in channel morphology (Konrad et al. 2005), water quality, macroinvertebrates, and fish (Deacon et al. 2005, Kennen et al. 2005, Walters et al. 2005, Stranko et al. 2008). In fact, many studies have identified impervious surface as a quantifiable attribute of land use that is clearly linked to (i.e., actually causes) water quality, aquatic habitat degradation, and adverse impacts to biota (Stranko et al. 2008, Magee 2009). As of January 2017, some 208 river segments comprising 12,734 miles have been afforded protection in the National Wild and Scenic Rivers System under the Wild and Scenic Rivers Act (IWSRCC 2017).

In addition to the impacts resulting from increased impervious surfaces, urban and suburban development also often result in direct waterbody modification, including channelization, channel armoring, creating dams and impoundments, and stream piping and burial. Additionally, removing vegetated riparian buffers leads to increased sediment, increased water temperature, increased nitrogen, and changes in channel morphology. Physical habitat degradation like this can significantly change the fish assemblage present in a stream (Diana et al. 2006). In general, as channel morphology and aquatic habitat become less diverse, nutrient and pollutant levels in streams increase, and macroinvertebrate and fish communities shift from species that require high quality water to species that can survive in degraded water quality and habitat conditions (Magee 2009).

Urban and suburban areas concentrate wastewater inputs to waterbodies. Common wastewater inputs include effluents (from both wastewater treatment plants and industrial discharges), stormwater runoff, sewer overflows, and septic systems. These wastewaters can result in increased nutrients, pathogens, metals, pharmaceuticals and personal care products, toxics, and dissolved solids. They also increase stream discharge and water temperature and decrease dissolved oxygen.

Many stream and riparian areas within the action area have been degraded by the effects of land and water use resulting from urbanization, road construction, forest management, agriculture, mining, transportation, and water development. Development activities have contributed to many interrelated factors causing the decline of listed anadromous fish species considered in this opinion. These include reduced in- and off-channel habitat, restricted lateral channel movement, increased flow velocities, increased erosion, decreased cover, reduced prey sources, increased contaminants, increased water temperatures, degraded water quality, and decreased water quantity.

Urbanization and increased human population density within a watershed result in changes in stream habitat, water chemistry, and the biota (plants and animals) that live there. The most obvious effect of urbanization is the loss of natural vegetation which results in an increase in impervious cover and dramatic changes to the natural hydrology of urban and suburban streams. Urbanization generally results in land clearing, soil compaction, modification and/or loss of riparian buffers, and modifications to natural drainage features. The increased impervious cover in urban areas leads to increased volumes of runoff, increased peak flows and flow duration, and greater stream velocity during storm events. Runoff from urban areas also contains chemical pollutants from vehicles and roads, industrial sources, and residential sources. Urban runoff is typically warmer than receiving waters and can significantly increase temperatures in small urban streams. Wastewater treatment plants replace septic systems, resulting in point discharges of nutrients and other contaminants not removed in the processing. Additionally, some cities have combined sewer/stormwater overflows and older systems may discharge untreated sewage following heavy rainstorms. These urban nonpoint and point source discharges affect the water quality and quantity in basin surface waters. Dikes and levees constructed to protect infrastructure and agriculture have isolated floodplains from their river channels and restricted fish access. The many miles of roads and rail lines that parallel streams with the action area have degraded stream bank conditions and decreased floodplain connectivity by adding fill to floodplains. Culvert and bridge stream crossings have similar effects and create additional problems for fish when they act as physical or hydraulic barriers that prevent fish access to spawning or rearing habitat, or contribute to adverse stream morphological changes upstream and downstream of the crossing itself.

3.1.1 USGS Land Cover Trends Project

The USGS Land Cover Trends Project (http://landcovertrends.usgs.gov/) was a research project focused on understanding the rates, trends, causes, and consequences of contemporary U.S. land use and land cover change. The project spanned from 1999 to 2011, producing statistical and geographic summaries of land cover change using time series land cover data. The project was designed to document the types and rates, causes, and consequences of land cover change from 1973 to 2000 within 84 ecoregions, as defined by EPA, that span the conterminous U.S.. Research objectives of this project were as follows:

- Develop a comprehensive methodology using sampling, change analysis techniques, and Landsat Multispectral Scanner and Thematic Mapper data for estimating regional land cover change.
- Characterize the spatial and temporal characteristics of conterminous U.S. land cover change for five periods from 1973-2000 (1973, 1980, 1986, 1992, and 2000).
- Document the regional driving forces and consequences of change.
- Prepare a national synthesis of land cover change.

For this opinion we summarized the results of the Land Cover Trends Project for project areas that overlap with PGP coverage. The Northeastern coastal zone covers approximately 37,158 km^2 in eight states (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, and New Jersey). Primary land-cover classes are forests and developed land which account for more than 70 percent of the ecoregion. Water, wetlands, and agriculture are secondary land covers classes found in smaller, less frequent concentrations in the Northeast coastal zone. Developed land increased an estimated 4 percent (1,510 km^2) from 1973 to 2000, to approximately 27 percent of the ecoregion's area. Much of the new development came from forest loss, with a decrease of 3.7 percent (1,361 km^2) during this same time period. Agricultural land-cover decreased by 0.8 percent. Other land cover changes in the Northeastern coastal zone from 1973 to 2000 included slight decreases in wetlands and slight increases in mechanically disturbed lands and mining.

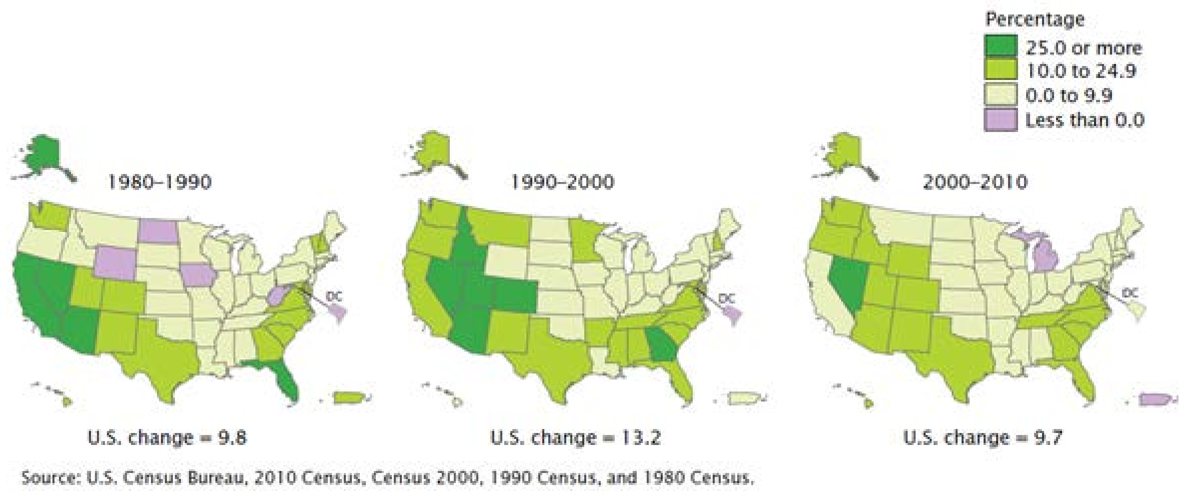

Figure 2. Percentage Change in Population by State and Decade from 1980 to 2010 (Source: U.S. Census Bureau)

The Puget lowland ecoregion is located in western Washington State and covers an area of approximately 17,541 km² (Omernik 1987). Puget Sound is in the center of the ecoregion, which is bordered on the west by the Olympic Mountains and on the east by the Cascade Mountains. The dominant land-cover class in 2000 for Puget lowland was forest (48.4 percent), followed by developed (19.3 percent), agriculture (10.6 percent), and water (10.6 percent). Puget lowland experienced one of the highest percentages of land use change of any ecoregion nationwide from 1973 to 2000. The largest net change for any land-cover class between 1973 and 2000 was the loss of 1,767 km² of forest, which is 10 percent of the land area of the ecoregion. Agriculture decreased by 0.7 percent during this period, while developed land increased by 6.7 percent or 1,186 km².

The Willamette Valley ecoregion covers approximately 14,400 km² and includes the Willamette River watershed, with headwaters in the Cascades draining northward into the Columbia River near the ecoregion's northern boundary in Washington State (Omernik 1987). The dominant land-cover class in 2000 for Willamette Valley was agriculture (45.1 percent), followed by forest/woodland (33.5 percent), developed/urban (12.6 percent), and mechanically disturbed (4.0 percent). The largest net change for any land-cover class between 1973 and 2000 was the loss of 597 km² (-4.1 percent) of forest, followed by the loss of 320 km² of agricultural land. Most of the land use increases were for development (+3.1 percent) and mechanically disturbed land (+2.8 percent).

The Central California Valley ecoregion is an elongated basin extending approximately 650 km north to south through central California (Omernik 1987). The ecoregion is bound by the Sierra Nevada mountain range to the east and the Coast Range to the west. Agriculture land cover, which accounted for more than 70 percent of the ecoregion area, remained relatively stable from 1973 to 2000 with a net increase of 357 km² or 0.8 percent . The largest change in any one land cover class between 1973 and 2000 was a 3.9 percent loss (1,777 km²) of grasslands and shrublands in the ecoregion. Developed lands increased in cover from 6.5 percent to 9.0 percent of the total ecoregion area during this time frame.

3.1.2 Water Quality

This section describes the current status and recent health trends of aquatic ecosystems within the *Action Area*. EPA sampling results (USEPA 2015) are summarized by region for the following biological, chemical, and physical indicators: 1) Biological – benthic macroinvertebrates; 2) Chemical – phosphorous, nitrogen, ecological fish tissue contaminants, sediment contaminants, sediment toxicity, and pesticides; and 3) Physical – dissolved oxygen, salinity, water clarity, pH, and Chlorophyll a. Cumulatively, these biological, chemical, and physical measures provide an overall picture of the ecological condition of aquatic ecosystems. Different thresholds, based on published references and the best professional judgment of regional experts, are used to evaluate each region as "good," "fair," or "poor" for each water quality indicator. EPA rates overall water quality from results of the five key indicators using the following guidelines: "poor" – two or more component indicators are rated poor; "fair" - one indicator is rated poor, or two or more are rated fair; "good" - no indicators are rated poor, and a maximum of one is rated fair.

Benthic macroinvertebrates (e.g., worms, mollusks, and crustaceans) inhabiting the bottom substrates of aquatic ecosystems are an important food source for a wide variety of fish, mammals, and birds. Benthic communities serve as reliable biological indicators of environmental quality because they are sensitive to chemical contamination, dissolved oxygen stresses, salinity fluctuations, and sediment disturbances. A good benthic index rating means that benthic habitats contain a wide variety of species, including low proportions of pollution-tolerant species and high proportions of pollution-sensitive species. A poor benthic index rating indicates that benthic communities are less diverse than expected and are populated by more pollution-tolerant species and fewer pollution-sensitive species than expected.

Chemical and physical components are measured as indicators of key stressors that have the potential to degrade biological integrity. Some of these are naturally occurring and others result only from human activities, but most come from both sources. EPA evaluates overall water quality based on the following primary indicators: surface nutrient enrichment—dissolved inorganic nitrogen and dissolved inorganic phosphorus concentrations; algae biomass—surface chlorophyll a concentration; and potential adverse effects of eutrophication—water clarity and bottom dissolved oxygen levels (USEPA 2015). Contaminants, including some pesticides, PCBs and mercury, also contribute to ecological degradation. Many contaminants adsorb onto suspended particles and accumulate in areas where sediments are deposited and may adversely affect sediment-dwelling organisms. As other organisms eat contaminated sediment-dwellers the contaminants can accumulate in organisms and potentially become concentrated throughout the food web.

Northeast Region (Maine to Virginia)

A wide variety of coastal environments are found in the Northeast region including rocky coasts, drowned river valleys, estuaries, salt marshes, and city harbors. The Northeast is the most populous coastal region in the U.S. In 2010, the region was home to 54.2 million people, representing about a third of the nation's total coastal population (USEPA 2015). The population in this area has increased by ten million residents (~ 23 percent) since 1970. The coast from Cape Cod to the Chesapeake Bay consists of larger watersheds that are drained by major riverine systems that empty into relatively shallow and poorly flushed estuaries. These estuaries are more susceptible to the pressures of a highly populated and industrialized coastal region.

A total of 238 sites were sampled to assess approximately 10,700 square miles of Northeast coastal waters. Figure 5 shows a summary of findings from the EPA's National Coastal Condition Assessment Report for the Northeast Region (USEPA 2015). Biological quality is rated as good in 62 percent of the Northeast coast region based on the benthic index. Poor biological conditions occur in 27 percent of the coastal area. About 11 percent of the region reported missing results, due primarily to difficulties in collecting benthic samples along the rocky coast north of Cape Cod. Based on the water quality index, 44 percent of the Northeast coast is in good condition, 49 percent is rated fair, and 6 percent is rated poor.

Based on the sediment quality index, 60 percent of the Northeast coastal area sampled is in good condition, 20 percent is in fair condition, and 9 percent is in poor condition (11 percent were reported "missing"). Compared to ecological risk-based thresholds for fish tissue contamination, less than 1 percent of the Northeast coast is rated as good, 27 percent is rated fair, and 33 percent is rated poor. Researchers were unable to evaluate fish tissue for 39 percent of the region, including almost the entire Acadian Province, because target species were not caught for analysis. The contaminants that most often exceed the thresholds for a "poor" rating in the assessed areas of the Northeast coast are selenium, mercury, arsenic, and, in a small proportion of the area, total PCBs.

New Hampshire conducted site specific water quality assessments on 42 percent of rivers, 81 percent of aquatic estuarine waters, and 85 percent of ocean waters within the state. Results reported in the New Hampshire 2012 Surface Water Quality Report indicate that approximately 0.8 percent of freshwater rivers and stream mileage is fully supportive of aquatic life, 26.0 percent is not supportive, and 73.2 percent could not be assessed due to insufficient information (NHDES 2012). In estuarine waters, approximately 0.8 percent of the square mileage is fully supportive of aquatic life, 91.9 percent is not supportive and 7.2 percent could not be assessed due to insufficient information. Twenty-six percent of estuarine waters fully met the water quality standards, 54 percent were impaired, and 19 percent could not be assessed due to insufficient information. In ocean waters, approximately 94.1 percent of the square mileage is fully supportive of aquatic life, 0.0 percent is not supportive and 5.9 percent could not be assessed due to insufficient information (NHDES 2012). Fifty-six percent of ocean waters fully met the water quality standards, 29 percent were impaired, and 15 percent could not be assessed due to insufficient information.

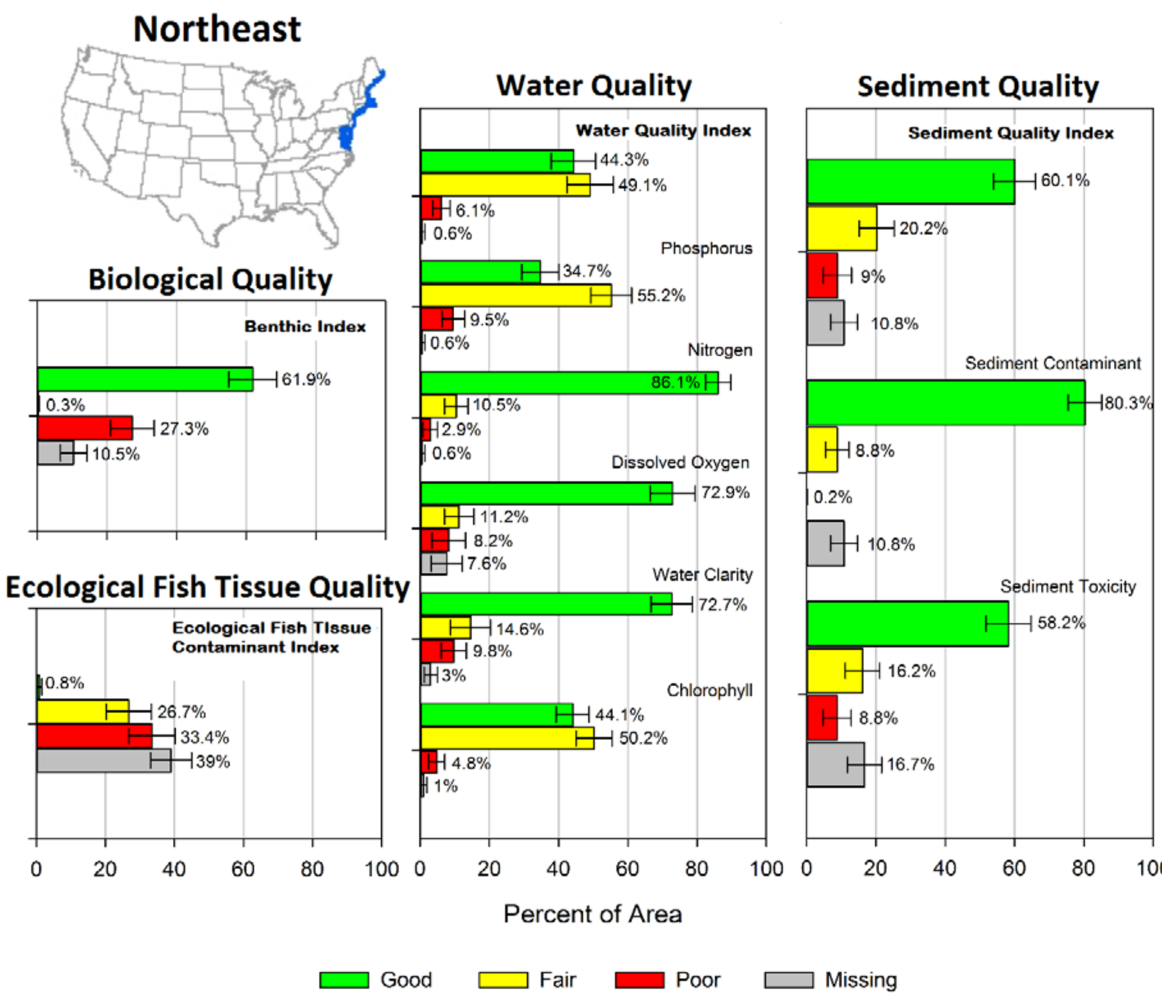

Figure 3. National Coastal Condition Assessment 2010 Report findings for the Northeast Region. Bars show the percentage of coastal area within a condition class for a given indicator (n = 238 sites sampled). Error bars represent 95 percent confidence levels (USEPA 2015).

All of New Hampshire waters are impaired by mercury contamination in fish tissue, with the source being atmospheric deposition. All New Hampshire's bays and estuaries are impaired by dioxins and PCBs. The top five reasons for impairment in New Hampshire rivers for 2012 were: mercury (16,962 acres), pH (3,821 acres), E coli (1,306 acres), dissolved oxygen (688 acres), and aluminum (563 acres) (NHDES 2012). The top five reasons for impairment in New Hampshire estuaries for 2012 were: mercury (18 acres), dioxin (18 acres), PCBs (18 acres), estuarine bioassessments (15 acres), and nitrogen (14 acres). The top five reasons for impairment in New Hampshire ocean waters for 2012 were: PCBs (81 acres), mercury (81 acres), dioxin (81 acres), Enterococcus (0.5 acres), and fecal coliform (0.5 acres). Besides atmospheric deposition, sources of impairment in New Hampshire include forced drainage pumping, waterfowl, domestic wastes, combined sewer overflows, animal feeding operations, municipal sources, and other unknown sources (NHDES 2012).

Violation rates among EPA- permitted pollutant sources are low in New Hampshire. A total of 68 (13 percent) of 492 NPDES-permitted facilities are in violation of their permits, and only 12 (2 percent) of these violations are classified as a significant noncompliance. Among these only one facility is near waters where ESA species occur. At the time of this writing, only one discharger that is in significant noncompliance is near waters where ESA-listed species occur.

In 2012, Massachusetts assessed the condition of 2,816 miles (28 percent) of the state's rivers and streams and found 63 percent to be impaired[1]. Four out of the top five impairment causes for rivers and streams in Massachusetts are attributed to pathogens and nutrients. The probable sources for these impaired waters include unknown sources, municipal discharges and unspecified urban stormwater. The distribution of impairment causes and probable sources suggest that eutrophication is a factor in Massachusetts rivers and stream impairments. PCBs in fish tissue from legacy sediment contamination is identified as a contributing factor in 14 percent of assessed river or stream miles. Both invasive species and atmospheric mercury deposition are major contributors to impairments of lakes, reservoirs and ponds. Nearly the entire spatial area of Massachusetts' bays and estuaries were assessed (98 percent of 248 square miles), with 87 percent found to be impaired. Fecal coliform contamination from municipal discharges impair the entire extent of assessed bays and estuaries. PCBs in fish tissue are also a significant factor, occurring in 36 percent of assessed waters. The impairment classification "other cause" is identified in 27 percent of estuaries and bays. This reporting category is used for dissolved gases, floating debris and foam, leachate, stormwater pollutants, and many other uncommon causes lumped together. Among sources for pollutants, stormwater was a major factor for Massachusetts estuaries and bays as three of the top five identified sources of impairments are discharges from municipal separate storm sewer systems (53 percent of impaired area), wet weather discharges (27 percent) and unspecified urban stormwater (25 percent). Among the 1511 NPDES discharge-permitted facilities located in Massachusetts, 231 (15 percent) are in violation, with 29 (2 percent) of these violations classified as a significant noncompliance. Among those with effluent violations, 3 discharge to tidal or coastal waters where ESA-listed species or designated critical habitat under NMFS' jurisdiction occur: the waste water treatment facilities for the municipalities of Marion and Salisbury and a supplier of crushed aggregates, hot mix asphalt, and recycled products, the P.J. Keating company.

In 2014, the District of Columbia (D.C.) assessed the condition of 98.5 percent of its 39 miles of rivers and streams and 99 percent of its 6 square miles of bays and estuaries[2]. All waters assessed were found to be impaired by PCBs. By impairment group, pesticides accounted for the most causes for impairment for 303 (d) listed waters assessed in D.C. Out of 86 NPDES-permitted facilities in D.C., 13 permits (15 percent) are in violation, with a single permit in significant noncompliance related to effluent violations. However, the facility in significant noncompliance discharges to the Anacostia River which has no ESA-designated critical habitat and ESA-listed species under NMFS' jurisdiction are not expected to use the river.

The remaining East coast portion of the *Action Area* is very small. It includes Tribal and federal lands within 24 subwatersheds distributed among Maine, Vermont, Connecticut, and Delaware. Although 13 of these are in Maine, few river and stream aquatic impairments are reported in this state (8 out of 250 total assessed water bodies are impaired). Impairment causes in Maine are identified as low dissolved oxygen and dioxins. Microbial pollution of rivers and streams are indicated as major impairment causes in Vermont, Connecticut and Delaware, accounting for nearly 60 percent of the impaired river and stream miles among these states (EPA Water Quality Assessment and TMDL Information, https://iaspub.epa.gov/waters10/attains_index.home).

[1] MA 2014 Water Quality Assessment Report, https://iaspub.epa.gov/waters10/attains_state.control?p_state=MA

[2] DC 2014 Water Quality Assessment Report, https://iaspub.epa.gov/waters10/attains_state.control?p_state=DC

Mercury, arsenic pollution and “unknown” are also among the top impairment causes for rivers and streams in these states.

West Coast Region

The West Coast region contains 410 estuaries, bays, and sub-estuaries that cover a total area of 2,200 square miles (USEPA 2015). More than 60 percent of this area consists of three large estuarine systems—the San Francisco Estuary, Columbia River Estuary, and Puget Sound (including the Strait of Juan de Fuca). Sub-estuary systems associated with these large systems make up another 27 percent of the West Coast. The remaining West Coast water bodies, combined, compose only 12 percent of the total coastal area of the region.

The majority of the population in the West Coast states of California, Oregon, and Washington lives in coastal counties. In 2010, approximately 40 million people lived in these coastal counties, representing 19 percent of the U.S. population residing in coastal watershed counties and 63 percent of the total population of West Coast states (U.S. Census Bureau, http://www.census.gov/2010census/). Between 1970 and 2010, the population in the coastal watershed counties of the West Coast region almost doubled, growing from 22 million to 39 million people.

A total of 134 sites were sampled to characterize the condition of West Coast waters. Figure 6 shows a summary of findings from the EPA’s National Coastal Condition Assessment Report for the west Coast Region (USEPA 2015).

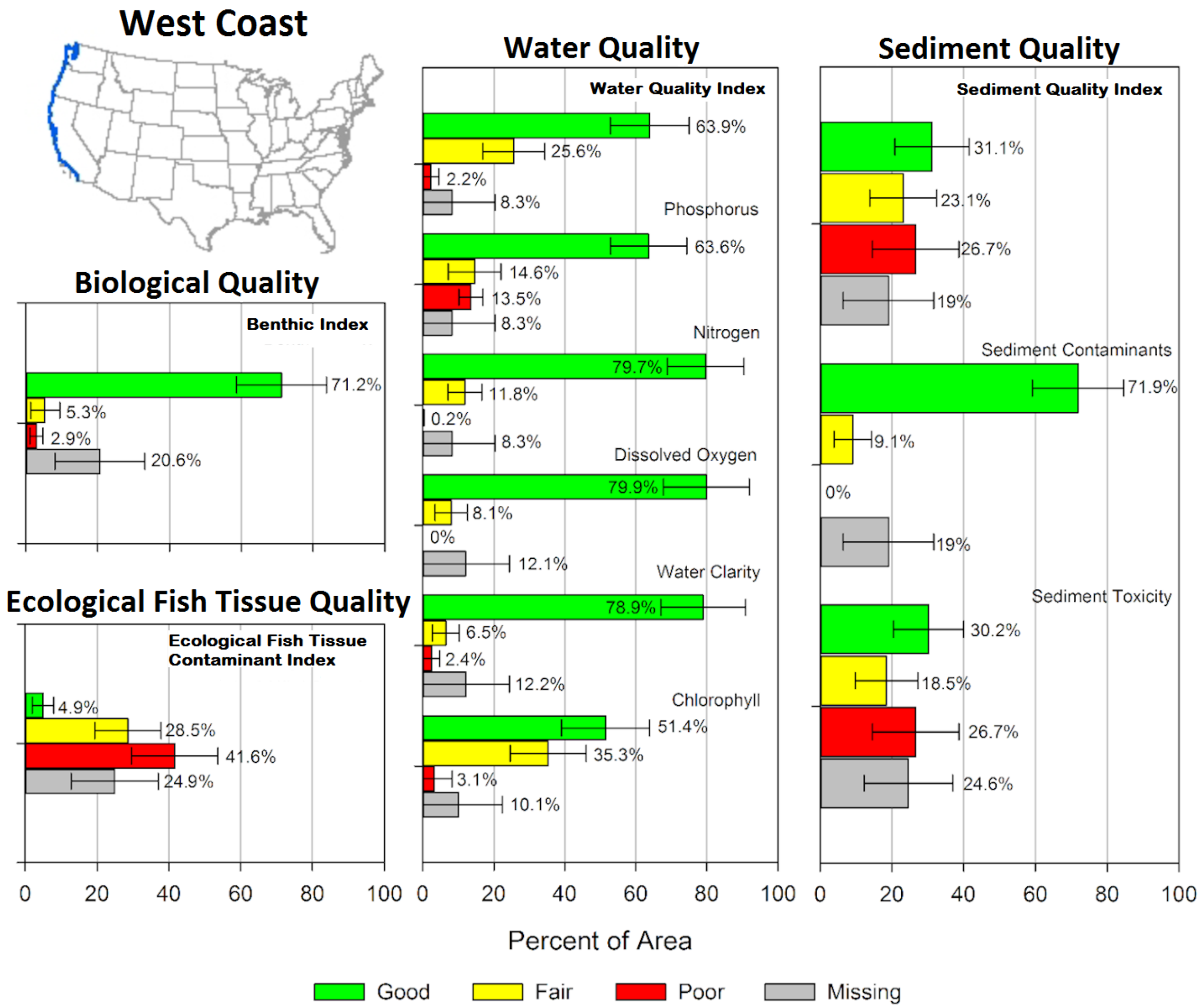

Figure 4. National Coastal Condition Assessment 2010 Report findings for the West Coast Region. Bars show the percentage of coastal area within a condition class for a given indicator (n = 238 sites sampled). Error bars represent 95 percent confidence levels (USEPA 2015).

Biological quality is rated good in 71 percent of West Coast waters, based on the benthic index. Fair biological quality occurs in 5 percent of these waters, and poor biological quality occurs in 3 percent (data are missing for an additional 21 percent of waters due to difficulty obtaining samples). Based on the water quality index, 64 percent of waters in the West Coast region are in good condition, 26 percent are rated fair, and 2 percent are rated poor (USEPA 2015).

Based on the sediment quality index, 31 percent of West Coast waters sampled are in good condition, 23 percent in fair condition, and 27 percent in poor condition (data missing for 19 percent of waters sampled) (USEPA 2015). Based on the ecological fish tissue contaminant index, 42 percent of West Coast waters are in poor condition, 29 percent in fair condition, and 5 percent in good condition (data missing for 25 percent of waters sampled). The contaminants that most often exceed the thresholds for “poor” condition are selenium, mercury, arsenic, and, in a very small proportion of the area, hexachlorobenzene (USEPA 2015).

Subwatersheds associated with Washington State federal lands where CGP eligible activities may occur (e.g., Department of Defense, Bureau of Land Management, Bureau of Reclamation) or Tribal lands, are distributed throughout the state and along the coast line. Information from the 2008 state water quality assessment report for the entire state was used to infer conditions within the *Action Area*. For the 2008 reporting year, the state of Washington assessed 1,997 miles of rivers and streams, 434,530 acres of lakes, reservoirs, and ponds, and 376 square miles of ocean and near coastal waters (Washington 2008 Water Quality Assessment Report, https://iaspub.epa.gov/waters10/attains_state.control?p_state=WA). Among assessed waters, 80 percent of rivers and streams, 68 percent of lakes, reservoirs, and ponds, and 53 percent of ocean and near coastal waters were impaired. Temperature (39 percent of assessed waters) and fecal coliform (32 percent of assessed waters) are prominent causes of impairments. These are followed by low dissolved oxygen (19 percent), pH (9 percent), and instream flow impairments (2 percent). Ocean and near coastal impairment causes include fecal coliform in 17 percent of assessed waters, followed by low dissolved oxygen in 12 percent of these waters. The remaining contributors are invasive exotic species, sediment toxicity, and PCBs.

Among the 47 permitted facilities located within Washington's Tribal lands, 36 are in violation of their permits, with 2 of these violations classified as a significant noncompliance with effluent violations. There are 12 facilities with violations reported for the 38 EPA-permitted facilities within the watersheds associated with federally operated facilities in Washington. One operation is in significant noncompliance for failure to submit a discharge monitoring report.

The area covered by subwatersheds within Tribal lands in Oregon where EPA has permitting authority account for only 1.5 percent of the *Action Area*. Direct examination of these areas using EPA's geospatial databases from 2006 indicate that 80 percent of the 376 km of rivers and streams assessed are impaired by elevated iron (NMFS 2015). While the source of the iron is not identified, iron contamination can result from acid mine drainage. Eleven out of the 13 assessed lakes, reservoirs, and ponds in subwatersheds associated with these lands are impaired, with causes listed as temperature and fecal coliform bacteria. This amounts to impairment of 93 percent of the assessed area.

The EPA also has permitting authority for Tribal lands in California. The subwatersheds associated with these lands account for about 6 percent of the total *Action Area*, but are dispersed widely and make up a very small fraction of the watersheds within the state. As such, we did not make generalizations about water quality in these areas based on the 2012 statewide water quality assessment report. Rather, information for the relevant watersheds was extracted from EPA geospatial databases and analyzed separately. Ninety-one percent of the assessed rivers and streams within these Tribal land subwatersheds are impaired by temperature, sediment, aluminum, nutrients/eutrophication, development and pH. Stressor sources are attributed to loss of riparian habitat, hydrological modification, forestry activities, development and roads, agriculture and construction. High impairment rates (97 percent) are also found for assessed lakes, reservoirs and ponds within the *Action Area* in California. The most common impairment for these waters is arsenic, affecting 35 percent of assessed waters, while nutrients and mercury are factors in about 33 and 31 percent of assessed waters, respectively. Greater than 99 percent of California's assessed bays and estuaries are impaired. Mercury, PCBs, DDT, and exotic invasive species are the top impairment causes, degrading 63-64 percent of these waters. Among the 20 permits located in Indian country lands the California *Action Area*, a total of 8 facilities are in violation of their NPDES permit, with 2 of these violations classified as a significant noncompliance for compliance schedule violations.

Inland waters of Idaho where anadromous salmonids occur were not covered by the EPA's 2015 coastal assessment report. In 2012 Idaho assessed 65 percent of its 96,391 miles of rivers and streams. The report indicates that 54 percent of rivers and streams to be impaired. Water temperature and sedimentation are the two most important causes of impairments, affecting 29 percent and 24 percent of assessed waters, respectively. Other causes included nutrients, pathogens, impaired aquatic assemblages, and flow regime alteration. The primary sources for impairments are all various expressions of livestock activity within the assessed watersheds, e.g., grazing, including grazing on riparian shorelines and rangeland. Among the 830 EPA NPDES-permitted facilities located in Idaho, a total of 568 (31 percent) are in noncompliance with their permits and with 21 (2.5 percent) of these violations classified as a significant noncompliance, 12 of which are effluent violations. Four of the current effluent violations occur in watersheds where ESA-listed species and designated critical habitat under NMFS' jurisdiction occur. One facility the waste water treatment facility fir City of Culdesac discharges directly to ESA-designated critical habitat in Lapwai Creek.

Puerto Rico

Since the ESA-listed species and designated critical habitat under NMFS' jurisdiction in Puerto Rico are strictly marine and do not occur in freshwaters or wetlands, this discussion will focus on water quality conditions reported for coastal shoreline and saltwater habitats. In 2014, Puerto Rico assessed the condition of 390 out of 550 miles of coastal shoreline (70.9 percent) and all 8.7 square miles of the surrounding bays and estuaries. The findings indicate that 77 percent of the coastline and 100 percent of the assessed estuaries and bays are impaired (Puerto Rico Water Quality Assessment Report, https://iaspub.epa.gov/waters10/attains_index.control?p_area=PR#total_assessed_waters). TMDLs are needed in 100 percent of coastal areas sampled but none have been completed. TMDLs are needed in 58.6 percent of bay/estuary areas sampled but are completed for less than 2 percent of assessed areas. Pathogens (e.g., fecal coliform, total coliform, Enterococcus) and pathogen sources dominate the impairment profiles for all three types of assessed waters These include onsite waste water systems, agriculture, concentrated animal feed operations, major municipal point sources, and urban runoff. Coastline impairment causes include pH, turbidity, and Enterococcus bacteria. Many of these impairments are attributed to sewage and urban-related stormwater runoff. Rates of noncompliance among EPA-permitted pollution sources are fairly high. Among the 808 NPDES-permitted facilities located in Puerto Rico, 30 percent were in violation of their, and 18 percent were classified in significant noncompliance and 5 of these violations were effluent violations and four discharges either directly to coastal waters where ESA ESA-listed species under NMFS' jurisdiction occur or discharged to a creek within one mile of coastal waters.

Pacific Islands

The EPA has NPDES permitting authority in the Pacific islands of Guam, the Northern Marianas, and American Samoa. Because the ESA-listed species and designated critical habitat under NMFS' jurisdiction in these areas are strictly marine and do not occur in freshwaters or wetlands, this discussion will focus on water quality conditions reported for coastal shoreline and saltwater habitats.

The population of American Samoa was 55,519 in 2010. Factors such as population density, inadequate land-use permitting, and increased production of solid waste and sewage, have impaired water quality in streams and coastal waters of this U.S. territory. The total surface area of American Samoa is very small, only 76.1 sq. miles, which is divided into 41 watersheds with an average size of 1.8 sq. miles. Water quality monitoring, along with coral and fish benthic monitoring, covers 34 of the 41 watersheds, which includes areas populated by more than 95 percent of the total population of American Samoa. For the goal to protect and enhance ecosystems (aquatic life), of the 45.1 shoreline miles (out of 149.5 total) assessed in 2012-2013, 15.5 miles were found to be fully supporting, 12.8 miles were found to be partially supporting, and 16.8 miles were found to be not supporting (Tuitele et al. 2014). For the goal to Protect and Enhance Public Health, all 7.9 shoreline miles assessed in 2012-2013 for fish consumption were found to be not supporting. Eighty-four percent of American Samoa's coastline was assessed in 2010 and 60 percent of the assessed waters were found to be impaired. Enterococcus is identified as causing impairments along 50 percent of the coastline evaluated, while 26 percent of assessed coastline had nonpoint source pollutants contributing to impairments. Of the 5.7 km^2 of reef flats assessed in 2010, 76 percent were fully supporting and 24 percent were not supporting the goal of Protect and Enhance Ecosystems(Tuitele et al. 2014). The major stressors identified were PCBs, metals (mercury), pathogen indicators, and other undetermined stressors(Tuitele et al. 2014). The major sources of impairment included sanitary sewer overflows and animal feed operations, each implicated for 50 percent of the waters assessed. Multiple nonpoint sources were identified as a stressor source for 26 percent of assessed waters, while contaminated sediments contributed to impairments in 6 percent of assessed waters. Five out of 6 American Samoa facilities with NPDES permits were in noncompliance, with 2 in significant noncompliance, one with effluent violations for discharges into Pago Pago Harbor.

Guam assessed 3 percent of its 915 acres of bays/estuaries and 14 percent of its 117 miles of coastline in 2010 (Guam 2010 Water Quality Assessment Report, https://iaspub.epa.gov/waters10/attains_state.control?p_state=GU). Impairments are identified in 42 percent of assessed bays and estuaries and the entire extent of assessed coastline. PCBs levels in fish tissue was the cause of impairment in 33 percent of assessed bays and estuaries, followed by antimony, dieldrin, tetrachloroethylene, and trichloroethylene, each listed as causing impairments to 6 percent of assessed waters. Enterococcus bacteria is the cause of impairment in nearly all of Guam's coastal shoreline waters (96 percent), while PCB contamination is a minor contributor to impairment of the coastal shoreline (4 percent). Sources of impairment causes have not been identified for Guam. Among the 26 NPDES-permitted facilities located in Guam, a total of 17 (65 percent) were in violation of their permit at the time of this writing, with 4 of these violations classified as a significant noncompliance, three with effluent violations for discharges to the Pacific Ocean or Tipalao Bay.

In the Northern Marianas, 36 percent of the 235.5 miles of assessed shoreline were found to be impaired in 2014 (N. Mariana Islands Water Quality Assessment Report, https://iaspub.epa.gov/waters10/attains_state.control?p_state=CN). Phosphate is listed as a cause for all impaired areas. Other causes identified among the impaired stretches of shoreline include microbiological contamination from Enterococcus bacteria (22 percent), dissolved oxygen saturation levels (16 percent), and mercury in fish tissue (1 percent). The presence of Enterococci bacteria was implicated for the impairment of 32.2 miles of Saipan's, 17.8 miles of Rota's, and 24.3 miles of Tinian's shoreline for recreational uses. In addition, 15 percent of the assessed waters had impaired biological assemblages. Sources of impairments included sediments (15 percent), unknown sources (13 percent), on-site septic treatment systems (12 percent), urban runoff (12 percent), and livestock operations (7 percent). Three out of the six NPDES-permitted facilities on the Northern Marianas were in noncompliance, but the none were in significant noncompliance.

3.2 Baseline Pesticide Detections in Aquatic Environments

Pesticide detections for the environmental baseline are addressed as reported in the U.S. Geological Survey (USGS) National Water-Quality Assessment Program's (NAWQA) national assessment (Gilliom 2006). This approach was chosen because the NAWQA reports provide the same level of analysis for each geographic area. In addition, given the lack of uniform reporting standards and large action area for this opinion, it is not feasible to present a comprehensive basin-specific analysis of pesticide detections.

Over half a billion pounds of herbicides, insecticides, and fungicides were used annually from 1992 to 2011 to increase crop production and reduce insect-borne disease (Stone et al. 2014) During any given year, more than 400 different types of pesticides are used in agricultural and urban settings. The distributions of the most prevalent pesticides in streams and groundwater correlate with land use patterns and associated present or past pesticide use (Gilliom 2006). When pesticides are released into the environment they frequently end up as contaminants in aquatic environments. Depending on their physical properties, some are rapidly transformed via chemical, photochemical, and biologically mediated reactions into other compounds known as degradates. These degradates may become as prevalent as the parent pesticides depending on their rate of formation and their relative persistence. Another dimension of pesticides and their degradates in the aquatic environment is their simultaneous occurrence as mixtures (Gilliom 2006). Mixtures result from the use of different pesticides for multiple purposes within a watershed or groundwater recharge area. Pesticides generally occur more often in natural water bodies as mixtures than as individual compounds. Fish exposed to multiple pesticides at once may also experience additive and synergistic effects. If the effects on a biological endpoint from concurrent exposure to multiple pesticides can be predicted by adding the potency of the pesticides involved, the effects are said to be additive. If, however, the response to a mixture leads to a greater than expected effect on the endpoint, and the pesticides within the mixture enhance the toxicity of one another, the effects are characterized as synergistic. These effects are of particular concern when the pesticides share a mode of action.

From 1992 to 2001, the USGS sampled water from 186 stream sites, bed sediment samples from 1,052 stream sites, and fish from 700 stream sites across the continental U.S. Pesticide concentrations were detected in streams and groundwater within most areas sampled with substantial agricultural or urban land uses. NAWQA results detected at least one pesticide or degradate in more than 90 percent of water samples, more than 80 percent of fish samples, and more than 50 percent of bed sediment samples from streams in watersheds with agricultural, urban, and mixed land use (Gilliom 2006). Compounds commonly detected included 11 agriculture-use herbicides and the atrazine degradate deethylatrazine; 7 urban-use herbicides; and 6 insecticides used in both agricultural and urban areas. Mixtures of pesticides were detected more often in streams than in ground water and at relatively similar frequencies in streams draining areas of agricultural, urban, and mixed land use. Water from streams in these developed land use settings had detections of two or more pesticides or degradates more than 90 percent of the time, five or more pesticides or degradates about 70 percent of the time, and 10 or more pesticides or degradates about 20 percent of the time (Gilliom 2006). NAWQA analysis of all detections indicates that more than 6,000 unique mixtures of 5 pesticides were detected in agricultural streams (Gilliom 2006). The number of unique mixtures varied with land use. More than half of all agricultural streams and more than three-quarters of all urban streams sampled had concentrations of pesticides in water that exceeded one or more benchmarks for aquatic life. Exceedance of an aquatic life benchmark level indicates a strong probability that aquatic species are being adversely affected. However, aquatic species may also be affected at levels below benchmark criteria. In agricultural streams, most concentrations that exceeded an aquatic life benchmark involved chlorpyrifos (21 percent), azinphos methyl (19 percent), atrazine (18 percent), DDE (16 percent), and alachlor (15 percent) (Gilliom 2006). Organochlorine pesticides that were discontinued 15 to 30 years ago still exceeded benchmarks for aquatic life and fish-eating wildlife in bed sediment or fish tissue samples from many streams.

Stone et al. (2014) compared pesticide levels for streams and rivers across the conterminous U.S. for the decade 2002−2011 with previously reported findings from the decade of 1992−2001. Overall, the proportions of assessed streams with one or more pesticides that exceeded an aquatic life benchmark were very similar between the two decades for agricultural (69 percent during 1992−2001 compared to 61 percent during 2002−2011) and mixed-land-use streams (45 percent compared to 46 percent). Urban streams, in contrast, increased from 53 percent during 1992−2011 to 90 percent during 2002−2011, largely because of fipronil and dichlorvos. Agricultural use of synthetic organic herbicides, insecticides, and fungicides in the continental U.S. had a peak in the mid-1990s, followed by a decline to a low in the mid-2000s (Stone et al. 2014). During the late-2000s, overall pesticide use steadily increased, largely because of the rapid adoption of genetically modified crops and the increased use of glyphosate. The herbicides that were assessed by USGS represent a decreasing proportion of total use from 1992 to 2011 because glyphosate was not previously included in the national monitoring network.

3.3 Hydromodification

Hydromodification is generally defined as a change in natural channel form, watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) associated with alterations in stream and rivers flows and sediment transport due to anthropogenic activities. Such changes often result in negative impacts to water quality, quantity, and aquatic habitats.

3.3.1 Dams

While dams provide valuable services to the public, such as recreation, flood control, and hydropower, they also have detrimental impacts on aquatic ecosystems. Dams can have profound effects on anadromous species by impeding access to spawning and foraging habitat and altering natural river hydrology and geomorphology, water temperature regimes, and sediment and debris transport processes (Pejchar and Warner 2001, Wheaton et al. 2004). The loss of historic habitat ultimately affects anadromous fish in two ways: 1) it forces fish to spawn in sub-optimal habitats that can lead to reduced reproductive success and recruitment, and 2) it reduces the carrying capacity (physically) of these species and affects the overall health of the ecosystem (Patrick 2005). Additionally, a substantial number of juvenile salmonids are killed and injured during downstream migrations. Physical injury and direct mortality occurs as juveniles pass through turbines, bypasses, and spillways. Indirect effects of passage through all routes may include disorientation, stress, delay in passage, exposure to high concentrations of dissolved gases, elevated water temperatures, and increased predation.

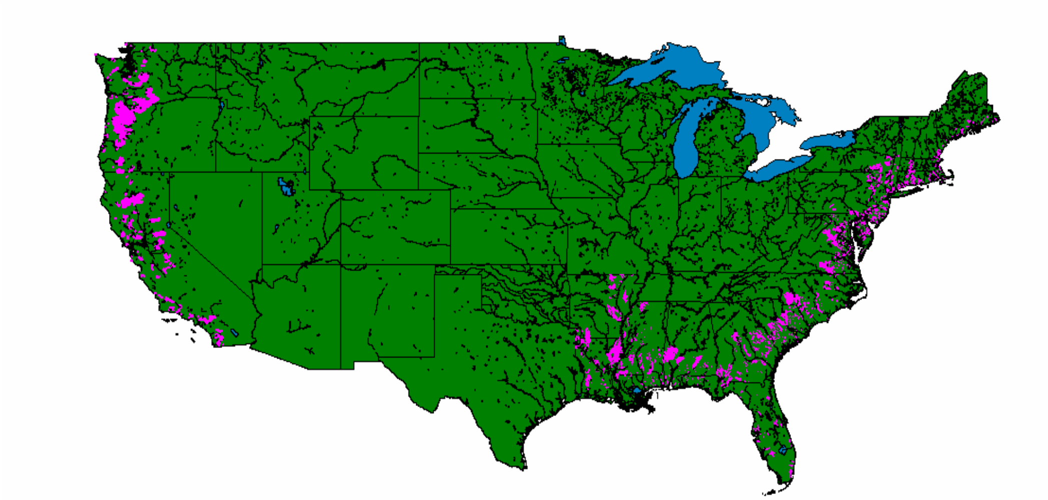

Figure 5. Map of River and Lake Habitat Impeded by Dams (Denoted in Purple) for the Continental U.S. (modified from Patrick 2005).

Nationwide, nearly 44,000 miles of river and lake habitat are blocked by terminal dams (those lowest in the watershed), which includes the area between the terminal dam and the next upstream impediment. This loss of habitat represents approximately 8.5 percent and 4.7 percent of the total riverine miles available (637,525 miles) along the Atlantic/Gulf Coast and Pacific Coast, respectively (Patrick 2005). Based on a non-random sample of dams affecting the largest areas (east and west coast) with diadromous fish runs, nearly 30 percent of diadromous fish habitat is blocked by terminal dams that have no fish passage (Patrick 2005).

The final rule listing Southern DPS green sturgeon indicates that the principle factor for the decline of this DPS is the reduction of spawning to a limited area, due largely to impassable barriers on the Sacramento River (Keswick Dam) and the Feather River (Oroville Dam) (71 FR 17757; April 7, 2006).

Comparative analyses of historic and contemporary hydrologic and thermal regimes indicate that aquatic habitats in the Sacramento, Yuba, and Feather rivers are different than they were before dam construction (NMFS 2015b). However, the impact of these changes on Southern DPS green sturgeon spawning and recruitment is not fully understood. (Mora et al. 2009) suggest that flow regulation has had mixed effects on habitat suitability. In the Sacramento River the removal of Red Bluff Diversion Dam as a barrier to migration has increased the use of upstream spawning habitat by Southern DPS green sturgeon. Modeling studies predict that Southern DPS green sturgeon would use additional areas on the Sacramento River in the absence of impassable dams (Mora et al. 2009). This modeling work also found that suitable spawning habitat historically existed on portions of the San Joaquin, lower Feather, American, and Yuba rivers, much of which is currently inaccessible to green sturgeon due to the presence of barriers. Flood bypass systems along the Sacramento River pose a challenge to Southern DPS green sturgeon during spawning migrations. Green sturgeon are particularly affected at the Yolo and Sutter bypasses and by Tisdale and Fremont weirs (Thomas et al. 2013).

3.3.2 Pacific Northwest Dams

There are more than 400 dams in the Pacific Northwest, ranging from mega dams that store large amounts of water to small diversion dams for irrigation (Panel on Economic Environmental and Social Outcomes of Dam Removal 2001). Every major tributary of the Columbia River, except the Salmon River, is totally or partially regulated by dams and diversions. More than 150 dams are major hydroelectric projects which provide a significant source of power to the region. Of these, 18 dams are located on the mainstem Columbia River and its major tributary, the Snake River. Development of the Pacific Northwest regional hydroelectric power system, dating to the early 20th century, has had profound effects on ecosystems within the Columbia River Basin, particularly the survival of anadromous salmonids (Williams et al. 1999). Approximately 80 percent of historical spawning and rearing habitat of Snake River fall-run Chinook salmon is now inaccessible due to dams. The Snake River spring/summer run has been limited to the Salmon, Grande Ronde, Imnaha, and Tuscanon rivers. Dams have cut off access to the majority of Snake River Chinook salmon spawning habitat. The Sunbeam Dam on the Salmon River is believed to have limited the range of Snake River sockeye salmon as well. Non-federal hydropower facilities on Columbia River tributaries have also partially or completely blocked higher elevation spawning (NMFS 2015b).

The Puget Sound region, which includes the San Juan Islands and south to Olympia is the second largest estuary in the U.S. and is fed by over 10,000 rivers and streams. More than 20 dams occur within this region's rivers and overlap with the distribution of salmonids. Dams were built on the Cedar, Nisqually, White, Elwha, Skokomish, Skagit, and several other rivers in the early 1900s to supply urban areas with water, prevent downstream flooding, allow for floodplain activities (like agriculture or development), and to power local timber mills (Ruckelshaus and McClure 2007).

Compared to other parts of the Northwest Region, the Oregon-Washington-Northern California coastal drainages are less impacted by dams and still have several remaining free flowing rivers.. Dams in the coastal streams of Washington permanently block only about 30 miles of salmon habitat (Palmisano et al. 1993 cited in NMFS, 2015). In the past, temporary splash dams were constructed throughout the region to transport logs out of mountainous reaches. Thousands of splash dams were constructed across the Northwest in the late 1800s and early 1900s. While these dams typically only temporarily blocked salmon habitat, in some cases dams remained long enough to wipe out entire salmon runs. The effects of the channel scouring and loss of channel complexity from splash dams also resulted in the long-term loss of salmon habitat (Salmonids 1996)

Several hydromodification projects in the Pacific Northwest have been designed to improve the productivity of listed salmonids. Improvements include flow augmentation to enhance water flows through the lower Snake and Columbia Rivers; providing stable outflows at Hells Canyon Dam during the fall Chinook salmon spawning season and maintaining these flows as minimums throughout the incubation period to enhance survival of incubating fall-run Chinook salmon; and reduced summer temperatures and enhanced summer flow in the lower Snake River ((USACE et al. 2007, Appendix 1 cited in NMFS, 2008). Providing suitable water temperatures for over-summer rearing within the Snake River reservoirs allows the expression of productive "yearling" life history strategy that was previously unavailable to Snake River Fall-run Chinook salmon. The mainstem Federal Columbia River Power System corridor has also improved safe passage through the hydrosystem for juvenile steelhead and yearling Chinook salmon with the construction and operation of surface bypass routes at Lower Granite, Ice Harbor, and Bonneville dams and other configuration improvements. For salmon, with a stream-type juvenile life history, projects that have protected or restored riparian areas and breached or lowered dikes and levees in the tidally influenced zone of the estuary have improved the function of the juvenile migration corridor. The Federal Columbia River Power System action agencies recently implemented 18 estuary habitat projects that removed passage barriers to increase fish access to high quality habitat. The Army Corps estimates that hydropower configuration and operational improvements implemented from 2000 to 2006 resulted in an 11.3 percent increase in survival of yearling juvenile Lower Columbia River Chinook salmon from populations that pass Bonneville Dam.

Obstructed fish passage and degraded habitat caused by dams is considered the greatest impediment to self-sustaining anadromous fish populations in Maine (NRC 2004). Gulf of Maine DPS Atlantic salmon are not well adapted to the artificially created and maintained impoundments resulting from dam construction (NRC 2004). Other aquatic species that thrive in impounded riverine habitat have proliferated and significantly altered the prey resources available to salmon, as well as the abundance and species composition of salmon competitors and predators. The National Inventory of Dams Program lists 639 dams (over four feet high) in Maine, over half of which are located within the range of the Gulf of Maine DPS (USACOE National Inventory of Dams Program, http://nid.usace.army.mil/cm_apex/f?p=838:12). The larger hydroelectric dams and storage projects within the Gulf of Maine DPS are primarily located in the Penobscot, Kennebec, and Androscoggin watersheds. Gulf of Maine DPS salmon habitat is also degraded as a result of bypassed reaches of natural river channels that re-route river flows through forebays or penstocks. Many smaller dams still remain on smaller rivers and streams within Gulf of Maine DPS range.

3.3.3 East Coast Dams

The prevalence of dams throughout East Coast rivers means that all Atlantic sturgeon life stages generally occur downstream of dams, leaving them vulnerable to perturbations of natural river conditions. Atlantic sturgeon spawning sites remain unknown for the majority of rivers in their range. However, they have been observed spawning hundreds of miles upstream in Southern non-tidal rivers that are unobstructed by dams, suggesting that dams may prevent them from reaching preferred spawning areas. Observations of Atlantic sturgeon spawning immediately below dams, further suggests that they are unable to reach their preferred spawning habitat upriver. Overall, 91 percent of historic Atlantic sturgeon habitat seems to be accessible, but the quality of the remaining portions of habitat as spawning and nursery grounds is unknown, therefore estimates of percentages of availability do not necessarily equate to functionality (ASSRT 2007). Access to 50 percent or more of historical sturgeon spawning habitat have been eliminated or restricted. Thus, dams may one of the primary causes of the extirpation of several Atlantic sturgeon subpopulations.

Due to their upriver locations, most dams in the Chesapeake Bay watershed have large freshwater tailways (unobstructed habitat downstream of the dam). Several dams within the Atlantic sturgeon historic range have been removed or naturally breached.Sturgeon appear unable to use some fishways (e.g., ladders) but have been transported in fish lifts (Kynard 1998). Data on the effects of the fish lift at the Holyoke Hydroelectric Project on the Connecticut River suggest that fish lifts that successfully attract other anadromous species (i.e., shad, salmon etc.) do a poor job of attracting sturgeon: attraction and lifting efficiencies for shortnose sturgeon at the Holyoke Project are estimated around 11 percent (ASSRT 2007). Despite decades of effort, fish passage infrastructure retrofitted at hydroelectric dams has largely failed to restore diadromous fish to historical spawning habitat (Brown et al. 2013). While improvements to fish passage are often required when hydroelectric dams go through Federal Energy Regulatory Commission relicensing, the relicensing process occurs infrequently, with some licenses lasting up to 50 years. Over 95 percent of dams on the eastern seaboard are not hydroelectric facilities and are thus not subject to continual relicensing or fish passage improvement measures (ASMFC 2008).

3.3.4 Water Diversions

Like many regions throughout the world, the U.S. is experiencing increasing demand for fresh, clean water. Increasing population growth and agricultural needs frequently conflict with water availability. The twentieth century saw increased dam construction, increased irrigation practices for agriculture, increased recreational use of waterbodies, and increased use of waterways for waste disposal, both sanitary and industrial. Water use in the western U.S. presents a particular concern because the western states are characterized by low precipitation and extended periods of draught. Moreover, agricultural uses dominate the water needs in these states (Anderson and Woosley 2008). Although the western states contain the headwaters of some of the continent's major river systems, these water sources have been utilized to the point that there are few undeveloped resources to draw upon to satisfy new demands or to restore depleted rivers and aquifers (USACE and CBI 2012). Groundwater has become an increasingly important source of water as surface water resources have been depleted. Water remains a finite resource, however, and there are consequences to pumping ground water including depleting aquifer storage, supplying poorer quality water to wells, diminishing flow to springs and streams, and land subsidence (Anderson and Woosley 2008).

The amount and extent of water withdrawals or diversions for agriculture impacts streams and their inhabitants by reducing water flow/velocity and dissolved oxygen levels, which can have negative effects on ESA-listed species and their designated critical habitat. Water diversions and withdrawals for agricultural irrigation or other purposes can directly impact fish populations by constraining available spawning and rearing habitat. Adequate water quantity and quality are critical to all salmonid life stages, especially adult migration and spawning, fry emergence, and smolt emigration. Low flow events may delay salmonid migration or lengthen fish presence in a particular water body until favorable flow conditions permit fish migration along the migratory corridor or into the open ocean. Survival of eggs, fry, and juveniles are also mediated by streamflow. Water withdrawals may dewater redds thus reducing egg survival. During summer and winter, the two periods of low flow annually, juvenile salmon survival is directly related to discharge, with better survival in years with higher flows during these two seasons (Gibson 1993, Ghent and Hanna 1999). Summer water withdrawals have the potential to limit carrying capacity and reduce parr survival.

Other potential detrimental impacts of water diversions include increases in nutrient loading, sediments (from bank erosion), and water temperature. Flow management, in combination with the effects of climate change (i.e., droughts), has further decreased the delivery of suspended particulate matter and fine sediment to estuaries. Low river flows may constrain conditions necessary for important salmonid refuge habitat (shade, woody debris, overhanging vegetation), making fish more vulnerable to predation, elevated temperatures, crowding, and disease. In addition, some listed fish species have been shown to be susceptible to entrainment through unscreened diversion pipes. Although many diversion pipes are now screend, the effectiveness of screening for green sturgeon requires further study given that screen criteria were designed to reduce salmon entrainment and impingement. Thousands of diversions exist in the Sacramento

River and Delta that could potentially entrain Southern DPS green sturgeon (Mussen et al. 2014). By the early 1900s, agricultural opportunities within the Columbia River basin began increasing rapidly with the creation of more irrigation canals and the passage of the Reclamation Act of 1902. Today, agriculture represents the largest water user within the basin (>90 percent). Approximately 6 percent of the annual flow from the Columbia River is diverted for the irrigation of over seven million acres of croplands (Hinck et al. 2004). The vast majority of these agricultural lands are located along the lower Columbia River, the Willamette, Yakima, Hood, and Snake rivers, and the Columbia Plateau.

In general, the southern basins in California have a warmer and drier climate while the more northern, coastal-influenced basins are cooler and wetter. About 75 percent of the runoff occurs in basins in the northern third of the state (north of Sacramento), while 80 percent of the demand occurs in the southern two-thirds of the state. Two major water diversion projects meet these demands—the federal Central Valley Project and the California State Water Project. Combined these two water storage and transport systems irrigate about four million acres of farmland and deliver drinking water to roughly 22 million residents.

Water withdrawal may also impact Gulf of Maine DPS Atlantic salmon habitat in the main stem areas of the Penobscot, Kennebec, and Androscoggin Rivers including headwater areas and tributaries of these watersheds (Fay et al. 2006). There are a variety of consumptive water uses in these large watersheds including municipal water supplies, snow making, mills, golf course and agricultural irrigation, and industrial cooling. Increased levels of agricultural irrigation have been occurring throughout the range of the Gulf of Maine DPS for several years. Approximately 6,000 acres of blueberries are irrigated annually with water withdrawn from Pleasant, Narraguagus, and Machias river watersheds (Fay et al. 2006).

3.3.5 Dredging

Riverine, nearshore, and offshore coastal areas are often dredged to support commercial shipping, recreational boating, construction of infrastructure, and marine mining. Dredging in spawning and nursery grounds modifies habitat quality, and limits the extent of available habitat in some rivers where anadromous fish habitat has already been impacted by the presence of dams. Negative indirect effects of dredging include changes in dissolved oxygen and salinity gradients in and around dredged channels ((Jenkins et al. 1993, Secor and Niklitschek 2001, Campbell and Goodman 2004). Dredging operations may also pose risks to anadromous fish species by destroying or adversely modifying benthic feeding areas, disrupting spawning migrations, and filling spawning habitat with resuspended fine sediments. As benthic omnivores, sturgeon in particular may be sensitive to modifications of the benthos which affect the quality, quantity and availability of prey species.

Dredging and filling impact important habitat features of Atlantic sturgeon as they disturb benthic fauna, eliminate deep holes, and alter rock substrates (Smith and Clugston 1997). (Hatin et al. 2007) reported avoidance behavior by Atlantic sturgeon during dredging operations. Dredging operations are also capable of destroying macroalgal beds that may be used as Nassau grouper nursery areas. The eulachon biological review team identified dredging as a low to moderate threat to the species in the Fraser and Columbia rivers, and a low threat in mainland British Columbia rivers due to less dredging activity there (FR 75 13012). They noted that dredging during eulachon spawning was particularly detrimental, as eggs associated with benthic substrates are likely to be destroyed. In addition to indirect impacts, hydraulic dredging can directly harm listed fish species by lethally entraining fish up through the dredge drag-arms and impeller pumps. Atlantic sturgeon have been reported as taken in hydraulic pipeline and bucket-and-barge operations (Moser and Ross 1995), mechanical dredges (i.e., clamshell) (Hastings 1983), and hopper dredges (Dickerson 2006).

Dredging and filling activities can adversely affect colonies of reef-building organisms by burying them, releasing contaminants such as hydrocarbons into the water column, reducing light penetration through the water, and increasing the level of suspended particles in the water column. Corals are sensitive to even slight reductions in light penetration or increases in suspended particulates, and the adverse effects of such activities lead to a loss of productive coral colonies. Among corals, Atlantic Acropora species are considered to be particularly environmentally sensitive, requiring relatively clear, well-circulated water (Jaap 1989). Acropora spp. are almost entirely dependent upon sunlight for nourishment compared to massive, boulder-shaped species in the region, with these latter types of corals more dependent on zooplankton (Porter 1976). Thus, Acropora are considered more susceptible to increases in water turbidity and reductions in water clarity that can result from dredging operations.

3.4 Mining

Mining operations can negatively impact aquatic ecosystems and decrease the viability of threatened and endangered fish populations. The effect of mining in a stream or reach depends upon the rate of harvest and the natural rate of replenishment, as well as flood and precipitation conditions during or after the mining operations. Extraction methods such as suction dredging, hydraulic mining, and strip mining may cause water pollution problems and increased levels of harmful contaminants. Metal contamination reduces the biological productivity within a basin. Metal contamination can result in fish kills at high levels or sublethal effects at low levels, including reduced feeding, activity level, and growth. Sand and gravel mined from riverbeds (gravel bars and floodplains) may result in substantial changes in channel elevation and patterns, in-stream sediment loads, and in-stream habitat conditions. In some cases, in-stream or floodplain mining has resulted in large-scale river avulsions.

California has a long history of mining that dates back to the Gold Rush of the mid-1800s. The Sacramento Basin and the San Francisco Bay watershed are two of the most heavily impacted basins from mining activities. The Iron Metal Mine in the Sacramento Basin releases large quantities of copper, zinc, and lead into the Keswick Reservoir below Shasta Dam (Cain et al. 2000). Methyl mercury contamination remains a persistent problem within San Francisco Bay (Conaway et al. 2003). Many of the streams and river reaches in the Pacific Northwest are impaired from mining. Metal mining (zinc, copper, lead, silver, and gold) peaked in Washington state between 1940 and 1970 (Palmisano et al. 1993 cited in NMFS, 2015). Several abandoned and former mining sites are designated as Superfund cleanup areas (Benke and Cushing 2011). An estimated 200 abandoned mines within the Columbia River Basin pose a potential hazard to the environment due elevated levels of lead and other trace metals (Quigley 1997 cited in Hinck, 2004).

3.5 Artificial Propagation

Each year approximately 380 million hatchery salmon and steelhead are released by government agencies on the Pacific coast and in New England (Kostow 2009). The introduction of hatchery produced fish can be a major cause of ecological perturbation in wild salmonid populations. Potential adverse effects of hatchery practices include: loss of genetic variability within and among populations (Hard et al. 1992, Reisenbichler 1997); disease transfer; increased competition for food, habitat, or mates; increased predation; altered migration; and the displacement of natural fish (Steward and Bjornn 1990 cited in NMFS, 2015, Hard et al. 1992, Fresh 1997). Recent research has demonstrated that the ecological effects of hatchery programs may significantly reduce wild population productivity and abundance even where genetic risks do not occur (Kostow 2009). Long-term domestication has eroded the fitness of hatchery reared fish in the wild and has reduced the productivity of wild stocks where significant numbers of hatchery fish spawn with wild fish.

Hatchery practices are cited as one of the key factors contributing to large reductions in salmonid populations in the Pacific Northwest over the past several decades, and remain a continuing threat to the recovery of many listed ESUs and DPSs. Hatcheries have been used for more than 100 years in the Pacific Northwest to produce fish for harvest and replace natural production lost to dam construction. Hatcheries have only minimally been used to protect and rebuild naturally produced salmonid populations. Hatchery contribution to naturally-spawning fish remains high for a number of Columbia River salmon populations, and it is likely that many returning unmarked adults are the progeny of hatchery-origin parents, especially where large hatchery programs operate (NWFSC 2015). For many populations the proportion of hatchery origin fish exceeds recovery goal criteria set for primary and contributing populations (Good et al. 2005, NWFSC 2015).

The Pacific Northwest Hatchery Reform Project was established in 2000. In their 2015 report to Congress the project's independent scientific review panel concluded that the widespread use of artificial propagation programs has contributed to the overall decline of wild salmonid populations. The states of Oregon and Washington have initiated a comprehensive program of hatchery and associated harvest reforms designed to manage hatchery broodstocks to achieve proper genetic integration with, or segregation from, natural populations, and to minimize adverse ecological interactions between hatchery and natural origin fish[3].

Atlantic salmon have been stocked in at least 26 rivers in Maine from 1871 to 2003. Over 106 million fry and parr and over 18 million smolts have been stocked during this period (Fay et al. 2006). Currently there are two federal hatcheries that spawn and rear progeny of anadromous, captive reared Atlantic salmon, and four permanent feeding/rearing stations that raise progeny of captive reared and domestic broodstock obtained from the federal hatcheries for recovery and restoration stocking.

3.5.1 Non-native Species

When non-native plants and animals are introduced into habitats where they do not naturally occur they can have significant impacts on ecosystems and native fauna and flora. Non-native species can be introduced through infested stock for aquaculture and fishery enhancement, ballast water discharge, and from the pet and recreational fishing industries. Non-native species can reduce native species abundance and distribution, and reduce local biodiversity by out-competing native species for food and habitat. They may also displace food items preferred by native predators, disrupting the natural food web. The introduction of non-native species is considered

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[3] (WDFW, http://wdfw.wa.gov/hatcheries/esa.html; ODFW, http://www.dfw.state.or.us/fish/HGMP/final.asp).

one of the primary threats to ESA-listed species (Wilcove and Chen 1998). Non-native species were cited as a contributing cause in the extinction of 27 species and 13 subspecies of North American fishes over the past 100 years (Miller et al. 1989).

The introduction of invasive blue and flathead catfish along the Atlantic coast has the potential to adversely affect ongoing anadromous fish restoration programs and native fish conservation efforts, including Atlantic sturgeon restoration in mid-Atlantic and south Atlantic river basins (Brown et al. 2005, Kahn, J., NMFS OPR, pers. comm. to R. Salz NMFS OPR, June 2016). Recent studies suggest that invasive species may reduce prey resources for Southern DPS green sturgeon. Green sturgeon may have difficulty feeding in substrate that has been invaded by Japanese eelgrass, which negatively impacts habitat for burrowing shrimp a common sturgeon prey item (Moser, M., NMFS, pers. comm., June 18, 2015 cited in NMFS, 2015b). Similarly, the invasive isopod (*U. pugettensis*) could also impact blue mud shrimp, another green sturgeon prey item (Langness, O., WDFW and Dumbauld, B. USDA-ARS, pers. comm. May 22, 2013 cited in NMFS, 2015b).

Natural predator-prey relationships in aquatic ecosystems in Maine have been substantially altered by non-native species interactions. Several non-native fish species have been stocked throughout the range of Gulf of Maine DPS of Atlantic salmon. Those that are known to prey upon Atlantic salmon include smallmouth bass, largemouth bass, chain pickerel, northern pike, rainbow trout, brown trout, splake, yellow perch, and white perch (Baum 1997). Yellow perch, white perch, and chain pickerel were historically native to Maine, although their range has been expanded by stocking and subsequent colonization. Dams create slow water habitat that is preferred by chain pickerel and concentrate emigrating smolts in these head ponds by slowing migration speeds (McMenemy and Kynard 1988, Spicer et al. 1995). Brown trout, capable of consuming large numbers of stocked Atlantic salmon fry, have contributed to the decline of several native salmonid populations in North America (Alexander 1977, Alexander 1979, Taylor et al. 1984 all cited in Fay, 2006, Moyle 1976).

Introduction of non-native species on the West Coast has resulted in increased salmonid predation in many river and estuarine systems. Native resident salmonid populations have also been affected by releases of non-native hatchery reared salmonids (See 1.2.7 Artificial Propagation). The introduced northern pikeminnow is a significant predator of yearling juvenile Chinook migrants. Chinook salmon represented 29 percent of northern pikeminnow prey in lower Columbia reservoirs, 49 percent in the lower Snake River, and 64 percent downstream of Bonneville Dam (Friesen and Ward 1999). An ongoing northern pikeminnow management program has been in place since 1990 to reduce predation-related juvenile salmonid mortality. The rapid expansion of pikeminnow populations in the Pacific Northwest is believed to have been facilitated by alterations in habitat conditions (particularly increased water temperatures) that favor this species (Brown et al. 1994).

Predation of invasive lionfish on small reef fish and early life stages is a general concern throughout the Caribbean and could have an impact on Nassau grouper populations (Albins and Hixon 2008).

3.6 Fisheries

Commercial, recreational, and subsistence fisheries can result in substantial detrimental impacts on populations of ESA ESA-listed species. Past fisheries contributed to the steady decline in the population abundance of many ESA listed anadromous fish species. Although directed fishing for the species covered in this opinion is prohibited under the ESA, many are still caught as a result of ongoing fishing operations targeting other species (i.e., "bycatch"). Bycatch occurs when fishing operations interact with marine mammals, sea turtles, fish species, corals, sponges, or seabirds that are not the target species for commercial sale.

3.6.1 Directed Harvest

While directed fisheries for Atlantic salmon in the U.S. are at present illegal, impacts from past fisheries are an important factor contributing to the present low abundance of the Gulf of Maine DPS. The most complete records of commercial harvest of Atlantic salmon in the U.S. are for the Penobscot River, although historical records also mention commercial salmon fisheries in the Dennys, Androscoggin and Kennebec rivers (Kendall 1935, Beland et al. 1982, Beland 1984 all cited in Fay, 2006, Stolte 1981) reported that nearly 200 pound nets were operating in Penobscot Bay in 1872. A record commercial catch of 200,000 pounds of salmon was recorded for the Penobscot River in 1888. By 1898, landings had declined to 53,000 pounds and continued to decline in the following decades. The directed commercial fishery for Atlantic salmon in the Penobscot was eliminated by the Atlantic Sea Run Salmon Commission after the 1948 season when commercial harvest was reduced to only 40 fish. Directed fisheries for Atlantic salmon were further regulated by the adoption of the Atlantic Salmon Fishery Management Plan in 1987 which prohibits possession of Atlantic salmon in the U.S. Exclusive Economic Zone (NEFMC, http://www.nefmc.org/management-plans/atlantic-salmon).

The West Greenland fishery is one of the last directed Atlantic salmon commercial fisheries in the Northwest Atlantic. Greenland implemented a 45 mt quota for this fishery for 2015-2017. The West Greenland fishery is a mixed stock fishery and genetic analysis on captures from 2002 to 2004 indicate that Maine-origin salmon contribute between 0.1 and 0.8 percent to this fishery (ICES 2006). Based upon historic tag returns, the commercial fisheries of Newfoundland and Labrador historically intercepted far greater numbers of Maine-origin salmon than the West Greenland fishery (Baum 1997). A small commercial salmon fishery occurs off St. Pierre et Miquelon, a French territory south of Newfoundland. Historically, the fishery was very limited (2 to 3 mt per year). Genetic analysis on 134 samples collected in 2004 indicate that all samples originated from North American salmon, with roughly 2 percent of U.S. origin, presumably from the Gulf of Maine DPS.

Sport fishing for Atlantic salmon in Maine dates back to the mid-1800s. Recreational harvest regulations were not very restrictive through the 1970s. Increasingly restrictive regulations on the recreational harvest of Maine Atlantic salmon began in the 1980s as run sizes decreased notably. In 1995 regulations were promulgated for catch and release fishing only (i.e., zero harvest) of sea run Atlantic salmon throughout the state (Fay et al. 2006). By 2000, directed recreational fishing for sea run Atlantic salmon in Maine was prohibited. Illegal harvest ("poaching") of Maine Atlantic salmon has been reported (MASTF 1997 cited in Fay, 2006) but the level of this activity and the impact on the Gulf of Maine DPS has not been quantified.

During the mid-1800s, an estimated 10 to 16 million adult salmonids entered the Columbia River each year. Large annual harvests of returning adult salmon and steelhead during the late 1800s, ranging from 20 million to 40 million pounds, significantly reduced population productivity (ODFW 2002). The largest known harvest of Chinook salmon occurred in 1883 when Columbia River canneries processed 43 million pounds (Lichatowich and Lichatowich 2001). Commercial landings declined steadily from the 1920s to a low in 1993 when just over one million pounds of

Chinook salmon were harvested (ODFW 2002). Harvest levels increased to 2.8 million pounds by the early 2000s, but almost half the harvest was hatchery produced fish. In the early 2000's, commercial harvest by tribal fisheries in the Columbia River ranged from between 25,000 and 110,000 fish. Recreational catches in both ocean and river fisheries have ranged from about 140,000 to 150,000 individuals over the same time frame. Non-Indian fisheries in the lower Columbia River are limited to a harvest rate of 1 percent. Treaty Indian fisheries are limited to a harvest rate of 5 percent to 7 percent, depending on the run size of upriver Snake River sockeye stocks. Snake River steelhead were historically taken in tribal and non-tribal gillnet fisheries, and in recreational fisheries in the mainstem Columbia River and its tributaries. In the 1970s, retention of steelhead in non-tribal commercial fisheries was prohibited, and in the mid 1980s tributary recreational fisheries in Washington adopted mark-selective regulations. Steelhead are still harvested in tribal fisheries and in mainstem recreational fisheries. Columbia River chum salmon were historically abundant and subject to substantial harvest until the 1950s (Johnson 1997). Illegal high seas driftnet fishing also likely contributed to past declines in Pacific salmon abundance although the extent of this activity is largely unknown.

Many grouper species are highly susceptible to overfishing, whether intentionally or as bycatch, due to a combination of life history traits including large size, late maturity, and tendency to form large spawning aggregations. Puerto Rico had significant commercial landings of Nassau grouper from the 1950s through the 1970s with fishermen targeting spawning aggregations (Schärer 2007). Landings subsequently dropped to negligible levels before the species was fully protected (in Commonwealth and federal waters) in 2004 (Sadovy 1997) (Matos-Caraballo 1997). Nassau grouper were considered "commercially extinct" in Puerto Rico by 1990 (Sadovy 1997); although the species still appeared in landings reports where it averaged approximately 11,000 pounds per year from 1994-2006.

Commercial harvest of eulachon in the Columbia and Fraser rivers was identified as a "low to moderate" threat by the Southern DPS eulachon biological review team. Current harvest levels are orders of magnitude lower than historic harvest levels, and a relatively small number of vessels still operate in this fishery. However, it is possible that even a small harvest of the remaining stock may slow recovery (75 FR 13012). Commercial fishing for eulachon is allowed in the Pacific Ocean, Columbia River, Sandy River, Umpqua River, and Cowlitz River. Commercial fishing in the Columbia River is managed according to the joint Washington and Oregon Eulachon Management Plan (WDFW and ODFW 2001). Under this plan, three eulachon harvest levels can be authorized based on the strength of the prior years' run, resultant juvenile production estimates, and ocean productivity indices.

In the final listing rule, past and present commercial and recreational fishing, as well as poaching, were recognized as factors that pose a threat to the Southern DPS green sturgeon (71 FR 17757). Current regulations prohibit retention of green sturgeon in California, Oregon, and Washington state fisheries and in federal fisheries in the U.S. and Canada. These regulations apply to the range of both Southern and Northern DPS green sturgeon to address the possibility of capture of the threatened Southern DPS throughout the coast. Estimates based on past encounters suggest that Washington commercial fisheries outside of the lower Columbia River annually encounter 311 Southern DPS green sturgeon (Hughes, K, WDFW pers. comm. January 30, 2015 cited in NMFS 2015b). An estimated 271 Southern DPS green sturgeon are annually encountered in lower Columbia River commercial fisheries (NMFS 2008a). Prior to the recreational retention limit, as many as 553 (1985) green sturgeon were harvested by anglers fishing in the lower Columbia

River. A small number of green sturgeon (≤10) are still annually retained in this fishery due to misidentification or poaching.

Harvest records indicate that fisheries for sturgeon were conducted in every major coastal river along the Atlantic coast at one time, with fishing effort concentrated during spawning migrations (Smith 1985). Approximately 3,350 mt (7.4 million lbs) of sturgeon (Atlantic and shortnose combined) were landed in 1890 (Smith and Clugston 1997). The sturgeon fishery during the early years (1870 to 1920) was concentrated in the Delaware River and Chesapeake Bay systems. During the 1970s and 1980s sturgeon fishing effort shifted to the South Atlantic which accounted for nearly 80 percent of total U.S. landings (64 mt). By 1990 sturgeon landings were prohibited in Pennsylvania, District of Columbia, Virginia, South Carolina, Florida, and waters managed by the Potomac River Fisheries Commission. From 1990 through 1996 sturgeon fishing effort shifted to the Hudson River (annual average 49 mt) and coastal areas off New York and New Jersey (Smith and Clugston 1997). By 1996, closures of the Atlantic sturgeon fishery had been instituted in all Atlantic Coast states except for Rhode Island, Connecticut, Delaware, Maryland, and Georgia, all of which adopted a seven-foot minimum size limit. Poaching of Atlantic sturgeon continues and is a potentially significant threat to the species, but the present extent and magnitude of such activity is largely unknown.

3.6.2 Bycatch

Commercial bycatch is not thought to be a major source of mortality for Gulf of Maine DPS Atlantic salmon. Beland (1984 cited in Fay, 2006) reported that fewer than 100 salmon per year were caught incidental to other commercial fisheries in the coastal waters of Maine. A more recent study found that bycatch of Maine Atlantic salmon in herring fisheries is not a significant mortality source (ICES 2004). Commercial fisheries for white sucker, alewife, and American eel conducted in state waters also have the potential to incidentally catch Atlantic salmon.

Recreational angling occurs for many freshwater fish species throughout the range of the Gulf of Maine DPS Atlantic salmon. As a result, Atlantic salmon can be incidentally caught (and released) by anglers targeting other species such as striped bass or trout. The potential also exists for anglers to misidentify juvenile Atlantic salmon as brook trout, brown trout, or landlocked salmon. A maximum length for landlocked salmon and brown trout (25 inches) has been adopted in Maine in an attempt to avoid the accidental harvest of sea-run Atlantic salmon due to misidentification.

Fisheries directed at unlisted Pacific salmonid populations, hatchery produced fish, and other species have caused adverse impacts to threatened and endangered salmonid populations. Incidental harvest rates for listed Pacific salmon and steelhead vary considerably depending on the particular ESU/DPS and population units. Bycatch represents one of the major threats to recovery as incidental harvest rates still remain as high as 50 percent-70 percent for some populations (NWFSC 2015). Freshwater fishery impacts on naturally-produced salmon have been markedly reduced in recent years through implementation of mark-selective fisheries (NWFSC 2015).

Take of Southern DPS green sturgeon in federal fisheries was prohibited as a result of the ESA 4(d) protective regulations issued in 2010 (75 FR 30714; June 2, 2010). Green sturgeon are occasionally encountered as bycatch in Pacific groundfish fisheries (Al-Humaidhi 2011), although the impact of these fisheries on green sturgeon populations is estimated to be small (NMFS 2012).

(NMFS 2012) estimates between 86 and 289 Southern DPS green sturgeon are annually encountered as bycatch in the state-regulated California halibut bottom trawl fishery.

Approximately 50 to 250 green sturgeon are encountered annually by recreational anglers in the lower Columbia River (NMFS 2015b), of which 86 percent are expected to be Southern DPS green sturgeon based on the higher range estimate of Israel (Israel et al. 2009). In Washington, recreational fisheries outside of the Columbia River may encounter up to 64 Southern DPS green sturgeon annually (Hughes, K, WDFW pers. comm. January 30, 2015 cited in NMFS 2015b). Southern DPS green sturgeon are also captured and released by California recreational anglers. Based on self-reported catch card data, an average of 193 green sturgeon were caught and released annually by California anglers from 2007-2013 (green sturgeon 5-year review). Recreational catch and release can potentially result in indirect effects on green sturgeon, including reduced fitness and increased vulnerability to predation. However, the magnitude and impact of these effects on Southern DPS green sturgeon are not well studied.

Directed harvest of Atlantic sturgeon is prohibited by the ESA. However, sturgeon are taken incidentally in fisheries targeting other species in rivers, estuaries, and marine waters along the east coast, and are probably targeted by poachers throughout their range (Collins et al. 1996) (ASSRT 2007). Commercial fishery bycatch is a significant threat to the viability of listed sturgeon species and populations. Bycatch could have a substantial impact on the status of Atlantic sturgeon, especially in rivers or estuaries that do not currently support a large subpopulation (< 300 spawning adults per year). Reported mortality rates of sturgeon (Atlantic and shortnose) captured in inshore and riverine fisheries range from 8 percent to 20 percent (Collins et al. 1996) (Bahn et al. 2012).

Because Atlantic sturgeon mix extensively in marine waters and may access multiple river systems, they are subject to being caught in multiple fisheries throughout their range. Atlantic sturgeon originating from the five DPSs considered in this consultation are at risk of bycatch-related mortality in fisheries operating in the action area and beyond. Sturgeon are benthic feeders and as a result they are generally captured near the seabed unless they are actively migrating (Moser and Ross 1995). Atlantic sturgeon are particularly vulnerable to being caught in commercial gill nets, therefore fisheries using this type of gear account for a high percentage of Atlantic sturgeon bycatch and bycatch mortality. An estimated 1,385 individual Atlantic sturgeon were killed annually from 1989-2000 as a result of bycatch in offshore gill net fisheries operating from Maine through North Carolina (Stein et al. 2004b). Sturgeon are also taken in trawl fisheries, though recorded captures and mortality rates are thought to be low.

From 2001-2006 an estimated 649 Atlantic sturgeon were killed annually in offshore gill net and otter trawl fisheries From 2006-2010 an estimated 3,118 Atlantic sturgeon were captured annually in Northeast fisheries, resulting in approximately 391 mortalities (Miller and Shepherd 2011).

3.7 Vessel Related Stressors

Both large and small vessels can adversely affect ESA-listed species within the action area. The detrimental effects of vessel traffic can be both direct (i.e., ship strikes) and indirect (i.e., noise, harassment, displacement, avoidance).

Atlantic sturgeon are susceptible to vessel collisions. The Atlantic Sturgeon Status Review Team (ASSRT 2007) determined Atlantic sturgeon in the Delaware River are at a moderately high risk of extinction because of ship strikes, and sturgeon in the James River are at a moderate risk from ship strikes. Balazik (Balazik et al. 2012) estimated up to 80 sturgeon were killed between 2007 and 2010 in these two river systems. Ship strikes may also be threatening Atlantic sturgeon populations in the Hudson River where large ships move from the river mouth to ports upstream through narrow shipping channels. The channels are dredged to the approximate depth of the ships, usually leaving less than 6 feet of clearance between the bottom of ships and the river bottom. Any aquatic life along the bottom is sucked through the large propellers of these ships. Large sturgeon are most often killed by ship strikes because their size means they are unable to pass through ship propellers without making contact. Green sturgeon may also be susceptible to ship strikes but there is no data available indicating that this is a major source of mortality.

Collisions with ships are also one of the primary threats to marine mammals, particularly large whales. While interactions between killer whales and ships are known to occur, large migratory cetaceans including blue, fin, humpback, right, and gray whales are considered the most vulnerable to ship strikes, particularly along migratory routes that span thousands of miles. Only one killer whale ship strike was recorded the NMFS national large whale ship strike database from 1975-2002 (Jensen et al. 2004).

While ship strikes may be rare for this species, killer whales are likely more susceptible to other vessel related effects including noise and harassment. Reduced feeding behavior has been reported when vessels are present (Lusseau et al. 2009). However, there is insufficient data available to quantify the reduction in feeding for individual whales or to evaluate the cumulative behavioral effects of vessel traffic on killer whales. Commercial and recreational whale watching was identified as a “high severity” and “high likelihood” threat in the listing determination of Southern Resident killer whales and cited as a factor that could potentially affect recovery of this DPS. Other vessel traffic (not targeting killer whales) was identified as a “medium severity” and “high likelihood” threat. Current voluntary guidelines are in place regarding vessel activity around killer whales, but a vessel monitoring program has documented persistent violations of these guidelines for many years (Koski 2010 cited in NMFS, 2011). In 2009 NMFS proposed regulations under the ESA and MMPA to prohibit vessels from approaching killer whales within 200 yards, parking in the path of whales in inland waters of Washington State, and entering a conservation area during a defined season (74 FR 37674). NMFS has coordinated with the U.S. Coast Guard, Washington Department of Fish and Wildlife, and the Canadian Department of Fisheries and Oceans to evaluate the need for regulations or areas with vessel restrictions as described in the Southern Resident Killer Whales Recovery Plan.

3.7.1 Climate Change

Climate change is a component of the current and future baseline conditions. Climate change is already having a profound effect on life in the oceans. Marine species tend to be highly mobile, and many are moving quickly toward the poles to stay cool as average ocean temperatures rise. These shifts can cause ecological disruptions as predators become separated from their prey. They can also cause economic disruptions if a fish population becomes less productive or moves out of range of the fishermen who catch them.

In addition to getting warmer, the oceans are also becoming more acidic as they absorb about one-half of the CO_2 we emit into the atmosphere. This increased acidity can make life difficult for organisms that build shells out of calcium carbonate. This includes not only corals and shellfish, but also tiny organisms like pteropods that form the foundation of many marine food webs.

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). This temperature increase is greater than what would be expected given the range of natural climatic variability recorded over the past 1,000 years (Crowley and Berner 2001). The IPCC estimates that the last 30 years were likely the warmest 30-year period of the last 1,400 years, and that global mean surface temperature change will likely increase in the range of 0.3 to 0.7°C by about 2033.

All species discussed in this opinion are or are likely to be threatened by the direct and indirect effects of global climatic change. Global climate change stressors, including consequent changes in land use, are major drivers of ecosystem alterations. Climate change is projected to have substantial direct effects on individuals, populations, species, and the community structure and function of marine, coastal, and terrestrial ecosystems in the foreseeable future (McCarty 2001, IPCC 2002, Parry et al. 2007, IPCC 2013). Increasing atmospheric temperatures have already contributed to changes in the quality of freshwater, coastal, and marine ecosystems and have contributed to the decline of populations of endangered and threatened species (Mantua et al. 1997, Karl et al. 2009, Littell et al. 2009).

Warming water temperatures attributed to climate change can have significant effects on survival, reproduction, and growth rates of aquatic organisms (Staudinger et al. 2012). For example, warmer water temperatures have been identified as a factor in the decline and disappearance of mussel and barnacle beds in the Northwest (Harley 2011). Increasing surface water temperatures can cause the latitudinal distribution of freshwater and marine fish species to change: as water temperatures rise, cold and warm water species will spread northward (Hiddink and ter Hofstede 2008, Britton et al. 2010). Cold water fish species and their habitat will begin to be displaced by the warm water species (Hiddink and ter Hofstede 2008, Britton et al. 2010). Fish species are expected to shift latitudes and depths in the water column, and the increasing temperatures may also result in expedited life cycles and decreased growth (Perry et al. 2005). Shifts in migration timing of pink salmon (*Oncorhynchus gorbuscha*), which may lead to high pre-spawning mortality, have also been tied to warmer water temperatures (Taylor 2008). Climate-mediated changes in the global distribution and abundance of marine species are expected to reduce the productivity of the oceans by affecting keystone forage species in marine ecosystems such as phytoplankton, krill, and cephalopods. For example, climate change may reduce recruitment in krill by degrading the quality of areas used for reproduction (Walther et al. 2002).

Climate change will extend growing seasons and spatial extent of arable land in temperate and northern biomes. This would be accompanied by changes land use and pesticide application patterns to control pests (Kattwinkel et al. 2011). However, modeling results indicate that predictions of mean trends in pesticide fate and transport is complicated by case specific and location specific conditions (Gagnon et al. 2016). Hellmann et al. (2008) described the consequences for climate change on the effectiveness of management strategies for invasive species. Such species are expected become more vigorous in areas where they had previously been limited by cold or ice cover. Increased vigor would make making mechanical control less effective and pesticide use likely. Some plant species may become more tolerant of herbicides due to elevated CO2. Pesticide fate and transport, toxicities, degradation rates, and the effectiveness of biocontrol agents are expected to change with changing temperature and water regimes, driven largely by effects on rates in organism metabolism and abiotic reactions (Bloomfield et al. 2006, Schiedek et al. 2007, Noyes et al. 2009).

Warmer water also stimulates biological processes which can lead to environmental hypoxia. Oxygen depletion in aquatic ecosystems can result in anaerobic metabolism increasing, thus leading to an increase in metals and other pollutants being released into the water column (Staudinger et al. 2012). In addition to these changes, climate change may affect agriculture and other land development as rainfall and temperature patterns shift. Aquatic nuisance species invasions are also likely to change over time, as oceans warm and ecosystems become less resilient to disturbances (USEPA 2008). If water temperatures warm in marine ecosystems, native species may shift poleward to cooler habitats, opening ecological niches that can be occupied by invasive species introduced via a ship's ballast water or other sources (Ruiz et al. 1999, Philippart et al. 2011). Invasive species that are better adapted to warmer water temperatures could outcompete native species that are physiologically geared towards lower water temperatures; such a situation currently occurs along central and northern California (Lockwood and Somero 2011).

Climate change is also expected to impact the timing and intensity of stream seasonal flows (Staudinger et al. 2012). Warmer temperatures are expected to reduce snow accumulation and increase stream flows during the winter, cause spring snowmelt to occur earlier in the year, and reduced summer stream flows in rivers that depend on snow melt. As a result, seasonal stream flow timing will likely shift significantly in sensitive watersheds (Littell et al. 2009). Warmer temperatures may also have the effect of increasing water use in agriculture, both for existing fields and the establishment of new ones in once unprofitable areas (ISAB 2007). This means that streams, rivers, and lakes will experience additional withdrawal of water for irrigation and increasing contaminant loads from returning effluent. Changes in stream flow due to use changes and seasonal run-off patterns alter predator-prey interactions and change species assemblages in aquatic habitats. For example, a study conducted in an Arizona stream documented the complete loss of some macroinvertebrate species as the duration of low stream flows increased (Sponseller et al. 2010). As it is likely that intensity and frequency of droughts will increase across the southwest (Karl et al. 2009), similar changes in aquatic species composition in the region is likely to occur.

Ocean acidification, as a result of increased atmospheric carbon dioxide, can interfere with numerous biological processes in corals including: fertilization, larval development, settlement success, and secretion of skeletons (Albright et al. 2010). Over the past 200 years, the oceans have absorbed about half of the CO2 produced by fossil fuel burning and other human activities. This increase in CO2 has led to a reduction of the pH of surface seawater of 0.1 units, equivalent to a 30 percent increase in the concentration of hydrogen ions in the ocean. If global emissions of CO2 from human activities continue to increase, the average pH of the oceans is projected to fall by 0.5 units by the year 2100 (Royal Society of London 2005). In addition to global warming, acidification poses another significant threat to oceans because many major biological functions respond negatively to increased acidity of seawater. Photosynthesis, respiration rate, growth rates, calcification rates, reproduction, and recruitment may be negatively impacted with increased ocean acidity (Royal Society of London 2005). Kroeker et al (2010) reviewed 139 studies that quantified the effect of ocean acidification on survival, calcification, photosynthesis, growth, and reproduction. Their analysis determined that the effects were variable depending on species, but effects were generally negative, with calcification being one of the most sensitive processes. Their meta-analysis was not able to show significant negative effects to photosynthesis. Although the scale of acidification changes would vary regionally, the resulting pH could be lower than the oceans have experienced over at least the past 420,000 years and the rate of change is probably one hundred times greater than the oceans have experienced at any time over that time interval.

Aquatic species, especially marine species, already experience stress related to the impacts of rising temperature. Corals, in particular, demonstrate extreme sensitivity to even small temperature increases. When sea temperatures increase beyond a coral's limit, the coral "bleaches" by expelling the symbiotic organisms that not only give coral its color, but provide food for the coral through their photosynthetic capabilities. According to (Hoegh-Guldberg 2010), bleaching events have steadily increased in frequency since the 1980s.

In summary, the direct effects of climate change include increases in atmospheric temperatures, decreases in sea ice, and changes in sea surface temperatures, patterns of precipitation, and sea level. Indirect effects of climate change include altered reproductive seasons/locations, shifts in migration patterns, reduced distribution and abundance of prey, and changes in the abundance of competitors and/or predators. Climate change is most likely to have its most pronounced effects on species whose populations are already in tenuous positions (Williams et al. 2008).

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APPENDIX C

NOI FORM AFTER EPA CONSULTATION WITH NMFS

EO12866_CGP 2040-ZA27 Final Appendix J_20161104

Appendix J - Notice of Intent (NOI) Form and Instructions

Part 1.4.1 requires you to use the NPDES eReporting Tool, or "NeT" system, to prepare and submit your NOI electronically. However, if the EPA Regional Office grants you a waiver to use a paper NOI form, and you elect to use it, you must complete and submit the following form.

NPDES FORM 3510-9	EPA	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY WASHINGTON, DC 20460 NOTICE OF INTENT FOR THE 2017 NPDES CONSTRUCTION GENERAL PERMIT	Form Approved. OMB No. 2040-0004

Submission of this Notice of Intent (NOI) constitutes notice that the operator identified in Section III of this form requests authorization to discharge pursuant to the NPDES Construction General Permit (CGP) permit number identified in Section II of this form. Submission of this NOI also constitutes notice that the operator identified in Section III of this form meets the eligibility requirements of Part 1.1 CGP for the project identified in Section IV of this form. Permit coverage is required prior to commencement of construction activity until you are eligible to terminate coverage as detailed in Part 8 of the CGP. To obtain authorization, you must submit a complete and accurate NOI form. Discharges are not authorized if your NOI is incomplete or inaccurate or if you were never eligible for permit coverage. Refer to the instructions at the end of this form.

I. Approval to Use Paper NOI Form

Have you been granted a waiver from electronic reporting from the Regional Office *? ☐ YES ☐ NO

If yes, check which waiver you have been granted, , the name of the EPA Regional Office staff person who granted the waiver, and the date of approval:

Waiver granted: ☐ The owner/operator's headquarters is physically located in a geographic area (i.e., ZIP code or census tract) that is identified as under-served for broadband Internet access in the most recent report from the Federal Communications Commission.

☐ The owner/operator has issues regarding available computer access or computer capability.

Name of EPA staff person that granted the waiver: ______

Date approval obtained: __ / __ / ____

*** Note: You are required to obtain approval from the applicable Regional Office prior to using this paper NOI form. If you have not obtained a waiver, you must file this form electronically using the NPDES eReporting Tool (NeT).**

II. Permit Information

NPDES ID (EPA Use Only): ______

Master Permit Number: ______ (see Appendix B of the CGP for the list of eligible permit numbers)

III. Operator Information

Operator Information

Operator Name: ______

Are you requesting coverage under this NOI as a "federal operator" as defined in Appendix A? ☐ YES ☐ NO

Mailing Address:

Street: ______

City: ______ State: __ ZIP Code: _____ - ____

County or Similar Government Division: ______

Phone: ___ - ___ - ____ Ext. ____

E-mail: ______

Operator Point of Contact Information:

First Name, Middle Initial, Last Name: ______

Title: ______

NOI Preparer (Complete if NOI was prepared by someone other than the certifier):

First Name, Middle Initial, Last Name: ______

Organization: ______

Phone: ___-___-____ Ext. _____

E-mail: ______________________________

IV. Project/Site Information

Project/Site Name: ______________________________

Project/Site Address:

Street/Location: ______________________________

City: ______________________________ State: __ ZIP Code: _____ - ____

County or Similar Government Subdivision: ______________________

For the project/site you are seeking permit coverage, provide the following information:

Latitude/Longitude (Use decimal degrees and specify method):

Latitude: ___ ___. ___ ___ ___ ___° N (decimal degrees) Longitude: ___ ___ ___. ___ ___ ___ ___° W (decimal degrees)

Latitude/Longitude Data Source: ☐ Map ☐ GPS ☐ Other____________________ Horizontal Reference Datum: ☐ NAD 27 ☐ NAD 83 ☐ WGS 84

Is your project/site located in Indian country lands, or located on a property of religious or cultural significance to an Indian tribe? ☐ YES ☐ NO

If yes, provide the name of the Indian tribe associated with the area of Indian country (including name of Indian reservation, if applicable), or if not in Indian country, provide the name of the Indian tribe associated with the property:

____

Estimated Project Start Date: __ / __ / ____ Estimated Project Completion Date: __ / __ / ____

Estimated Area to be Disturbed (to the nearest quarter acre): _____ . __

Type of Construction Site (check all that apply): ☐ Single-Family Residential ☐ Multi-Family Residential ☐ Commercial ☐ Industrial ☐ Institutional ☐ Highway or Road ☐ Utility ☐ Other ______________________________

Will there be demolition of any structure built or renovated before January 1, 1980? ☐ YES ☐ NO

If yes, do any of the structures being demolished have at least 10,000 square feet of floor space? ☐ YES ☐ NO

Was the pre-development land use used for agriculture (see Appendix A for definition of "agricultural land")? ☐ YES ☐ NO

Have earth-disturbing activities commenced on your project/site? ☐ YES ☐ NO

If yes, is your project an "emergency-related project" (see Appendix A)? ☐ YES ☐ NO

Have stormwater discharges from your project/site been covered previously under an NPDES permit? ☐ YES ☐ NO

If yes, provide the NPDES ID (if you had coverage under EPA's 2012 CGP or the NPDES permit number if you had coverage under an EPA individual permit: __________

V. Discharge Information

By indicating "Yes" below, I confirm that I understand that the CGP only authorizes the allowable stormwater discharges in Part 1.2.1 and the allowable non-stormwater discharges listed in Part 1.2.2. Any discharges not expressly authorized in this permit cannot become authorized or shielded from liability under CWA section 402(k) by disclosure to EPA, state, or local authorities after issuance of this permit via any means, including the Notice of Intent (NOI) to be covered by the permit, the Stormwater Pollution Prevention Plan (SWPPP), during an inspection, etc. If any discharges requiring NPDES permit coverage other than the allowable stormwater and non-stormwater discharges listed in Parts 1.2.1 and 1.2.2 will be discharged, they must be covered under another NPDES permit.
☐ YES

Does your project/site discharge stormwater into a Municipal Separate Storm Sewer System (MS4)? ☐ YES ☐ NO

Are there any waters of the U.S. within 50 feet of your project's earth disturbances? ☐ YES ☐ NO

Receiving Waters Information: (Attach a separate list if necessary)

List all of the stormwater point of discharge from your facility. Each point of discharge must be identified by a unique 3-digit ID (e.g., 001, 002). Also provide the latitude and longitude in degrees decimal for each point of discharge. Note that this information does not need to be updated in the NOI if the points of discharge change during the project.		**For each point of discharge, provide the following receiving water information:**		
		Provide the name of the first water of the U.S. that receives stormwater directly from the point of discharge **and/or from the MS4 that the point of discharge discharges to:**	**If the receiving water is impaired (on the CWA 303(d) list), list the pollutants that are causing the impairment:**	**If a TMDL been completed for this receiving waterbody, providing the following information:**
Point of Discharge ID				**TMDL Name and ID:**
Latitude	___ ___. ___ ___ ___ ___ ° N (decimal degrees)			**Pollutant(s) for which there is a TMDL:**
Longitude	___ ___ ___. ___ ___ ___ ___ ° W (decimal degrees)			
Point of Discharge ID				**TMDL Name and ID:**
Latitude	___ ___. ___ ___ ___ ___ ° N (decimal degrees)			**Pollutant(s) for which there is a TMDL:**
Longitude	___ ___ ___. ___ ___ ___ ___ ° W (decimal degrees)			
Point of Discharge ID				**TMDL Name and ID:**
Latitude	___ ___. ___ ___ ___ ___ ° N (decimal degrees)			**Pollutant(s) for which there is a TMDL:**
Longitude	___ ___ ___. ___ ___ ___ ___ ° W (decimal degrees)			
Point of Discharge ID				**TMDL Name and ID:**
Latitude	___ ___. ___ ___ ___ ___ ° N (decimal degrees)			**Pollutant(s) for which there is a TMDL:**

Longitude	___ ___ ___. ___ ___ ___ ___ ° W (decimal degrees)			

Point of Discharge ID				**TMDL Name and ID:**
Latitude	___ ___. ___ ___ ___ ___ ° N (decimal degrees)			**Pollutant(s) for which there is a TMDL:**
Longitude	___ ___ ___. ___ ___ ___ ___ ° W (decimal degrees)			
Point of Discharge ID				**TMDL Name and ID:**
Latitude	___ ___. ___ ___ ___ ___ ° N (decimal degrees)			**Pollutant(s) for which there is a TMDL:**
Longitude	___ ___ ___. ___ ___ ___ ___ ° W (decimal degrees)			

Provide the following Information about your point of discharge latitude longitude:

Latitude/Longitude Data Source: ☐ Map ☐ GPS ☐ Other ______________________ Horizontal Reference Datum: ☐ NAD 27 ☐ NAD 83 ☐ WGS 84

Are any of the waters of the U.S. to which you discharge designated by the state or tribal authority under its antidegradation policy as a Tier 2 (or Tier 2.5) water (water quality exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water) or as a Tier 3 water (Outstanding National Resource Water)? (See Appendix F).

☐ YES ☐ NO

If yes, name(s) of receiving water(s) and its designation (Tier 2, Tier 2.5 or Tier 3): ____

VI. Chemical Treatment Information

Will you use polymers, flocculants, or other treatment chemicals at your construction site? ☐ YES ☐ NO

If yes, will you use cationic treatment chemicals at your construction site*? ☐ YES ☐ NO

If yes, have you been authorized to use cationic treatment chemicals by your applicable EPA Regional Office in advance of filing your NOI*?
☐ YES ☐ NO

If you have been authorized to use cationic treatment chemicals by your applicable EPA Regional Office, attach a copy of your authorization letter and include documentation of the appropriate controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to a violation of water quality standards.

Please indicate the treatment chemicals that you will use: ____

____

* Note: You are ineligible for coverage under this permit unless you notify your applicable EPA Regional Office in advance and the EPA office authorizes coverage under this permit after you have included appropriate controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to a violation of water quality standards.

VII. Stormwater Pollution Prevention Plan (SWPPP) Information

Has the SWPPP been prepared in advance of filing this NOI, as required? ☐ YES ☐ NO

SWPPP Contact Information:

First Name, Middle Initial Last Name: ____________ _ ____________

Professional Title: ____________

Phone: ___ - ___ - ____ Ext. ____

E-mail: ____________

VIII. Endangered Species Protection

Using the instructions in Appendix D of the CGP, under which criterion listed below are you eligible for coverage under this permit? Check only 1 box, include the required information and provide a sound basis for supporting the criterion selected**.** You must consider Endangered Species Act listed threatened or endangered species (ESA-listed) and/or designated critical habitat(s) under the jurisdiction of both the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). If different eligibility criteria apply to each agency, select the more conservative criterion (i.e., E=F>D>B>C>A) as your certification.

☐ **A** No ESA-listed species and/or designated critical habitat present in action area. Using the process outlined in Appendix D of this permit, you certify that ESA-listed species and designated critical habitat(s) under the jurisdiction of the USFWS or NMFS are not likely to occur in your site's "action area" as defined in Appendix A of this permit. ***[A basis statement supporting the selection of this criterion should identify the USFWS and NMFS information sources used. Attaching aerial image(s) of the site to this NOI is helpful to EPA, USFWS, and NMFS in confirming eligibility under this criterion. Please Note: NMFS' jurisdiction includes ESA-listed marine and estuarine species that spawn in inland rivers.]***

☐ **B** Eligibility requirements met by another operator under the 2017 CGP. The construction site's discharges and discharge-related activities were already addressed in another operator's valid certification of eligibility for your "action area" under eligibility Criterion A, C, D, E, or F of the 2017 CGP and you have confirmed that no additional ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS not considered in the that certification may be present or located in the "action area." To certify your eligibility under this criterion, there must be no lapse of NPDES permit coverage in the other CGP operator's certification. By certifying eligibility under this criterion, you agree to comply with any conditions upon which the other CGP operator's certification was based. You must include in your NOI the NPDES ID from the other 2017 CGP operator's notification of authorization under this permit. If your certification is based on another 2017 CGP operator's certification under criterion C, you must provide EPA with the relevant supporting information required of existing dischargers in criterion C in your NOI form. **[*A basis statement supporting the selection of this criterion should identify the eligibility criterion of the other CGP NOI, the authorization date, and confirmation that the authorization is effective.*]**

If you select criterion B, provide the NPDES ID from the other operator's notification of authorization under this permit: _ _ _ _ _ _ _ _ _

☐ **C** Discharges not likely to adversely affect ESA-listed species and/or designated critical habitat. ESA-listed species and/or designated critical habitat(s) under the jurisdiction of the USFWS and/or NMFS are likely to occur in or near your site's "action area," and you certify that your site's discharges and discharge-related activities are not likely to adversely affect ESA-listed threatened or endangered species and/or designated critical habitat. This certification may include consideration of any stormwater controls and/or management practices you will adopt to ensure that your discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat. To certify your eligibility under this criterion, indicate 1) the ESA-listed species and/or designated habitat located in your "action area" using the process outlined in Appendix D of this permit; 2) the distance between the site and the listed species and/or designated critical habitat in the action area (in miles); and 3) a rationale describing specifically how adverse effects to ESA-listed species will be avoided from the discharges and discharge-related activities. You must also include a copy of your site map from your SWPPP showing the upland and in-water extent of your "action area" with this NOI. ***[A basis statement supporting the selection of this criterion should identify the information resources and expertise (e.g., state or federal biologists) used to arrive at this conclusion. Any supporting documentation should explicitly state that both ESA-listed species and designated critical habitat under the jurisdiction of the USFWS and/or NMFS were considered in the evaluation. Attaching aerial image(s) of the site to this NOI is helpful to EPA, USFWS, and NMFS in confirming eligibility under this criterion.]***

What ESA-listed species and/or designated critical habitat are located in your "action area":

____

____

Distance between your site and the ESA-listed species and/or designated critical habitat within the action area (in miles, state "on site" if the ESA-listed species and/or designated critical habitat is within the area to be disturbed):

____

____

☐ **D** Coordination with USFWS and/or NMFS has successfully concluded. The coordination must have addressed the effects of your site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS, and resulted in a written concurrence from USFWS and/or NMFS that your site's discharges and discharge-related activities are not likely to adversely affect listed species and/or critical habitat. You must include copies of the correspondence with the participating agencies in your SWPPP and this NOI. ***[A basis statement supporting the selection of this criterion should identify whether USFWS or NMFS or both agencies participated in coordination, the field office/regional office(s) providing that coordination, and the date that coordination concluded.]***

☐ **E** ESA Section 7 consultation between a Federal Agency and the USFWS and/or NMFS has successfully concluded. The consultation must have addressed the effects of the construction site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS. To certify eligibility under this criterion, Indicate the result of the consultation:

- ☐ biological opinion from USFWS and/or NMFS that concludes that the action in question (taking into account the effects of your site's discharges and discharge-related activities) is not likely to jeopardize the continued existence of listed species, nor the destruction or adverse modification of critical habitat; or
- ☐ written concurrence from USFWS and/or NMFS with a finding that the site's discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat.

You must include copies of the correspondence between yourself and the USFWS and/or NMFS in your SWPPP and this NOI. ***[A basis statement supporting the selection of this criterion should identify the federal action agencie(s) involved, the field office/regional office(s) providing that consultation, any tracking numbers of identifiers associated with that consultation (e.g., IPaC number, PCTS number), and the date the consultation was completed.]***

☐ **F** Issuance of section 10 permit. Potential take is authorized through the issuance of a permit under section 10 of the ESA by the USFWS and/or NMFS, and this authorization addresses the effects of the site's discharges and discharge-related activities on ESA-listed species and designated critical habitat. You must include copies of the correspondence between yourself and the participating agencies in your SWPPP and your NOI. ***[A basis statement supporting the selection of this criterion should identify whether USFWS or NMFS or both agencies provided a section 10 permit, the field office/regional office(s) providing permit(s), any tracking numbers of identifiers associated with that consultation (e.g., IPaC number, PCTS number), and the date the permit was granted.]***

Provide a brief summary of the basis for criterion selection listed above *[the necessary content for a supportive basis statement is provided under the criterion you selected.]*.

____

____

IX. Historic Preservation

Are you installing any stormwater controls as described in Appendix E that require subsurface earth disturbance? (Appendix E, Step 1) ☐ YES ☐ NO

If yes, have prior surveys or evaluations conducted on the site have already determined historic properties do not exist, or that prior disturbances have precluded the existence of historic properties? (Appendix E, Step 2) ☐ YES ☐ NO

If no, have you determined that your installation of subsurface earth-disturbing stormwater controls will have no effect on historic properties? (Appendix E, Step 3) ☐ YES ☐ NO

If no, did the SHPO, THPO, or other tribal representative (whichever applies) respond to you within the 15 calendar days to indicate whether the subsurface earth disturbances caused by the installation of stormwater controls affect historic properties? (Appendix E, Step 4) ☐ YES ☐ NO

If yes, describe the nature of their response:

- ☐ Written indication that no historic properties will be affected by the installation of stormwater controls.
- ☐ Written indication that adverse effects to historic properties from the installation of stormwater controls can be mitigated by agreed upon actions.
- ☐ No agreement has been reached regarding measures to mitigate effects to historic properties from the installation of stormwater controls.
- ☐ Other: ____

X. Certification Information

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

First Name, Middle Initial, Last Name: |_|_|_|_|_|_|_|_|_|_|_|_|_| |_| |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|

Title: |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|

Signature: ____ Date: |_|_| / |_|_| / |_|_|_|_|

Email: |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|

Instructions for Completing EPA Form 3510-9

Notice of Intent for the 2017 NPDES Construction General Permit

NPDES Form Date (X/XX) This Form Replaces Form 3510-9 (02/12) Form Approved OMB No. 2040-0004

Who Must File an NOI Form

Under the provisions of the Clean Water Act, as amended (33 U.S.C. 1251 et. seq.; the Act), federal law prohibits stormwater discharges from certain construction activities to waters of the U.S. unless that discharge is covered under a National Pollutant Discharge Elimination System (NPDES) permit. Operators of construction sites where one or more acres are disturbed, smaller sites that are part of a larger common plan of development or sale where there is a cumulative disturbance of at least one acre, or any other site specifically designated by the Director, must obtain coverage under an NPDES general permit. For coverage under the 2017 CGP, each person, firm, public organization, or any other entity that meets either of the following criteria must file a Notice of Intent form: (1) they have operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or (2) they have day-to-day operational control of those activities at the project necessary to ensure compliance with the permit conditions. If you have questions about whether you need a NPDES stormwater permit, or if you need information to determine whether EPA or your state agency is the permitting authority, contact your EPA Regional Office.

Completing the Form

Obtain and read a copy of the 2017 CGP, viewable at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#cgp. To complete this form, type or print uppercase letters, in the appropriate areas only. Please place each character between the marks (abbreviate if necessary to stay within the number of characters allowed for each item). Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions on this form, telephone EPA's NOI Processing Center at (866) 352-7755. **Please submit the original document with signature in ink - do not send a photocopied signature.**

Section I. Approval to Use Paper NOI Form

You must indicate whether you have been granted a waiver from electronic reporting from the EPA Regional Office. Note that you are not authorized to use this paper NOI form unless the EPA Regional Office has approved its use. Where you have obtained approval to use this form, indicate the waiver that you have been granted, the name of the EPA staff person who granted the waiver, and the date that approval was provided.

See https://www.epa.gov/npdes/contact-us-stormwater#regional

for a list of EPA Regional Office contacts.

Section II. Permit Number

Provide the master permit number of the permit under which you are applying for coverage (see Appendix B of the general permit for the list of eligible master permit numbers)

Section III. Operator Information

Provide the legal name of the person, firm, public organization, or any other entity that operates the project described in this NOI. Refer to Appendix A of the permit for the definition of "operator". Indicate whether you are seeking coverage under this permit as a "federal operator" as defined in Appendix A.

Also provide a point of contact, the operator's mailing address, county, telephone number, and e-mail address (to be notified via e-mail of NOI approval when available). Correspondence for the NOI will be sent to this address.

If the NOI was prepared by someone other than the certifier (for example, if the NOI was prepared by the facility SWPPP contact or a consultant for the certifier's signature), include the full name, organization, phone number, and email address of the NOI preparer.

Section IV. Project/Site Information

Enter the official or legal name and complete street address, including city, state, ZIP code, and county or similar government subdivision of the project or site. If the project or site lacks a street address, indicate the general location of the site (e.g., Intersection of State Highways 61 and 34). Complete site information must be provided for permit coverage to be granted.

Provide the latitude and longitude of your facility in decimal degrees format. The latitude and longitude of your facility can be determined in several different ways, including through the use of global positioning system (GPS) receivers, U.S. Geological Survey (U.S.G.S.) topographic or quadrangle maps, and web-based siting tools, among others. For consistency, EPA requests that measurements be taken from the approximate center of the construction site. For linear construction sites, the measurement should be taken midpoint of the site. If known, enter the horizontal reference datum for your latitude and longitude. The horizontal reference datum is shown on the bottom left corner of USGS topographic maps; it is also available for GPS receivers.

Indicate whether the project is in Indian country lands or located on a property of religious or cultural significance to an Indian tribe, and if so, provide the name of the Indian tribe associated with the area of Indian country (including name of Indian reservation, if applicable), or if not in Indian country, provide the name of the Indian tribe associated with the property.

Enter the estimated construction start and completion dates using four digits for the year (i.e., 10/06/2012). Indicate to the nearest quarter acre the estimated area to be disturbed.

Select the estimated percentage of impervious area that will remain on the site at the completion of construction as a percent of the total site area. Impervious areas include, but are not limited to, any land surface with a low or no capacity for soil infiltration including, but not limited to, pavement, sidewalks, parking areas and driveways, packed gravel or soil, or rooftops.

This question can be answered by looking the site map in the SWPPP which shows where impervious surfaces will occur after construction is completed (see Part 7.2.4.b.vi).

Indicate the type of construction site, and if demolition is occurring, the age of the structure being demolished. Indicate whether the pre-development land use of the site was used for agriculture Appendix A defines "agricultural land" as cropland, grassland, rangeland, pasture, and other agricultural land, on which agricultural and forest-related products or livestock are produced and resource concerns may be addressed. Agricultural lands include cropped woodland, marshes, incidental areas included in the agricultural operation, and other types of agricultural land used for the production of livestock.

Indicate whether earth-disturbing activities have already commenced on your project/site. If earth-disturbing activities have commenced on your site because stormwater discharges from the site have been previously covered under a NPDES permit, you must provide the 2008 CGP NPDES ID or the NPDES permit number if coverage was under an individual permit.

Section V. Discharge Information

You must confirm that you understand that the CGP only authorizes the allowable stormwater discharges listed in Part 1.2.1 and the allowable non-stormwater discharges listed in Part 1.2.2. Any discharges not expressly authorized under the CGP are not covered by the CGP or the permit shield provision of the CWA Section 402(k) and they cannot become authorized or shielded by disclosure to EPA, state, or local authorities via the NOI to be covered by the permit or by any other means (e.g., in the SWPPP or during an inspection). If any discharges requiring NPDES permit coverage other than the allowable stormwater and non-stormwater discharges listed in Parts 1.2.1 and 1.2.2 will be discharged, they must either be eliminated or covered under another NPDES permit.

Indicate whether discharges from the site will enter into a municipal separate storm sewer system (MS4), as defined in Appendix A.

Also, indicate whether any waters of the U.S. exist within 50 feet from your site. Note that if "yes", you are required to comply with the requirement in Part 2.2.1 of the permit to provide natural buffers or equivalent erosion and sediment controls.

You must identify all the points of discharge from the site that discharge stormwater and/or authorized non-stormwater. Each point of discharge must be assigned a unique 3-digit ID (e.g., 001, 002, 003). You must also provide the latitude and longitude for each point of discharge from your facility. For each unique point of discharge you list, you must specify the name of the first water of the U.S. that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to. You must specify whether any waters of the U.S. that you discharge to are listed as "impaired" as defined in Appendix A, and the pollutants for which the water is impaired. You must identify any Total Maximum Daily Loads (TMDL) that have been completed for any of the waters of the U.S. that you discharge to. You must also provide information about the point of discharge latitude/longitude, including data source, the scale (if applicable), and the horizontal reference datum.

Indicate whether discharges from the site will enter into a water of the U.S. that is designated as a Tier 2, Tier 2.5, or Tier 3 water. A list of Tier 2, 2.5, and 3 waters is provided as Appendix F. If the answer is "yes", name all waters designated as Tier 2, Tier 2.5, or Tier 3 to which the site will discharge.

Section VI. Chemical Treatment Information

Indicate whether the site will use polymers, flocculants, or other treatment chemicals. Indicate whether the site will employ cationic treatment chemicals. If the answer is "yes" to either question, indicate which chemical(s) you will use. Note that you are not eligible for coverage under this permit to use cationic treatment chemicals unless you notify your applicable EPA Regional Office in advance and the EPA office authorizes coverage under this permit after you have included appropriate controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to a violation of water quality standards. If you have been authorized to use cationic treatment chemicals by your applicable EPA Regional Office, attach a copy of your authorization letter and include documentation of the appropriate controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to a violation of water quality standards. Examples of cationic treatment chemicals include, but are not limited to, cationic polyacrylamide (C-PAM), PolyDADMAC (POLYDIALLYLDIMETHYLAMMONIUM CHLORIDE), and chitosan.

Section VII. Stormwater Pollution Prevention Plan (SWPPP) Information

All sites eligible for coverage under this permit are required to prepare a SWPPP in advance of filing the NOI, in accordance with Part 7. Indicate whether the SWPPP has been prepared in advance of filing the NOI.

Indicate the street, city, state, and ZIP code where the SWPPP can be found. Indicate the contact information (name, organization, phone, and email) for the person who developed the SWPPP for this project.

Section VIII. Endangered Species Information

Using the instructions in Appendix D, indicate under which criterion (i.e., A, B, C, D, E, or F) of the permit the applicant is eligible with regard to protection of ESA-listed endangered and threatened species and designated critical habitat. A description of the basis for the criterion selected must also be provided.

If criterion B is selected, provide the NPDES Number for the other operator who had previously certified their eligibility for the CGP under criterion A, C, D, E, or F. The Tracking Number was assigned when the operator received coverage under this permit, and is included in the notice of authorization.

If criterion C is selected, you must attach copies of your site map. See Part 7.2.6 of the permit for information about what is required to be in your site map. You must also specify the federally-listed species and/or federally-designated critical habitat that are located in the "action area" of the project, and provide the distance between the construction site and any listed endangered species and/or their designated critical habitat.

If criterion D, E, or F is selected, attach copies of any communications between you and the U.S. Fish and Wildlife Service and National Marine Fisheries Service and identify the participating agencies and Field Offices/Regional Offices you worked with in the basis statement of this NOI.

Section IX. Historic Preservation

Use the instructions in Appendix E to complete the questions on the NOI form regarding historic preservation.

Section X. Certification Information

The NOI must be signed as follows:

Instructions for Completing EPA Form 3510-9

Notice of Intent for the 2017 NPDES Construction General Permit

NPDES Form Date (X/XX) This Form Replaces Form 3510-9 (02/12) Form Approved OMB No. 2040-0004

For a corporation: By a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means:

(i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or

For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this Part, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA). Include the name and title of the person signing the form and the date of signing. An unsigned or undated NOI form will not be considered eligible for permit coverage.

Modifying Your NOI

If after submitting your NOI you need to correct or update any fields on this NOI form, you may do so by submitting a paper modification form, which you can obtain at the following link: https://www.epa.gov/npdes/stormwater-discharges-construction-activities#ereporting

Paperwork Reduction Act Notice

Public reporting burden for this NOI is estimated to average 3.7 hours. This estimate includes time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may increase or reduce this burden to: Chief, Information Policy Branch 2136, U.S. Environmental Protection, Agency, 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460. Include the OMB control number on any correspondence. Do not send the completed form to this address.

Submitting Your Form

Submit your NOI form by mail to one of the following addresses:

For Regular U.S. Mail Delivery:
Stormwater Notice Processing Center
Mail Code 4203M, ATTN: 2017 CGP
U.S. EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460

For Overnight/Express Mail Delivery:
Stormwater Notice Processing Center
William Jefferson Clinton East Building - Room 7420
ATTN: 2017 CGP
U.S. EPA
1201 Constitution Avenue, NW
Washington, DC 20004

Visit this website for instructions on how to submit electronically:

https://www.epa.gov/npdes/stormwater-discharges-construction-activities#ereporting