BIOLOGICAL OPINION

FOR THE

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

MULTI-SECTOR GENERAL PERMIT

FOR STORMWATER DISCHARGES

ASSOCIATED WITH INDUSTRIAL ACTIVITY

(MSGP)

May 2015

U.S. Fish and Wildlife Service
Endangered Species Program
Division of Environmental Review
Falls Church, Virginia

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Abbreviations

BE – Biological Evaluation

BMP – Best Management Practices

Cu - Copper

CWA – Clean Water Act (33 USC 1342 et seq.)

EPA – Environmental Protection Agency

ELG – Effluent Limitation Guidelines

ESA – Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)

MSGP – Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity, or “the permit”

NOI – Notice of Intent to seek coverage under the permit

NPDES – National Pollutant Discharge Elimination System

NTU - Nephelometric Turbidity Units

OMB – Office of Management and Budget

Opinion – Biological Opinion

PAH – Polyaromatic hydrocarbons

PBFs – essential physical and biological features of designated critical habitat.

Permit – Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity

Service – U.S. Fish and Wildlife Service

Services – U. S. Fish and Wildlife Service and National Marine Fisheries Service

TSS – Total Suspended Solids

Zn - Zinc

INTRODUCTION

This document represents the U. S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) based on our review of the proposed reissuance of the Environmental Protection Agency’s (EPA) National Pollutant Discharge Elimination System Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (hereafter MSGP or “permit”), and its effects on listed species and designated critical habitat in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (ESA).

Your request for formal consultation was received on January 27, 2014. This Opinion is based on information provided in the January 27, 2014, Biological Evaluation (BE), additional information received February 26, and March 4, 6, and 12, 2014, and other sources of information as described below. A complete record of this consultation is on file at this Service’s headquarters office in Falls Church, Virginia.

CONSULTATION HISTORY

In the fall of 2012, EPA staff requested early coordination with the U.S. Fish and Wildlife Service and National Marine Fisheries Service (Services) prior to drafting a BE for the reissuance of the MSGP. Subsequent meetings and conference calls were also used to assist EPA in identifying any issues related to listed species and critical habitat that were likely to be raised with permit language and implementation prior to the submission of a draft permit to the Office of Management and Budget (OMB). The following timeline describes early coordination and informal consultation between EPA and the Services and identifies key points in the consultation process:

- September 2011. Initial meeting between EPA and the Services to discuss the proposed reissuance of the MSGP.
- November 20, 2011. Follow-up meeting between EPA and the Services. Initial discussion of previous permit cycle and preliminary criterion selection data represented by geographic area.
- January 2012 through July 22, 2012. Frequent meetings between EPA and the Services to discuss refinements to the permit language and issues to be addressed in the BE to reduce the potential for adverse effects to listed species and critical habitat. Examples of issues that were discussed include, but are not limited to the following:
    - Use of conservation measures, best management practices, and other measures to reduce potential adverse effects
    - Use of monitoring efforts to reduce potential adverse effects
    - Consideration of criterion selection errors from past permit cycles that may underestimate adverse effects
    - Consideration of monitoring data from past permit cycles that may provide insight on likelihood of anticipated future compliance with the proposed permit
    - Additional tools that EPA could implement to assist the MSGP applicants with their efforts to avoid criterion selection errors

  - EPA's oversight of the permit
- July 24, 2012. The EPA submitted the draft BE to the Services for review and comment.
- July 24, 2012. The EPA requested the Services provide supporting information regarding monitoring needs for their coordination with OMB during review of the draft permit.
- July 31, 2012. The Services submitted the requested supporting information to the EPA for demonstrating monitoring needs to OMB.
- September 30, 2012. Submission of Services' combined comments on the BE to EPA for consideration in finalizing the BE.
- January 27, 2014. The EPA submitted the final BE to the Services and requested initiation of formal consultation.
- February 26, 2014. The Service sent a letter to the EPA requesting additional information including: 1) a list of critical habitat designations covered under the permit; 2) determinations for listed species and critical habitat anticipated to be affected by the proposed action and descriptions of how the effects would be anticipated to occur; and 3) monitoring data for the last permit cycle.
- March 4, 2014. The EPA submitted their monitoring database.
- March 6, 2014. The EPA submitted a supplemental monitoring database file.
- March 12, 2014. The Service received a letter from the EPA clarifying critical habitat designations and determinations for listed species and critical habitat under the proposed action.
- April 11, 2014. The Service sent a letter to the EPA confirming all requested information had been received and formal consultation had been initiated as of March 12, 2014.
- June 19, 2014. The EPA submitted a revised draft of Appendix E (*Procedures Relating to Endangered Species Protection* and attached *E4 Criterion Selection Worksheet*) of the permit to the Services.
- July 28, 2014. The EPA amended the BE to include a representative compliance check on Criterion A facility proposals to reduce Criterion A selection errors in an email to the Services.
- December 22, 2014. The EPA emailed the Service to clarify coordination procedures with the Service during review of Criterion C facilities where the Service has indicated in writing that the coverage proposal does not appear to support rationale for coverage under Criterion C.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Under reissuance of MSGP or "permit", EPA proposes to authorize stormwater discharges associated with industrial activity from 30 sectors into waters of the United States over the permit period from 2015 to 2020. The EPA estimates the 2015 MSGP will reauthorize discharges from approximately 2,365 existing facilities and that an average of approximately 52 additional facilities will seek coverage under the MSGP each year totaling approximately 250 new facilities over the life of the 5-year permit.

The statutory authority for the proposed action is the National Pollution Discharge Elimination System (NPDES) of the Clean Water Act (33 USC §§ 1342 et seq.; CWA). The purpose of the proposed general permit is to provide an efficient manner for industrial facilities discharging stormwater (and specified non-stormwater) to waters of the United States to secure authorization for discharges. Requiring a CWA permit (either the MSGP or an individual permit) for these discharges provides EPA with the authority to enforce CWA requirements and provides the ability of citizens to sue for permit violations. In its permit, EPA reserved the right to modify or revoke and reissue this permit under 40 CFR 122.62.

The MSGP would provide NPDES permit coverage for stormwater discharges, certain allowable non-stormwater discharges, and discharge-associated activities for facilities where EPA is the NPDES permitting authority. In addition, the MSGP provides coverage for facilities in four States (Idaho, Massachusetts, New Hampshire, and New Mexico), the District of Columbia, Puerto Rico, Puerto Rico and other Pacific Territories (except the U.S. Virgin Islands), designated areas in Oklahoma and Texas, Tribal lands in 19 states, and facilities operated by federal operators in Colorado, Delaware, Vermont, and Washington. To be authorized to discharge under the MSGP a facility must[1]:

- Be located in a state, territory, or Indian country, or be a federal operator identified in Appendix C of the MSGP where EPA is the permitting authority;
- Meet the eligibility requirements described in permit;
- Select, design, install, and implement control measures in accordance with the permit to meet numeric and non-numeric effluent limits;
- Develop a Stormwater Pollution Prevention Plan (SWPPP) according to the requirements in Part 5 of the permit or update the existing SWPPP consistent with Part 5 prior to submitting the Notice of Intent to seek coverage under the permit (NOI) for coverage under the MSGP; and
- Submit a complete and accurate NOI in accordance with permit.

The 2015 MSGP has been modified from previous permits in an effort to strengthen protections to listed species and designated critical habitat (hereafter, "listed resources"). These modifications include: 1) revisions to the ESA eligibility criteria; 2) revisions to the procedures operators are required to implement prior to obtaining coverage to address potential adverse effects to listed resources; and 3) more clearly articulated, transparent and enforceable non-numeric and best management practice-based effluent limits.

The following sections summarize the proposed permit and pertinent details embedded in the permit fact sheets and appendices. More detailed information on implementation of the proposed permit can be found in the BE, addenda, and in the permit and is in the administrative record for this Opinion. A copy of the draft permit submitted for consultation was provided as an attachment to the BE, and is appended to this Opinion (Appendix A). In some instances, the information from the sections below was taken directly from the permit language and/or the BE in the interest of clarity.

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[1] Section 1.2.1 of the permit.

Types of Facilities Covered by the MSGP

EPA proposes to cover 10 broad categories of industrial activities under the MSGP, which have been categorized into 30 sectors (Table 1) and associated subsectors (Appendix B). The broad categories include:

- Category One (i): Facilities subject to federal stormwater effluent discharge standards in 40 CFR Parts 405-471
- Category Two (ii): Heavy manufacturing (e.g., paper mills, chemical plants, petroleum refineries, and steel mills and foundries)
- Category Three (iii): Coal and mineral mining and oil and gas exploration and processing
- Category Four (iv): Hazardous waste treatment, storage, or disposal facilities
- Category Five (v): Landfills, land application sites, and open dumps with industrial wastes
- Category Six (vi): Metal scrapyards, salvage yards, automobile junkyards, and battery reclaimers
- Category Seven (vii): Steam electric power generating plants
- Category Eight (viii): Transportation facilities that have vehicle maintenance, equipment cleaning, or airport deicing operations
- Category Nine (ix): Treatment works treating domestic sewage with a design flow of 1 million gallons a day or more
- Category Eleven (xi): Light manufacturing (e.g., food processing, printing and publishing, electronic and other electrical equipment manufacturing, and public warehousing and storage).

EPA reserves discretion to designate other industrial activities as eligible for coverage under the MSGP under Sector AD[2]. Some industrial facilities are covered under multiple sector or subsector categories, and these are identified by the facilities' Standard Industrial Classification (SIC) code(s) referenced when facilities seek coverage under the MSGP.

Types of Activities Covered by the MSGP

The MSGP covers three main categories of activities that could result in potential effects to species listed as threatened or endangered under the ESA and their designated critical habitats: stormwater discharges, certain allowable non-stormwater discharges, and discharge-related activities[3]. These activities are described in the following sections.

[2] Section 1.1.1 of the permit.
[3] Sections 1.1.2 and 1.1.3 of the Permit

Table 1. Primary industrial sectors eligible for coverage under the MSGP.

Primary Industrial Sector[a]	
Sector A: Timber products	Sector P: Land transportation and warehousing
Sector B: Paper and allied products	Sector Q: Water transportation
Sector C: Chemicals and allied products	Sector R: Ship and boat building and repairing yards
Sector D: Asphalt paving and roofing materials and lubricants	Sector S: Air transportation facilities
Sector E: Glass, clay, cement, concrete, and gypsum products	Sector T: Treatment works
Sector F: Primary metals	Sector U: Food and kindred products
Sector G: Metal mining (ore mining and dressing)	Sector V: Textile mills, apparel, and other fabric product manufacturing; leather and leather products
Sector H: Coal mines and coal mining-related facilities	Sector W: Furniture and fixtures
Sector I: Oil and gas extraction and refining	Sector X: Printing and publishing
Sector J: Mineral mining and dressing	Sector Y: Rubber, miscellaneous plastic products, and miscellaneous manufacturing industries
Sector K: Hazardous waste treatment, storage, or disposal facilities	Sector Z: Leather tanning and finishing
Sector L: Landfills, land application sites, and open dumps	Sector AA: Fabricated metal products
Sector M: Automobile salvage yards	Sector AB: Transportation equipment, industrial or commercial machinery
Sector N: Scrap recycling facilities	Sector AC: Electronic, electrical, photographic, and optical goods
Sector O: Steam electric generating facilities	Sector AD: Non-classified facilities

[a]Subsector activities are identified in Appendix D of the MSGP

Allowable Stormwater Discharges

The MSGP is primarily intended to cover stormwater discharges from the industrial sectors listed above into the Nation's receiving waters in locations and for facilities where EPA has retained permitting jurisdiction and has made the MSGP available for coverage. The receiving waters are defined as the first waters of the United States that are discharged into, or, for discharges that enter a storm sewer system or other water body prior to discharge, the first waters of the United States discharged to by the storm sewer system or water body. The BE notes that typical industrial activities that may contribute to pollutants in stormwater include: loading and unloading operations, outdoor storage, outdoor process activities, dust or particulate generating processes, and waste management. To reduce the discharge of pollutants in stormwater from industrial activity into receiving waters, there are certain requirements that apply to the discharges. The following stormwater discharges will be authorized under the permit:

- Stormwater discharges associated with industrial activity for any primary industrial activities and co-located industrial activities (as defined in the permit);
- Discharges designated by EPA as needing a stormwater permit as provided in sector AD of the MSGP;
- Discharges that are not otherwise required to obtain an NPDES permit but are comingled with MSGP-authorized discharges (e.g., condensate from air conditioners); and
- Discharges subject to the national stormwater-specific effluent limitations guidelines[4] (discussed later in this section).

Allowable Non-Stormwater Discharges

Certain non-stormwater discharges are authorized under the MSGP, provided that all discharges comply with the effluent limitations as described at Part 2 of the MSGP, *Control Measures and Effluent Limits*. The allowable non-stormwater discharges are:

- discharges from fire-fighting activities;
- fire hydrant flushings;
- potable water, including water line flushings;
- uncontaminated condensate from air conditioners, coolers, and other compressors and from the outside storage of refrigerated gases or liquids;
- irrigation drainage;
- landscape watering provided all pesticides, herbicides, and fertilizers have been applied in accordance with the approved labeling;
- pavement wash waters where no detergents or hazardous cleaning products are used (e.g., bleach, hydrofluoric acid, muriatic acid, sodium hydroxide, nonylphenols), and the wash waters do not come into contact with oil and grease deposits or any other toxic or hazardous materials (unless cleaned up using dry clean-up methods);
- routine external building washdown / power washwater that does not use detergents or hazardous cleaning products, (such as those containing bleach, hydrofluoric acid, muriatic acid, sodium hydroxide, nonylphenols);
- uncontaminated ground water or spring water;
- foundation or footing drains where flows are not contaminated with process materials;

[4] Table 1-1 in the Permit

- incidental windblown mist from cooling towers that collects on rooftops or adjacent portions of the facility, but not intentional discharges from the cooling tower (e.g., "piped" cooling tower blowdown or drains); and

- discharges from the spray down of lumber and wood product storage yards where no chemical additives are used in the spray-down waters and no chemicals are applied to the wood during storage (applicable only to Sector A facilities provided the non- stormwater component of the discharge is in compliance with the non-numeric effluent limits requirements in the permit at *Part 2.1.2 Non-Numeric Technology-Based Effluent Limits (BPT/BAT/BCT)*).

Allowable discharges (both stormwater and non-stormwater discharges) commingled with a discharge authorized by a different NPDES permit and/or a discharge that does not require NPDES permit authorization are also authorized under the MSGP.

Discharge-Related Activities[5]

Discharge-related activities are any activities that cause, contribute to, or result in stormwater and allowable non-stormwater point source discharges, and measures such as the siting, construction, and operation of stormwater controls to control, reduce, or prevent pollutants from being discharged. The majority of the facilities that are anticipated to seek coverage under the MSGP are not expected to propose discharge-related activities, as many of the facilities are existing facilities with ongoing discharges covered under previous permit cycles. However, new facilities, facilities seeking new or expanded coverage, or a limited number of existing facilities may plan to install new controls or engage in other discharge-related activities. Thus, this category of activities is also included in the MSGP.

Activities not Covered by the MSGP

Any discharges not expressly authorized as summarized above[6] are not within the scope of the pollutants addressed by the MSGP and are not included as part of the proposed action. To provide greater clarity, the EPA has also defined activities and discharges that are explicitly not covered by the MSGP. Some of these activities may require an individual permit or other form of alternative permit, or, in some cases, no permit would be required. These activities are not part of the proposed action.

Procedures for Addressing Listed Species and Critical Habitat in Permit Coverage Requests[7]

As noted above, coverage under the MSGP is available only for stormwater discharges, allowable non-stormwater discharges, and stormwater discharge-related activities. The MSGP specifies that facilities seeking coverage must ensure the effects of the discharges are not likely to adversely affect any species that are federally listed as endangered or threatened ("listed")

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[5] See Part 1.1.4.5 of the permit,
[6] Described in detail in parts 1.1.2 through 1.1.4 of the MSGP
[7] Section 1.1.4.5 of the Permit

under the ESA and are not likely to adversely affect habitat that is federally designated as critical habitat under the ESA. Alternatively, facilities can qualify for coverage under another operator's permit coverage, or where effects of the allowable discharges and discharge-associated activities have previously been the subject of an ESA section 7 consultation or an ESA Section 10 permit. To demonstrate that the facility is eligible for coverage under the MSGP, a facility operator must determine which of five ESA eligibility criteria applies to the facility's discharge(s), allowable non-stormwater discharge(s), and/or discharge-related activities. The facility operator must then submit an NOI to apply for coverage under the MSGP. The following sections describe the ESA eligibility criteria and the proposed process for facility operators to select an appropriate criterion while seeking coverage under the 2015 MSGP.

ESA Eligibility Criteria

The facility operators are directed to demonstrate their eligibility under one of the ESA criteria by following instructions outlined in Appendix E to the permit: *Procedures Relating to Endangered Species Protection,* which includes an "*E4 Criterion Selection worksheet"* (Appendix E of the permit and Appendix C of this Opinion). This form guides a permit applicant in selecting the most appropriate eligibility criterion their facility meets or will meet based on information such as existing documentation, facility location, and overlap of listed species/critical habitat with the area of potential effects (or "action area") of their discharge(s) (and discharge-related activities, where proposed). The ESA eligibility criteria for Endangered Species Protection are shown in Table 2 below.

Table 2. ESA eligibility criteria as defined in the MSGP (Note: *The text below is reproduced from Appendix E of the draft permit (with minimal edits based on coordination with EPA), but reorganized into table format for clarity in the Opinion.*

Criterion	**Additional Considerations**
A: No federally-listed threatened or endangered species or their designated critical habitat(s) are likely to occur in the "action area" as defined in Appendix A (of the MSGP).	To certify eligibility under this criterion, the permit applicant must use the *E.4 Criterion Selection worksheet*. The permit applicant must also provide a description of the basis for the criterion the permit applicant selected on the NOI form and provide documentation supporting the eligibility determination in the SWPPP.
B: The industrial activity's discharges and discharge-related activities were already addressed in another operator's valid certification of eligibility for the action area under this permit 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" (e.g., due to a new species listing or critical habitat designation).	To certify eligibility under this criterion, there must be no lapse of NPDES permit coverage in the other operator's certification. The permit applicant must also comply with any terms and conditions imposed under the other operator's valid certification of eligibility to ensure that the discharges and discharge-related activities are protective of listed species and/or critical habitat. To certify eligibility under this criterion, the permit applicant must use the *E.4 Criterion Selection worksheet*. The NOI must include the NPDES ID from the other operator's notification of authorization under this permit, and a description of the basis for the criterion selected on the NOI form, including the eligibility criterion selected by the other operator's certification. The permit applicant must also provide any documentation in the SWPPP that supports the other operator's eligibility determination, as well as any terms and conditions imposed under the eligibility requirements that applied under the prior certification.

C: Federally-listed threatened or endangered species or their designated critical habitat(s) are likely to occur in or near the facility's "action area," and the industrial activity's discharges and discharge-related activities are not likely to adversely affect listed threatened or endangered species or critical habitat.	To certify eligibility under this criterion, the permit applicant must use the *E.4 Criterion Selection worksheet*. At least 30 days prior to filing an NOI for permit coverage, the permit applicant must submit to EPA a completed Criterion C Eligibility Form. After evaluation of this form, EPA may require additional controls that the permit applicant must implement to avoid or eliminate adverse effects on listed species and critical habitat from discharges and discharge-related activities. The permit applicant may submit a NOI for permit coverage 30 days after submitting the form. The permit applicant must provide a description of the basis for the criterion the permit applicant selected on the NOI form and provide documentation supporting the applicant's eligibility determination in the SWPPP.
D: Consultation between a federal agency and the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service under section 7 of the ESA has been concluded.	Consultations can be either formal or informal, and would have occurred only as a result of a separate federal action (e.g., during application for an individual wastewater discharge permit or the issuance of a wetlands dredge and fill permit), and consultation must have addressed the effects of the industrial activity's discharges and discharge-related activities on all federally-listed threatened or endangered species and all federally-designated critical habitat. The result of this consultation must be one of the following: A biological opinion that concludes that the action in question (taking into account the effects of the facility's discharges and discharge-related activities) is not likely to jeopardize the continued existence of listed species, nor result in the destruction or adverse modification of critical habitat; a biological opinion that concludes that the action is likely to jeopardize listed species or to result in the destruction or adverse modification of critical habitat with recommended reasonable and prudent alternatives that the facility is implementing; or written concurrence from the applicable Service(s) with a finding that the facility's discharges and discharge-related activities are not likely to adversely affect federally-listed species or federally-designated critical habitat. To certify eligibility under this criterion, the permit applicant must use the *E.4 Criterion Selection worksheet.* The permit applicant must verify that the consultation remains valid, in accordance with 50 CFR §402.16. If reinitiation of consultation is required, in order to be eligible under this Criterion the permit applicant must ensure the consultation is reinitiated and the result of the consultation must be consistent with (i), (ii), or (iii) above. If eligible, the permit applicant must also provide supporting documentation for this determination in the NOI and SWPPP, including the Biological Opinion (or PCTS tracking number) or concurrence letter.
E: Industrial activities are authorized through the issuance of a permit under section 10 of the ESA, and this authorization addresses the effects of the facility's discharges and discharge-related activities on federally-listed species and federally-designated critical habitat.	To certify eligibility under this criterion, the permit applicant must use the *E.4 Criterion Selection worksheet.* The permit applicant must also provide supporting documentation for the determination in the NOI and SWPPP, including a copy of the permit from the Services.

[a] Some of the criteria have been relabeled from previous permit cycles. Using this format: 2015 Criteria (2008 Criteria): 2015 B (2008 F); 2015 C (2008 D & E); 2015 D (2008 B), and 2015 E (2008 C). Criterion A remains the same in both past and proposed permit cycles.

Eligibility Criteria Selection Procedure

As the facility operators prepare to seek coverage under the MSGP, they must use the *E.4 Criterion Selection workshee*t to guide them in determining which ESA criterion most appropriately applies to their facility. The criterion selection process directs facility operators to consider first whether the facility is eligible for MSGP coverage under Criterion B, Criterion D, or Criterion E, as described above. When considering these criteria, the operator must ensure the facility's stormwater discharges (and associated pollutants) were adequately addressed in the analyses associated with each of these criteria. For example, if a facility is selecting Criterion D based on an earlier, separate federal nexus with a completed ESA section 7 consultation for construction of a facility, the operator must confirm that effects of the stormwater discharge were considered during the section 7 consultation. If stormwater discharges were not considered in the suite of effects evaluated in the section 7 consultation, selection of Criterion D would not be appropriate. If an operator can demonstrate the facility is eligible for coverage under Criterion B, D, or E, the operator can proceed with submittal of an NOI.

Should the applicant be unable to meet either of Criteria B, D, or E, the operator must then determine whether Criteria A or C would apply to the facility. To do so, the applicant must first determine the extent of the action area of the facility to evaluate whether effects from the proposed activities overlap with endangered or threatened species or their designated critical habitats. The action area of the facility includes all areas potentially affected directly or indirectly by the stormwater discharges, allowable non-stormwater discharges, and any proposed discharge-related activities[8] and not merely the immediate area (e.g., mixing zone) involved in the action. This area includes all waterbodies or downstream/down-current reaches within waterbodies that are reasonably expected to receive pollutants from these sources. Once the extent of the action area is determined for the facility, the applicant must request a species list of threatened and/or endangered species and designated critical habitat from the Service, as described by the permit. If the species and critical habitat list indicates no listed resources are present in the action area of the facility, the operator may select Criterion A, and proceed with submittal of an NOI.

If the applicant is unable to certify there is no overlap between their action area and any threatened or endangered species or their designated critical habitats (i.e., if facility discharges are not eligible under Criterion A), the applicant must complete the Criterion C Eligibility Form (hereafter, "Eligibility Form") and submit it to EPA. This Eligibility Form is a tool that is used to assist the operator in making a preliminary determination of whether listed species or critical habitat may be exposed to discharges and/or discharge-related activities, and whether such exposures would be likely to adversely affect listed threatened or endangered species or their designated critical habitats. If the applicant determines listed resources may be exposed to discharge pollutants, the form requires the applicant to evaluate discharge effects and verify that facility operators will implement controls and other measures to avoid adverse effects.

If an operator determines the facility is likely to be eligible under Criterion C, the completed Eligibility Form must be submitted to EPA at least 30 days prior to the submission of a NOI.

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[8] e.g., upland areas associated with installation of and operation of stormwater control measures

Once the Eligibility Form has been received, EPA will review it for completeness and forward to the appropriate Service(s) Regional or Field Office[9] (RO/FO) within 5 business days for consideration. If either of the Services requests additional time or information to complete review of the proposal, EPA will temporarily stop the clock and notify the operator of any additional information requests or requirements, as needed, when they are identified. For example, in some cases, a Service reviewer may request a SWPPP (or link to a SWPPP, as available) to supplement review of the Eligibility Form.

Once the Eligibility Form has been submitted to the Service RO/FOs, reviewers will be provided 25 days (or a time extension, if requested) to respond if they have additional information needs, or if they have concerns that a proposal for coverage has not demonstrated sufficient measures in the Eligibility Form or SWPPP (if requested) to avoid adverse effects to listed species or their designated critical habitats. If no response or request for additional review time is received within the 25-day time period, EPA will assume that the Service has no objection to the use of Criterion C for coverage of the facility under the MSGP, and will proceed accordingly (although questions or concerns can be raised about listed resources or other Service trust resources until the end of the NOI review period, as described below).

If, during review of a Eligibility Form, a Service reviewer responds in writing that the information submitted in the review package may not support the rationale for coverage under Criterion C for listed species under the Service's jurisdiction, EPA will coordinate with the relevant Service field office to identify the appropriate controls or other additional measures in the facility's SWPPP that are sufficient to support a "may affect, not likely to adversely affect" determination for the facility's activities that would be covered by the permit. In deciding whether to provide authorization to discharge under the MSGP, EPA will ensure one of the following is met:

i. Additional information is provided that addresses the Service's concerns and the Service subsequently agrees that coverage under Criterion C is appropriate;

ii. Additional measures are included in the SWPPP that would address the concerns raised during Service review;

iii. Changes to the facility's proposal are made to address the Service's concerns; or

iv. The Service subsequently determines no changes are necessary to support a "may affect, not likely to adversely affect" determination.

In making the eligibility determination, EPA will rely on the Services' expertise.

Permittees must comply with any applicable terms, conditions, or other requirements developed in the process of meeting these eligibility criteria to remain eligible for coverage under the

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[9] Contact information for each Service Regional or Field Office has been forwarded to EPA to ensure timely electronic submission of the Criteria C Eligibility Forms.

MSGP. The Eligibility Form and any additional documentation related to these requirements must be kept onsite as part of the SWPPP. The operator may proceed with submittal of an NOI 30 days after submitting the Eligibility Form.

Submitting a Notice of Intent (NOI)[10]

As of the date of this Opinion, the EPA is currently in the process of transitioning their NOI submission system to a fully on-line system (the Integrated Compliance Information System, or ICIS) using electronic NOIs. EPA anticipates the use of this system for the MSGP will improve and streamline the coverage application process, as well as provide for better oversight capabilities for EPA. To be considered complete, the NOI must contain all the required information supporting the selected ESA criterion (as well as other non-ESA information required for the permit). A sample copy of the NOI form is included as Appendix D to this Opinion. The NOI serves as the facility operator's certification that that the discharges are eligible for coverage according to the requirements of the MSGP. The NOI specifically describes:

- Industrial activities and associated discharges for the subject facility;
- Onsite industrial activities exposed to stormwater, including potential spill and leak areas;
- Pollutants or pollutant constituents associated with each industrial activity exposed to stormwater that could be discharged in stormwater and/or any authorized non-stormwater;
- Stormwater control measures facility operators employ to comply with the non-numeric technology- based effluent limits, and any other measures taken to comply with the requirements in MSGP Part 2.2 (Water Quality -Based Effluent Limitations); and
- Schedule for good housekeeping and maintenance and schedule for all required inspections.

Development of a SWPPP

Prior to submitting the NOI for coverage under the MSGP, the facility operators must develop a SWPPP[11] or update their existing SWPPP. If facility operators choose to post the SWPPP on the Internet according to Part 5.4.1 of the permit, the URL must be included on the NOI form and this URL must directly link to the SWPPP (not just the corporate or facility homepage). If the SWPPP is not posted online, additional facility information from the SWPPP must be entered into the NOI. Once the SWPPP is complete and all other permit eligibility requirements are met, a complete and accurate NOI may be submitted to EPA. NOIs for coverage under the MSGP must be submitted by the appropriate deadline described below. Discharges are not authorized if the NOI is incomplete or inaccurate or if the facility was never eligible for permit coverage.

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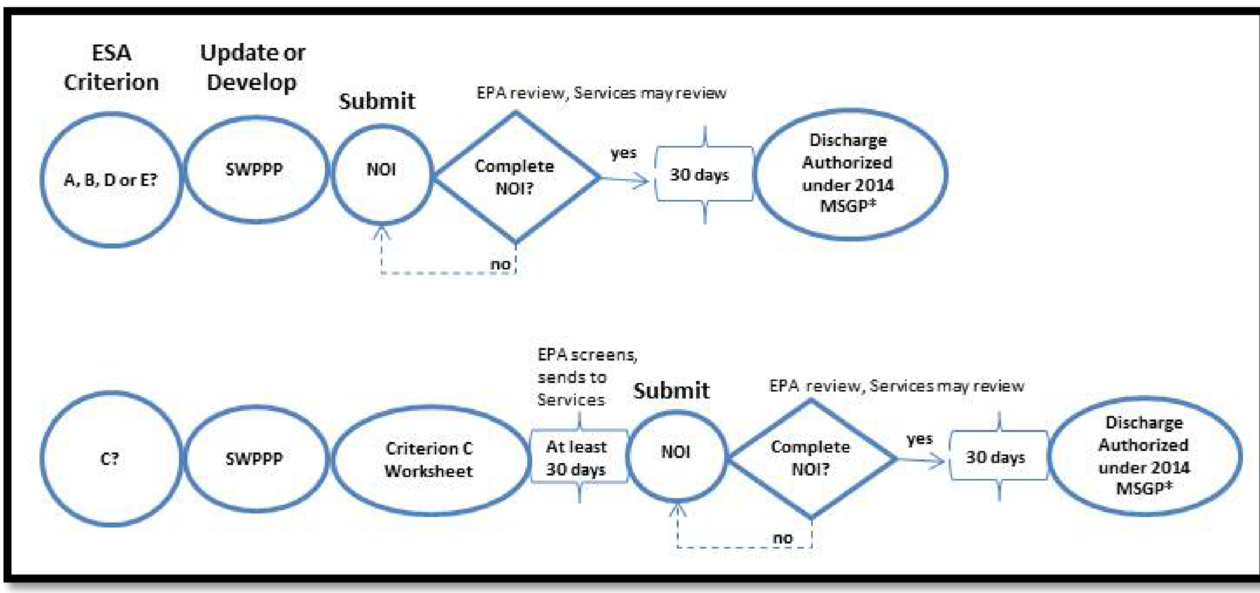
[10] Part 1.2.1.1 and 1.2.1.3 of the permit.

[11] Detailed information on development of the SWPPP and all information to be included therein is described in the permit.

Timelines for Seeking Coverage under the New Permit

All facilities seeking coverage under the 2015 permit are required to submit their NOIs according to an established timeframe, with separate deadlines for existing and new dischargers. Existing dischargers that were authorized for coverage under the 2008 MSGP must submit their NOIs no later than 90 days after the permit is issued (projected to be early summer 2015). New dischargers and existing dischargers that were not authorized for coverage under the 2008 MSGP must submit NOIs at least 30 days prior to commencing discharge. New owners/operators of an existing discharger where the discharge is authorized under the 2015 MSGP must submit an NOI at least 30 days prior to the date of the transfer of ownership/operations. Finally, other eligible facilities (i.e., facilities that commenced discharging prior to the issuance of the 2015 MSGP but are/were not covered by any type of NPDES permit) must submit their NOIs immediately per EPA's permit to minimize the time that unauthorized discharges would occur. In each of these cases, coverage would begin 30 days after EPA notifies the applicant that a complete NOI has been received (unless EPA notifies that applicant that authorization has been denied or delayed). A timeline integrating the ESA criterion certification process and the NOI submission process is provided in Figure 1 below.

Figure 1. Preparation, submittal, and approval sequence for documents required for coverage under the 2015 MSGP



The majority of the facilities anticipated to seek coverage under the 2015 MSGP are existing dischargers; thus, most of the requests for coverage (i.e., via NOI submissions) are expected to occur within the first 3 months after issuance of the MSGP, and are administratively covered under the 2008 permit during this time in accordance with the Administrative Procedure Act and 40 CFR 122.6. If a facility was authorized to discharge under the MSGP prior to its expiration date, any discharges authorized under this permit will automatically remain covered by this permit until the earliest of:

- Authorization for coverage under a reissued permit or a replacement version of the MSGP following the timely submittal of a complete and accurate NOI requesting coverage under the new permit; or
- Submittal of a Notice Of Termination of coverage; or
- Issuance of an individual permit for the facility's discharges; or
- A formal permit decision by EPA not to reissue this general permit, at which time EPA will identify a reasonable time period for covered dischargers to seek coverage under an alternative general permit or an individual permit. Coverage under the MSGP will cease at the end of this time period.

If facility operators fail to submit a timely NOI for coverage under a reissued or replacement permit, the coverage will terminate on the date that the NOI was due, and discharges from the industrial activities will continue to be unauthorized under the CWA until they are covered by this or a different NPDES permit. EPA may take enforcement action for any unpermitted discharges that occur between the commencement of discharging and discharge authorization. Enforcement actions are not part of the proposed action.

After submission of the NOI, the operator will receive notice their discharges are authorized unless EPA provides notice that coverage has been delayed or denied. EPA may choose to interrupt or postpone initiation of coverage during this timeframe for a number of reasons, including, but not limited to: requests to the operator for additional information, requirements for additional measures or controls, and suggested and/or recommended changes in permit type (e.g., to an individual or other alternative permit), as applicable. As noted above, the Services have the opportunity to provide input to the request for coverage until the end of the 30-day NOI review period. As NOIs are submitted to EPA, notification of submittals will be automatically forwarded to Service's ROs/FOs that have requested the opportunity to review the NOIs. This automated notification process will also allow Service's ROs/FOs the opportunity to review NOIs that are seeking coverage under other criteria besides Criterion C.

Control Measures and Effluent Limits[12]

Facility operators must select, design, install, and implement control measures (including, but not limited to, best management practices) to minimize effects to water quality and adverse effects to listed species and critical habitat. In the technology-based limits included in the MSGP, the term "minimize" means reduce and/or eliminate to the extent achievable using control measures (including best management practices) that are technologically available and economically practicable and achievable in light of best industry practice.[13]

There are additional considerations for new dischargers under the MSGP. A new discharger is defined as a facility: 1) from which there is a discharge; 2) that did not commence the discharge

[12] Part 2.0 of the Permit
[13] Part 2.0 of the permit

at a particular site prior to August 13, 1979; 3) which is not a new source;and 4) which has never received a final effective NPDES permit for discharges at that site. The MSGP places additional limitations on new discharges to receiving waters that are identified as impaired or of high water quality.

New dischargers are not eligible for coverage if EPA determines the discharges will not meet any applicable water quality standard prior to authorizing under this permit. In such cases, EPA may notify the facility that an individual permit application is necessary. However, EPA may authorize coverage under the MSGP if the facility includes appropriate controls and implementation procedures designed to ensure the discharge will meet water quality standards. In the absence of information demonstrating otherwise, EPA expects that compliance with the stormwater control requirements of this permit, including the requirements applicable to such discharges, will meet applicable water quality standards.

Water Quality Standards

Water Quality Standards define the goals for a waterbody by designating its uses, setting numeric and narrative criteria to protect those uses, and establishing provisions such as antidegradation policies to protect waterbodies from pollutants. EPA expects that if receiving waters continue to meet Water Quality Standards, exposures of listed species and critical habitat to hazardous concentrations of stormwater pollutants will have been avoided or limited. To this end, the MSGP employs effluent limit guidelines, water quality benchmarks, and SWPPPs to prevent stormwater and permitted non-stormwater discharges from creating conditions which do not meet Water Quality Standards. Effluent limit guidelines are sector-specific pollutant discharge concentrations based on the ability of technological controls (e.g., Best Management Practices [BMPs] and control measures described in SWPPPs) to control the amount of pollutant in stormwater discharges. Water quality benchmarks are based on national recommended water quality criteria, and are a level of concern at which a stormwater discharge could potentially cause or contribute to an impairment of water quality standards.

A facility's discharge must be controlled as necessary to meet applicable water quality standards. EPA expects that compliance with the conditions in this permit will control discharges as necessary to meet this goal. If, at any time, a facility operator becomes aware, or EPA determines, that the discharge does not meet applicable water quality standards, the facility operator must take corrective action (described in a subsequent section) and document the corrective actions taken. The facility must also comply with any additional requirements that the state or tribe requires (per Part 9 of the MSGP).

Control Measures[14]

The MSGP directs facilities to evaluate selection and design considerations when determining appropriate controls[15] for the facility's discharges, as well as to meet the specified limits

[14] Part 2.1 of the permit
[15] Sector and pollutant source-specific control measures were developed by EPA for the 2008 MSGP. These are found at http://cfpub1.epa.gov/npdes/stormwater/swsectors.cfm.

described in the permit (i.e., non-numeric effluent limits, applicable effluent limitations guidelines, and water quality-based effluent limitations). If control measures are not achieving their intended effect of minimizing pollutant discharges, facility operators must modify the control measures for their facilities in accordance with specified corrective action requirements described in the permit. In particular, facility operators are directed to consider a variety of measures, which include, but are not limited to:

- measures that prevent exposure to contaminants
- combinations of controls
- minimization of impervious surfaces
- good housekeeping practices
- maintenance of control measures
- spill prevention and response measures
- erosion and sediment controls

Additionally, all employees who work in areas where industrial materials or activities are exposed to stormwater, or who are responsible for implementing activities necessary to meet the conditions of this permit must be provided appropriate training. (For additional measures, see Part 8 of the MSGP; EPA also provides facts sheets for the applicants that clarify sector-specific controls). Additional details related to consideration and implementation of controls is found in the permit.

Sector Specific Requirements

The MSGP outlines a number of sector-specific requirements with which facility operators must comply that are associated with the facility's primary industrial activity and any co-located industrial activities. These requirements are in addition to any requirements specified elsewhere in the MSGP. Part 8 is organized by individual sectors to allow permit applicants to focus on only those requirements that apply to their facility. These measures are listed in the permit and are summarized in Appendex E of this Opinion.

Numeric Effluent Limitations Based on Effluent Limitations Guidelines[16]

If a facility is in an industrial category subject to one of the effluent limitations guidelines identified in the permit, facility discharges must meet the corresponding effluent limits as described in the permit. These effluent limits apply to the following regulated activities:

[16] Part 2.1.3 of the Permit

- Discharges resulting from spray down or intentional wetting of logs at wet deck storage areas
- Runoff from phosphate fertilizer manufacturing facilities that comes into contact with any raw materials, finished product, by-products or waste products
- Runoff from asphalt emulsion facilities
- Runoff from material storage piles at cement manufacturing facilities
- Mine dewatering discharges at crushed stone, construction sand and gravel, or industrial sand mining facilities
- Runoff from hazardous waste landfills
- Runoff from non-hazardous waste landfills
- Runoff from coal storage piles at steam electric generating facilities
- Existing and new primary airports with 1,000 or more annual jet departures that discharge wastewater associated with airfield pavement deicing that contains urea commingled with stormwater

Water Quality-Based Effluent Limitations[17]

The MSGP includes a narrative water quality-based effluent limitation that discharges must be "controlled as necessary to meet applicable water quality standards." EPA may also impose additional water quality-based limitations on a site-specific basis, or require the facility to obtain coverage under an individual permit, if information in the NOI, required reports, or from other sources indicates that the discharges are not controlled as necessary to meet applicable water quality standards.

Discharges to Water Quality-Impaired Waters[18]

A facility will be considered to discharge to an impaired water if the first water of the United States discharged to 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 total maximum daily load (TMDL). For discharges that enter a storm sewer system prior to discharge, the first water of the United States discharged to is the waterbody that receives the stormwater discharge from the storm sewer system.

If a facility discharges to an impaired water with an EPA approved or established TMDL, EPA will inform the facility operators 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. If a facility discharges to an

[17] Section 2.2
[18] Part 2.2.2 of the permit

impaired water without an EPA approved or established TMDL, facility operators are still required to comply with Part 2.2.1 of the permit, and must comply with the corresponding monitoring requirements. This provision also applies to situations where EPA determines that the discharge is not controlled sufficiently to meet water quality standards in a downstream water segment, even if the discharge is to a receiving waterbody that is not specifically identified on a Section 303(d) list.

If the authorization to discharge under this permit relied on Part 1.1.4.8 for a new discharge to an impaired water, facility operators must implement and maintain any control measures or conditions on the site that enabled the facility to become eligible under Part 1.1.4.8, and modify such measures or conditions as necessary pursuant to any corresponding corrective actions. The facility is also required to comply with Part 2.2.1 and the monitoring requirements of Parts 6.2.4.

The MSGP states that in some cases, a new discharger discharging to an impaired receiving waterbody[19] is eligible for coverage under the permit. In these cases, the discharger must either: prevent all exposure to stormwater of the pollutant(s) for which the waterbody is impaired; demonstrate that the pollutant(s) for which the waterbody is impaired is not present at the site; or demonstrate to EPA that the facility's discharge is expected to meet applicable water quality standards. A facility is eligible if the EPA Regional Office fails to respond within 30 days of data submission or provides an affirmative determination that the discharge will meet applicable water quality standards. Both the supporting documentation for the facility's rationale and the EPA's determination (if provided) must be maintained onsite with the SWPPP.

Discharges to Tier 2 or Tier 2.5 Waters

If the facility is a new discharger, or an existing discharger required to notify EPA of an increased discharge consistent with Part 7.7 (i.e., a "planned changes" report), and discharges directly to waters designated by a state or tribe as Tier 2 or Tier 2.5 for antidegradation purposes under 40 CFR 131.12(a), in the absence of information demonstrating otherwise, EPA expects that compliance with the stormwater control requirements of this permit will result in discharges that will not lower the water quality of the applicable water. However, EPA may notify facility operators that additional analyses, control measures, or other permit conditions are necessary to comply with the applicable antidegradation requirements, or that an individual permit application is necessary.

New dischargers are authorized to discharge to Tier 2[20] or Tier 2.5 waters provided the discharge does not lower the water quality of the receiving water. New dischargers are not eligible to

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[19] A facility will be considered to discharge to an impaired water if the receiving water has been 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 total maximum daily load (TMDL).

[20] Tier 2 waters are characterized as having water quality that exceeds the levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water. Tier 2.5 waters are those waters designated by states or tribes as requiring a level of protection equal to and above that given to Tier 2 waters, but less than that given Tier 3 waters. States have special requirements for these waters. Tier 3 waters are identified by states as having high

discharge to Tier 3 waters. A list of Tier 2, Tier 2.5 and Tier 3 waters is provided in Appendix L of the MSGP. These waters are identified for antidegradation purposes, pursuant to 40 CFR 131.12(a).

Inspections and Monitoring Requirements

The MSGP outlines specific inspection and monitoring requirements that facilities must follow once coverage has been granted. These requirements are specified in the permit, and are summarized below (see Appendix A for more detail).

Inspections

The MSGP requires facility operators to conduct quarterly inspections of the facility during normal facility operating hours by qualified personnel. Inspections are intended to ensure that exposure to pollutants is avoided or corrected, and focuses on locations of potential exposure (e.g., storage locations, discharge points) as well as areas where previous spills or leaks have been observed. Some facilities may be required to monitor more frequently based on the use of certain types of equipment, processes and/or stormwater control measures, or where areas of the facility may have significant activities and/or materials exposed to stormwater.

The permit notes that at least one of the routine inspections must be conducted during a period when a stormwater discharge is occurring. Inspectors must consider the results of visual and analytical monitoring (if any) for the past year when planning and conducting inspections.

Inspections should focus on and document instances where contaminants (e.g., industrial materials, residue or trash) may have or could come into contact with stormwater, leaks or spills have occurred, and offsite tracking of materials or sediment has occurred. Inspections should also document any control measures needing replacement, maintenance or repair. Control measures should also be inspected to determine whether the facility is complying with effluent limits. At least one inspection must be conducted during a stormwater discharge to ensure control measures are functioning correctly. Discharge points must also be observed during the inspection. If such discharge locations are inaccessible, the permit notes that nearby downstream locations must be inspected.

The MSGP allows for certain exceptions to routine inspections. For example, routine inspections are not required at facilities that are inactive and unstaffed as long as there are no industrial materials or activities exposed to stormwater. Such facilities are only required to conduct an annual site inspection. If the facility is already covered under the permit and the facility has changed from active to inactive and unstaffed, facility operators must modify the NOI to reflect the changed status, and the facility must maintain a statement to this effect in the SWPPP. If circumstances change and industrial materials or activities become exposed to stormwater or the facility becomes active and/or staffed, this exception no longer applies, and the permit requires that facility operators must immediately resume routine facility inspections.

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quality waters constituting an Outstanding Natural Resource Water (ONRW), such as waters of National Parks and State Parks, wildlife refuges, and waters of exceptional recreational or ecological significance.

Additionally inactive and unstaffed facilities covered under Sectors G (Metal Mining), H (Coal Mines and Coal Mining-Related Facilities), and J (Non-Metallic Mineral Mining and Dressing), are not required to meet the “no industrial materials or activities exposed to stormwater” standard to be eligible for this exception from routine inspections.

Facility operators must document the findings of the facility inspections and maintain this report with the SWPPP. Facilities are not required to submit the routine facility inspection report to EPA, unless the facility is specifically requested to do so. However, findings must be documented and summarized in the annual report that is submitted to EPA.

Monitoring

All required monitoring must be performed in response to a storm event that results in an actual discharge from the site (“measurable storm event”) that follows the preceding measurable storm event by at least 72 hours (3 days). This storm interval does not apply if facility operators are able to document that a shorter interval is representative for local storm events during the sampling period. In the case of snowmelt, the monitoring must be performed at a time when a measurable discharge occurs at the site.

For each monitoring event (except snowmelt monitoring), facility operators must identify the date and duration of the rainfall event, rainfall total for that rainfall event, and time since the previous measurable storm event. For snowmelt monitoring, operators must identify the date of the sampling event.

Facility operators must take required samples from a discharge resulting from a measurable storm event as described above. Samples must be collected within the first 30 minutes of a measurable storm event. If it is not possible to collect the sample within the first 30 minutes of a measurable storm event, the sample must be collected as soon as practicable after the first 30 minutes and documentation must be kept with the SWPPP explaining why it was not possible to take samples within the first 30 minutes. In the case of snowmelt, samples must be taken during a period with a measurable discharge. When adverse weather conditions[21] prevent the collection of samples according to the relevant monitoring schedule, a substitute sample must be taken during the next qualifying storm event. Operators must report any failure to monitor indicating the basis for not sampling during the usual reporting period.

If the facility is located in areas where limited rainfall occurs during parts of the year (e.g., arid or semi-arid climates) or in areas where freezing conditions exist that prevent runoff from occurring for extended periods, required monitoring events may be distributed during seasons when precipitation occurs, or when snowmelt results in a measurable discharge from the site. Facility operators must still collect the required number of samples.

Monitoring requirements as specified in the MSGP begin in the first full quarter following either 90 days after the permit issuance, or the date of discharge authorization, whichever date comes later. If the monitoring is required on a quarterly basis (e.g., benchmark monitoring), monitoring must at least once in each of the following 3-month intervals:

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[21] Adverse weather does not exempt facility operators from having to file a benchmark monitoring report in accordance with the sampling schedule.

- January 1 – March 31;
- April 1 – June 30;
- July 1 – September 30; and
- October 1 – December 31.

This monitoring schedule may be modified by the facility if the revised schedule is documented with the SWPPP and provided to EPA with the first monitoring report.

Quarterly Visual Assessments

With a few exceptions, all facilities covered by the MSGP are required to conduct quarterly visual assessments of discharges covered under the permit[22]. A stormwater sample from each outfall must be collected and visually assessed once each quarter for the entire permit term. The MSGP notes that these samples should be collected in such a manner that the samples are representative of the stormwater discharge, and on-line guidance on how to conduct monitoring is provided on EPA's website (www.epa.gov/npdes/stormwater/msgp). The MSGP notes that samples should be taken within the first 30 minutes of an actual discharge from a storm event (or as soon as practicable), and should note any water quality characteristics indicative of stormwater pollution (e.g., color, odor, clarity, foam, oil sheen, and floating, settled, or suspended solids). Additional details on how the visual assessment should be conducted are available in the permit (Appendix A). Whenever the visual assessment shows obvious signs of stormwater pollution, facility operators must initiate the corrective action procedures described in the permit.

Facility operators must document the results of the visual assessments and maintain this documentation onsite with the SWPPP. Facility operators are not required to submit visual assessment findings to EPA, unless the facility is specifically requested to do so, although findings should be noted in the annual report.

The MSGP notes several exceptions to requirements for visual monitoring. In some cases, adverse weather conditions prevent the safe or practical collection of samples, and the MSGP requires substitute samples during the next qualifying storm event. In other cases, the MSGP allows for variation of the assessment schedule, such as in areas subject to longer-term snow accumulation or in arid/semi-arid areas where limited rainfall occurs. Other exceptions are provided for inactive and unstaffed sites, or where a facility has two or more outfalls that would most likely discharge substantially identical effluents ("substantially identical outfalls"). For each of these cases, the MSGP outlines appropriate procedures for inspections and reporting.

[22] EPA considers the visual assessments to be part of the inspection process rather than categorized together with analytical monitoring; however for the purposes of the Opinion, we have included this discussion under monitoring to summarize the types of evaluations that will occur to evaluate the presence of pollutants in the discharge waters.

Analytical Monitoring

Facility operators must collect and analyze stormwater samples[23] and document all monitoring activities consistent with the procedures described in the MSGP including any additional sector-specific or state/tribal-specific requirements that are applicable to their facility. Applicable monitoring requirements apply to each outfall authorized by this permit, except as otherwise exempt from monitoring (e.g., as with a substantially identical outfalls[24]). The permit includes five types of required analytical monitoring, one or more of which may apply to the discharge(s):

- Quarterly benchmark monitoring
- Annual effluent limitations guidelines monitoring
- State- or tribal-specific monitoring
- Impaired waters monitoring
- Other monitoring as required by EPA

When more than one type of monitoring for the same parameter at the same outfall applies (e.g., total suspended solids once per year for an effluent limit and once per quarter for benchmark monitoring at a given outfall), facility operators may use a single sample to satisfy both monitoring requirements (i.e., one sample satisfying both the annual effluent limit sample and one of the four quarterly benchmark monitoring samples). All required monitoring must be conducted in accordance with the procedures described in Appendix B, Subsection 10.D of the MSGP.

Benchmark Monitoring

The MSGP specifies pollutant benchmark concentrations that are applicable to certain sectors/subsectors. Benchmark monitoring data are primarily to determine the overall effectiveness of the control measures and to assist facility operators in knowing when additional corrective action(s) may be necessary to comply with the effluent limitations in Part 2 of the MSGP. The benchmark concentrations are not effluent limitations; a benchmark exceedance, therefore, is not a permit violation. However, if corrective action is required as a result of a benchmark exceedance, failure to conduct required corrective action is a permit violation.

Facility operators must monitor for any benchmark parameters specified for the industrial sector(s), both primary industrial activity and any co-located industrial activities, applicable to the discharge. Industry-specific benchmark concentrations are listed in the sector-specific sections of Part 8 of the MSGP. If the facility is in one of the industrial sectors subject to benchmark concentrations that are hardness-dependent, facility operators are required to submit

[23] Facility operators are only required to monitor allowable non-stormwater discharges when they are commingled with stormwater discharges associated with industrial activity.
[24] Facility operators are required to monitor each outfall covered by a numeric effluent limit

to EPA with the NOI a hardness value established consistent with the procedures in Appendix J of the MSGP that is representative of the receiving water. Samples must be analyzed consistent with 40 CFR Part 136 analytical methods and using test procedures with quantitation limits at or below benchmark values for all benchmark parameters for which the facility is required to sample.

Benchmark monitoring must be conducted quarterly for the first four full quarters of permit coverage commencing no earlier than 90 days after permit issuance. As noted earlier, facilities in climates with irregular stormwater runoff may modify this quarterly schedule provided that this revised schedule is reported to EPA when the first benchmark sample is collected and reported, and that this revised schedule is kept with the facility's SWPPP. When conditions prevent obtaining four samples in four consecutive quarters, facility operators must continue monitoring until obtaining the four samples required for calculating the benchmark monitoring average. At the operator's discretion, more than four samples may be taken during separate runoff events and used to determine the average benchmark parameter concentration for facility discharges.

After collection of four quarterly samples, if the average of the four monitoring values for any parameter does not exceed the benchmark, the facility has fulfilled the monitoring requirements for that parameter for the permit term. However, if the average of the four monitoring values for any parameter exceeds the benchmark, facility operators must review the selection, design, installation, and implementation of the control measures to determine if modifications are necessary to meet the effluent limits in this permit, and either:

- Make the necessary modifications and continue quarterly monitoring until four additional quarters of monitoring are completed for which the average does not exceed the benchmark; or

- Make a determination that no further pollutant reductions are technologically available and economically practicable and achievable in light of best industry practice to meet the technology-based effluent limits or are necessary to meet the water-quality-based effluent limitations in the MSGP, in which case monitoring must continue once per year. The facility operator must also document the rationale for concluding that no further pollutant reductions are achievable, and retain all records related to this documentation with the SWPPP.

Facility operators must review the control measures and perform any required corrective action immediately (or document why no corrective action is required), without waiting for the full four quarters of monitoring data, if an exceedance of the four-quarter average is mathematically certain. If after modifying the control measures and conducting four additional quarters of monitoring, the average still exceeds the benchmark (or if an exceedance of the benchmark by the four quarter average is mathematically certain prior to conducting the full four additional quarters of monitoring), operators must again review the control measures and take one of the two actions above.

Following the first four quarters of benchmark monitoring (or sooner if the exceedance is triggered by less than four quarters of data, as noted above), if the average concentration of a pollutant exceeds a benchmark value, and the facility operator determines that exceedance of the benchmark is attributable solely to the presence of that pollutant in the natural background, the operator is not required to perform corrective action or additional benchmark monitoring provided that:

- The average concentration of the benchmark monitoring results is less than or equal to the concentration of that pollutant in the natural background;

- The operator documents and maintains with the SWPPP the supporting rationale for concluding that benchmark exceedances are in fact attributable solely to natural background pollutant levels. Any data previously collected by the facility and others must be included in the supporting rationale (including literature studies) that describe the levels of natural background pollutants in the stormwater discharge; and

- The operator notifies EPA on the final quarterly benchmark monitoring report that the benchmark exceedances are attributable solely to natural background pollutant levels.

Natural background pollutants include those substances that are naturally occurring in soils or ground water. Natural background pollutants do not include legacy pollutants from earlier activity on the site, or pollutants in run-on from neighboring sources that are not naturally occurring, such as other industrial sites or roadways. However, facilities may be eligible to discontinue monitoring for pollutants that occur solely from run-on sources, and operators are advised in the permit to consult the appropriate EPA Regional Office for related guidance.

The requirement for benchmark monitoring does not apply at a facility that is inactive and unstaffed, as long as there are no industrial materials or activities exposed to stormwater. This exception has different requirements for Sectors G, H, and J. To invoke this exception, a facility operator must maintain a statement with the SWPPP stating that the site is inactive and unstaffed, and that there are no industrial materials or activities exposed to stormwater in accordance with the substantive requirements in 40 CFR 122.26(g), and then sign and certify the corresponding statement as described in the MSGP. If circumstances change and industrial materials or activities become exposed to stormwater or the facility becomes active and/or staffed, this exception no longer applies and the facility must immediately begin complying with the applicable benchmark monitoring requirements as if the facility were in the first year of permit coverage. If the facility is not qualified for this exception at the time discharges are authorized under the MSGP, but during the permit term the facility becomes qualified because the facility is inactive and unstaffed, and there are no industrial materials or activities that are exposed to stormwater, then the facility operator must notify EPA of this change in the next benchmark monitoring report. The facility operator may discontinue benchmark monitoring once EPA has been notified, and has prepared and signed the certification statement described above concerning the facility's qualification for this special exception.

Effluent Limitations Monitoring

As noted above, certain stormwater discharges subject to effluent limitation guidelines are authorized for coverage under the MSGP. Beginning in the first full quarter following 90 days after permit issuance or the date of discharge authorization, whichever date comes later, facility operators must monitor once per year at each outfall containing the discharges identified in the sector-specific section of Part 8 applicable to each regulated activity.

Facility operators must monitor each outfall discharging runoff from any of the applicable regulated activities. The substantially identical outfall monitoring provisions are not available for numeric effluent limits monitoring. Facility operators must conduct follow- up monitoring within 30 calendar days (or during the next qualifying runoff event, should none occur within 30 days) of implementing corrective action(s) taken in response to an exceedance of a numeric effluent limit contained in this permit. The MSGP also outlines specific monitoring requirements applicable to individual states or tribes. Monitoring must be performed for any pollutant(s) that exceeds the effluent limit. If this follow-up monitoring exceeds the applicable effluent limitation, facility operators must 1) submit an Exceedance Report no later than 30 days after receiving the lab result; and 2) continue to monitor, at least quarterly, until the discharge is in compliance with the effluent limit or until EPA waives the requirement for additional monitoring. Facility operators must comply with any state or tribal monitoring requirements applicable to the facility's location. If a monitoring frequency is not specified for an applicable requirement, facility operators must monitor once per year for the entire permit term.

If a facility discharges to an impaired waterbody, facility operators must monitor all pollutants for which the waterbody is impaired and for which a standard analytical method exists. If the pollutant of concern for the impaired waterbody is suspended solids, turbidity or sediment/sedimentation, facility operators must monitor for Total Suspended Solids (TSS). If a pollutant of concern is expressed in the form of an indicator or surrogate pollutant, facility operators must monitor for that indicator or surrogate pollutant. No monitoring is required when a waterbody's biological communities are impaired but no pollutant, including indicator or surrogate pollutants, is specified as causing the impairment, or when a waterbody's impairment is related to hydrologic modifications, impaired hydrology, or other non-pollutant. Facility operators are directed to consult the appropriate EPA Regional Office for any available guidance regarding required monitoring parameters under this part. If the EPA's Discharge Mapping Tool does not provide the needed information, facility operators may consult the appropriate EPA Regional Office for guidance regarding required monitoring parameters under this part.

Stormwater discharges to impaired waters without an applicable EPA-approved or established TMDL waste load allocation must be monitored once per year at each outfall (except substantially identical outfalls) beginning in the first full quarter following 90 days after permit issuance or the date of discharge authorization, whichever date comes later. This monitoring requirement no longer applies once the pollutant of concern is not detected above natural background levels in the stormwater monitoring results, and facility operators document this pollutant is not expected to be present above natural background levels in the discharge.

If the pollutant of concern is not present and not expected to be present in the discharge, or it is present but facility operators have determined that its presence is caused solely by natural background sources, facility operators must include a notification to this effect in the first monitoring report, after which facility operators may discontinue monitoring. To support a determination that the pollutant's presence is caused solely by natural background sources, facility operators must document and maintain with the SWPPP:

- An explanation of why facility operators believe that the presence of the pollutant of concern in the discharge is not related to the activities or materials at the facility; and

- Data and/or studies that tie the presence of the pollutant of concern in the discharge to natural background sources in the watershed.

Stormwater discharges to waters for which there is an EPA approved or established TMDL wasteload allocation are not required to be monitored for the pollutant for which the TMDL was written unless EPA informs facility operators, upon examination of the applicable TMDL and/or wasteload allocation, that facility operators are subject to such a requirement consistent with the assumptions of the applicable TMDL and/or wasteload allocation. EPA's notice will include specifications on which pollutant to monitor and the required monitoring frequency. Facility operators must consult the appropriate EPA Regional Office for guidance regarding required monitoring under this part.

Additional Monitoring Required by EPA.

EPA may notify facility operators of additional discharge monitoring requirements. Any such notice will briefly state the reasons for the monitoring, locations, and parameters to be monitored, frequency and period of monitoring, sample types, and reporting requirements.

Corrective Actions

The MSGP outlines a number of corrective actions that may be required during the 5-year permit cycle and describes how and when these actions should be undertaken and reported to EPA. Although SWPPPs are intended to address anticipated conditions at covered facilities, EPA recognizes that unforeseen conditions or other factors may sometimes require the need for corrective actions at a facility. Where corrective actions are needed based on inspections, monitoring, or other observations, or when notified by the EPA, or local, state or tribal entity, operators are required to review their SWPPP to determine if and where revisions may need to be made to eliminate the condition, prevent its reoccurrence, and ensure that effluent limits are met. Corrective measures may be required to address the following:

- An unauthorized release or discharge (e.g., spill, leak, or discharge of non-stormwater not authorized by this or another NPDES permit) occurs at the facility.

- A discharge violates a numeric effluent limit.

- Control measures are not stringent enough for the discharge to meet applicable water quality standards or the non-numeric effluent limits in this permit.

- A required control measure was never installed, was installed incorrectly, or not in accordance with Parts 2 and/or 8, or is not being properly operated or maintained.
- Visual assessments indicate obvious signs of stormwater pollution (e.g., color, odor, floating solids, settled solids, suspended solids, foam, sheen, etc.).
- The average of four quarterly sampling results exceeds an applicable benchmark. If less than four benchmark samples have been taken, but the results are such that an exceedance of the four quarter average is mathematically certain (i.e., if the sum of quarterly sample results to date is more than four times the benchmark level) this is considered a benchmark exceedance, triggering a review.
- Construction or a change in design, operation, or maintenance at the facility that significantly changes the nature of pollutants discharged in stormwater from the facility, or significantly increases the quantity of pollutants discharged.

The MSGP states that in all circumstances, facility operators must immediately take all reasonable steps necessary to minimize or prevent the discharge of pollutants until a permanent solution is installed and made operational, including cleaning up any contaminated surfaces so that the material will not discharge in subsequent storm events. In this context, the term "immediately" requires action on the same day it is discovered that a control measure needs to be replaced or repaired, and that all reasonable steps must be taken to minimize or prevent the discharge of pollutants until a permanent solution is installed and made operational. However, if a problem is identified at a time in the workday when it is too late to take action, the initiation of action must begin on the following workday.

If a facility operator determines that additional changes are necessary beyond those implemented, the operator must install a new or modified control and make it operational, or complete the repair, before the next storm event if possible, and within 14 calendar days from the time of discovery. If it is infeasible to complete the installation or repair within 14 calendar days, the operator must document why it is infeasible to complete the installation or repair within the 14-day timeframe. The facility operator must also identify the schedule for completing the work, which must be done as soon as practicable after the 14-day timeframe but no longer than 45 days after discovery. Where the corrective actions result in changes to any of the controls or procedures documented in the SWPPP, the operator must modify the SWPPP accordingly within 14 calendar days of completing corrective action work.

EPA does not consider these time intervals to be grace periods; they are instead schedules that are considered reasonable for documenting the findings and for making repairs and improvements. The time intervals are included in the permit to ensure that the conditions prompting the need for these repairs and improvements are not allowed to persist indefinitely.

If the event triggering corrective action is linked to an outfall that represents other substantially identical outfalls, the review must assess the need for corrective action for each outfall represented by the outfall that triggered the review. Any necessary changes to control measures that affect these other outfalls must also be made before the next storm event if possible, or as soon as practicable following that storm event. Any corrective actions must be conducted within the timeframes set forth in the permit.

Facility operators must document the existence of any of the conditions listed requiring corrective action within 24 hours of becoming aware of such condition. Facility operators must also document the corrective actions taken that occurred as a result of the conditions within 14 days from the time of discovery of any of those conditions. If applicable, facility operators must also document why it is infeasible to complete necessary installations or repairs within the 14-day timeframe and document the schedule for installing the controls and making them operational as soon as practicable after the 14-day timeframe. Operators are required to submit to EPA a summary of any corrective action taken from the previous year of permit coverage in their Annual Report.

If the event triggering the review is a permit violation (e.g., non-compliance with an effluent limit), correcting it does not remove the original violation. Additionally, failing to take corrective action in accordance with this section is an additional permit violation. EPA will consider the appropriateness and promptness of corrective action in determining enforcement responses to permit violations.

Any noncompliance with any of the requirements of the MSGP constitutes a violation of the permit, issued under the CWA. The MSGP states that failure to take any required corrective actions constitutes an independent, additional violation of this permit, in addition to any original violation that triggered the need for corrective action. As such, any actions and time periods specified for remedying noncompliance do not absolve parties of the initial underlying noncompliance. However, where corrective action is triggered by an event that does not itself constitute permit noncompliance, such as an exceedance of an applicable benchmark, there is no permit violation provided the facility operators takes the required corrective action within the relevant deadlines established in Part 4.2.

Reporting and Recordkeeping

The EPA requires that facility operators submit all NOIs, Notices of Termination, Annual Reports, Discharge Monitoring Reports, and other reporting information as appropriate electronically, unless a waiver was received from the relevant EPA Regional Office. Waivers are only granted for a one-time use for a single information submittal (i.e., an initial waiver does not apply for the entire term of the permit). All required information to be submitted under the permit will be submitted via EPA's NOI system unless the permit states otherwise or unless a waiver has been granted. Thus, the NOI, discharge monitoring reports and annual reports, along with any no exposure certifications or Notices of Termination would be submitted electronically (or by hard copy if granted a waiver by EPA).

Facility operators must submit an Annual Report to EPA electronically, per Part 7.2, by January 30th for each year of permit coverage containing information generated from the past calendar year. The annual report must include the following information:

- The results or a summary of the past year's routine facility inspection documentation required and quarterly visual assessment documentation;
- Information copied or summarized from the corrective action documentation required (if applicable). If corrective action is not yet completed at the time of submission of this

Annual Report, facility operators must describe the status of any outstanding corrective action(s);

- Regarding benchmark monitoring resulting in four quarter average exceedances, the rationale for why facility operators believe that no further pollutant reductions are achievable (i.e., technologically available and economically practicable and achievable in light of best industry practices); and
- Any incidents of noncompliance observed or, if there is no noncompliance, a signed certification signed stating the facility is in compliance with this permit.

For benchmark monitoring, note that facility operators are required to submit sampling results to EPA no later than 30 days after receiving laboratory results for each quarter that operators are required to collect benchmark samples, in accordance with Part 6.2.1.2. If operators collect multiple samples in a single quarter (e.g., due to adverse weather conditions, climates with irregular stormwater runoff, or areas subject to snow), facility operators are required to submit all sampling results to EPA within 30 days of receiving the laboratory results.

If follow-up monitoring exceeds a numeric effluent limit, facility operators must submit an Exceedance Report to the appropriate EPA Regional Office no later than 30 days after receiving the lab results. The report must include the following:

- NPDES ID;
- Facility name, physical address and location;
- Name of receiving water;
- Monitoring data from this and the preceding monitoring event(s);
- An explanation of the situation; what facility operators have done and intend to do (should the corrective actions not yet be complete) to correct the violation; and
- An appropriate contact name and phone number.

In addition to the reporting requirements described above, facility operators are also subject to standard permit reporting provisions of the MSGP, as shown in the permit (see Appendix A of this Opinion).

OVERVIEW OF THE ASSESSMENT FRAMEWORK

Approach to the Assessment

Section 7(a)(2) of the ESA of 1973, as amended, requires federal agencies, in consultation with and with the assistance of the Service, to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of endangered or threatened species, and is not likely to destroy or adversely modify critical habitat that has been designated for these species (16 U.S.C. 1539). During consultations on specific actions, the Service fulfills its obligations using an assessment framework that begins by identifying the physical, chemical, or biotic components of proposed actions that are likely to have individual, interactive, or cumulative direct and indirect effects on the environment (we use the term "potential stressors" for these components of an action); we then determine whether ESA-listed species or designated critical habitat are likely to be exposed to those potential stressors; we estimate how ESA-listed species or designated critical habitat are likely to respond to any exposure; then we conclude by estimating the risks those responses pose to the individuals, populations, and species or designated critical habitat that are likely to be exposed.

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

Instead of trying to adapt the traditional approach to programmatic consultations, we developed an assessment framework in recent years, in concert with NMFS, that allows the Services to help Federal agencies ensure that their programs comply with the requirements of section 7(a)(2) of the ESA as described in the Interagency Endangered Species Consultation Handbook (USFWS and NMFS 1998; Chapter 5). Our assessment framework for general permits, used in this consultation, first assesses whether the actions a general permit authorizes are likely to adversely affect ESA-listed species or designated critical habitats. We do this by estimating exposure and response to the stressors these actions contribute, just as described above for traditional consultations. If potential stressors are reasonably likely to measurably affect listed resources, we then examine the general permit's structure and decision-making processes to determine whether they are likely to ensure that the actions the agency authorizes collectively comply with the requirements of section 7(a)(2).

The steps followed in the assessment for this consultation are described in detail below.

The Proposed Action

In reviewing the proposed action and BE, the Service examined the activities that would be authorized by the proposed MSGP. This step of our analyses identified spatial and temporal patterns associated with each category of activity: specifically (a) the geographic distribution of the different activities; (b) the number of activities and/or covered facilities; (c) the types and amounts of pollutants that are likely to be discharged; and (d) the rate and other characteristics of discharges.

Our analysis evaluated the effects of all discharges of likely industrial stormwater pollutants and allowable non-stormwater discharges to waters of the United States incidental to the normal operation the facility sectors that would be covered by the MSGP. In addition, we will considered the discharge-related activities that are proposed as part of the action.

Action Area

We considered the degree of geographic and temporal overlap between: a) the activities that would be authorized by the proposed MSGP; and b) ESA-listed species and designated critical habitat.

Effects Analysis

Before assessing an agency's decision-making process (in the approach as described above), the Service first established whether the proposed action could expose ESA-listed species and designated critical habitat to potentially harmful stressors and whether ESA-listed species and designated critical habitats are likely to be adversely affected. If exposure to stressors and adverse effects are not likely to occur, we do not assess the agency's decision-making process. In this case, we determined that adverse effects were likely to occur, and the Opinion thus includes an assessment of the EPA's decision-making process.

Our analysis of effects as presented in this Opinion will be divided into two sections. First, we will describe the potential stressors of the action, including both effects from the discharges and discharge-associated activities. Rather than discuss the literature for each species, we organize the data using categories of potential stressors. The anticipated effects to listed resources from the potential stressors will be discussed in general terms, using examples of effects to taxa as described in the relevant literature. These effects will be described in general terms, as would be anticipated to occur in the absence of protective BMPs and other measures. The second section of the effects analysis will consider whether EPA has structured the permit to provide sufficient avoidance and minimization of adverse effects to listed resources. Thus, we determine whether adverse effects are likely to occur though a review of the BE supplemented with additional information on the physical, physiological, behavioral, and ecological responses of endangered or threatened species or essential physical and biological features (hereafter, "PBFs") of designated critical habitat.

As we have already discussed, we treat the issuance of the proposed MSGP as a permitting "program" that would authorize discharges of pollutants over a five-year period. The specific questions we ask about the proposed MSGP as a permitting program are:

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 program?

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 (e.g., the stressors produced by the actual discharges to waters of the United States)?

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?

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 constituent elements of designated critical habitat?

5. Responses of Listed Resources

Does the general permit have an analytical methodology that considers:

- Status and trends of endangered or threatened species or designated critical habitat;
- Demographic and ecological status of populations and individuals of those species given their exposure to pre-existing stressors in different drainages and watersheds;
- 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
- 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?

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?

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:

- At concentrations, durations, or frequencies that are potentially harmful to individual listed organisms, populations, or the species, or;
- To ecological consequences that are potentially harmful to individual listed organisms, populations, the species or PBFs of designated critical habitat?

Additionally, we address the question of whether activities authorized by the proposed MSGP that may individually have minor direct and indirect effects on the environment but collectively may have large effects (i.e., aggregate effects).

Integration and Synthesis

Our integration and sysnthesis section of the Opinion focuses on whether or to what degree an agency’s program is likely to ensure that the direct or indirect effects of actions the program would authorize are not likely to reduce the fitness of listed individuals to a degree that would be sufficient to reduce the viability of the population(s) those individuals represent and jeopardize the survival and recovery of the species. In particular, the programmatic assessment focuses on whether and to what degree the EPA structured the program in ways that would prevent or minimize endangered or threatened species or designated critical habitat from being exposed to harmful discharges of pollutants into waters of the United States and other harmful activities because such exposures commonly trigger responses that are difficult to prevent. Because it is so difficult to prevent free-ranging organisms from responding to anthropogenic stressors once they have been exposed, the most effective management measures are designed to influence the exposure itself. For that reason, our assessment focuses on whether and to what degree the program prevents or minimizes endangered and threatened species and designated critical habitat from being exposed to harmful discharges and other harmful activities that would be authorized by the proposed MSGP.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this Opinion relies on four components: (1) the Status of the Species, which evaluates the species' range-wide condition, the factors responsible for that condition, and the survival and recovery needs of the species; (2) the Environmental Baseline, which evaluates the condition of the species in the Action Area, the factors responsible for that condition, and the relationship of the Action Area to the survival and recovery of the species; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed federal action and the effects of any interrelated or interdependent activities on the species; and (4) Cumulative Effects, which evaluates the effects of future, non-federal activities that are reasonably certain to occur in the Action Area on the species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed federal action in the context of the species' current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

The jeopardy analysis in this Opinion emphasizes consideration of the range-wide survival and recovery needs of the species and the role of the Action Area in the survival and recovery of the species. It is within this context that we evaluate the significance of the effects of the proposed federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Adverse Modification Determination

This Opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this Opinion relies on four components: 1) the Status of Critical Habitat, which evaluates the range-wide condition of designated critical habitat for the species, the factors responsible for that condition, and the intended recovery function of the critical habitat overall; 2) the Environmental Baseline, which evaluates the condition of the critical habitat in the Action Area, the factors responsible for that condition, and the recovery role of the critical habitat in the Action Area; 3) the Effects of the

Action, which determines the direct and indirect impacts of the proposed federal action and the effects of any interrelated or interdependent activities on the PBFs and how that will influence the recovery role of affected critical habitat units; and 4) Cumulative Effects, which evaluates the effects of future, non-federal activities reasonably certain to occur in the Action Area on the PBFs and how that will influence the recovery role of affected critical habitat units.

For purposes of the adverse modification determination, the effects of the proposed federal action on the species' critical habitat are evaluated in the context of the range-wide condition of the critical habitat, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PBFs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the species.

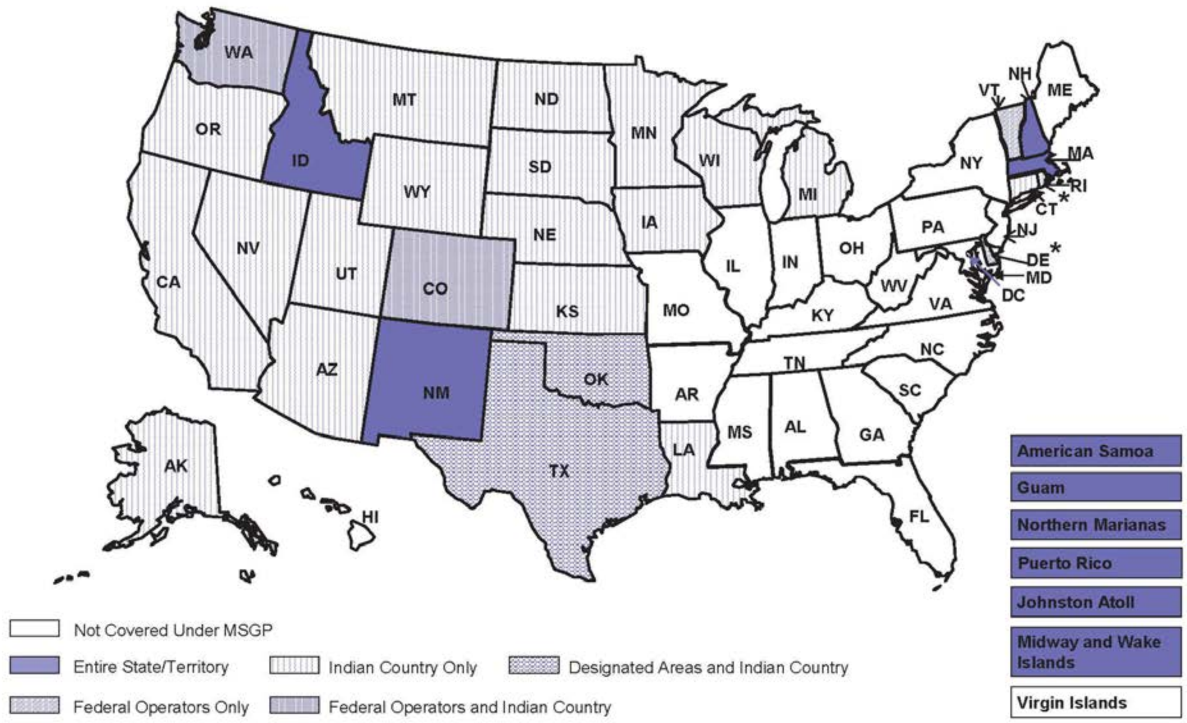
The analysis in this Opinion places an emphasis on using the intended range-wide recovery function of the species' critical habitat and the role of the Action Area relative to that intended function as the context for evaluating the significance of the effects of the proposed federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

ACTION AREA

The Action Area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). In delineating the Action Area, we evaluated the farthest reaching physical, chemical, and biotic effects of the action on the environment.

The MSGP applies to states, territories, and other geographic areas where EPA retains permitting authority, as described above. The Action Area for the proposed action includes watersheds in the states and territories where facilities seeking coverage under the permit exist would discharge points to if granted coverage under the permit. Both current and future dischargers may request coverage under the MSGP in these geographic areas. Thus, the Action Area for the proposed action is not limited to existing discharge points and their associated areas of effect, but instead includes all waterbodies and watersheds in these geographic areas and the farthest downstream and/or down-current extent of the effects of the current and future discharges. The Action Area also includes upland areas where new stormwater control features are installed or modified within the footprint of the industrial facilities' boundaries. While not indicated in Figure 2 (below), the Action Area would also include areas in adjacent states, as downstream movement of stressors are not fully contained within a state or territory where EPA retains full or partial permitting authority (e.g., for federal facilities or tribal lands).

Figure 2. Action area of the proposed action (from the EPA's BE), showing states, territories and other lands where EPA retain's permitting jurisdiction. New and existing facilities located in the areas defined below may seek coverage under the MSGP.



STATUS OF THE SPECIES AND CRITICAL HABITAT

In their BE, EPA identified numerous species that may be affected by the proposed permit, as well as a list of species for which they provided a "no effect" determination. Table 3 represents a refinement of EPA's list of species to include only those species and designated critical habitat under the jurisdiction of the Service that may be affected by the proposed action. This conclusion is based on the overlap between the species' ranges and designated critical habitats and the anticipated extent of effects from facility discharges and other activities authorized under the MSGP.

For more information regarding the individual species and critical habitats listed in Table 3, and the factors affecting their conservation status, please refer to proposed and final listing determinations, critical habitat designations, recovery plans, and 5-year reviews available at: http://ecos.fws.gov/ecos/home.action. The discussion that follows focuses on attributes of life history and distribution that influence the manner and likelihood that species may be exposed to the proposed action, as well as the species' potential response and risk when exposure occurs.

Table 3. List of threatened (T), endangered (E), and candidate (C) species addressed in the consultation, as compiled from the BE and its appendices. Species with designated critical habitat are indicated by an asterisk. (Species for which the EPA has made a "no effect" call are not included in this table, but are listed in an appendix to the BE for reference.)

Common Name	Scientific Name	Status	State/Territory Range
BIVALVES			
Hornshell, Texas	*Popenaias popei*	C	NM, TX
Mucket, Neosho	*Lampsilis rafinesqueana*	E	OK
Wedgemussel, dwarf	*Alasmidonta heterodon*	E	MD, MA, NH, VT
CRUSTACEANS			
Amphipod, Hay's Spring	*Stygobromus hayi*	E	MA, MD
Amphipod, Noel's*	*Gammarus desperatus*	E	NM
Crayfish, Shasta	*Pacifastacus fortis*	E	CA
Fairy shrimp, Conservancy*	*Branchinecta conservatio*	E	CA, NV
Fairy shrimp, longhorn*	*Branchinecta longiantenna*	E	CA, NV
Fairy shrimp, Riverside*	*Streptocephalus woottoni*	E	NM
Fairy shrimp, San Diego*	*Branchinecta sandiegonensis*	E	CA
Fairy shrimp, vernal pool*	*Branchinecta lynchi*	T	CA, OR
Isopod, Socorro	*Thermosphaeroma thermophilus*	E	NM
Shrimp, California freshwater	*Syncaris pacifica*	E	CA, NV
Tadpole shrimp, vernal pool	*Lepidurus packardi*	E	CA
INSECTS			
Tiger beetle, northeastern beach	*Cicindela dorsalis dorsalis*	T	MD, MA
Tiger beetle, Puritan	*Cicindela puritana*	T	MD, MA

Common Name	Scientific Name	Status	State/Territory Range
SNAILS			
Ambersnail, Kanab	*Oxyloma haydeni kanabensis*	E	AZ, UT
Limpet, Banbury Springs	*Lanx sp.*	E	ID
Snail, Bliss Rapids	*Taylorconcha serpenticola*	T	ID
Snail, Pecos assiminea*	*Assiminea pecos*	E	NM, TX
Snail, Snake River physa	*Physa natricina*	E	ID
Springsnail, Alamosa	*Tryonia alamosae*	E	NM
Springsnail, Bruneau Hot	*Pyrgulopsis bruneauensis*	E	ID
Springsnail, Chupadera	*Pyrgulopsis chupaderae*	E	NM
Springsnail, Huachuca	*Pyrgulopsis thompsoni*	C	AZ
Springsnail, Koster's*	*Juturnia kosteri*	E	NM
Springsnail, Page	*Pyrgulopsis morrisoni*	C	AZ
Springsnail, Roswell*	*Pyrgulopsis roswellensis*	E	NM
Springsnail, San Bernadino*	*Pyrgulopsis bernardina*	T	AZ
Springsnail, Socorro	*Pyrgulopsis neomexicana*	E	NM
Springsnail, Three Forks*	*Pyrgulopsis trivialis*	E	AZ
FISH			
Catfish, Yaqui*	*Ictalurus pricei*	T	AZ
Cavefish, Ozark	*Amblyopsis rosae*	T	OK
Chub, bonytail*	*Gila elegans*	E	AZ, CA, NV, UT
Chub, Chihuahua	*Gila nigrescens*	T	NM
Chub, Gila*	*Gila intermedia*	E	AZ, NM
Chub, headwater	*Gila nigra*	C	AZ, NM
Chub, humpback*	*Gila cypha*	E	AZ, UT
Chub, Mohave tui	*Gila bicolor mohavensis*	E	CA

Common Name	Scientific Name	Status	State/Territory Range
Chub, Oregon*	*Oregonichthys crameri*	T	OR
Chub, Virgin River*	*Gila seminuda (=robusta)*	E	UT
Chub, Yaqui*	*Gila purpurea*	E	AZ
Cui-ui	*Chasmistes cujus*	E	NV
Gambusia, Pecos	*Gambusia nobilis*	E	NM, TX
Gambusia, San Marcos*	*Gambusia georgei*	E	TX
Goby, tidewater*	*Eucyclogobius newberryi*	E	CA
Madtom, Neosho	*Noturus placidus*	T	OK
Minnow, loach*	*Tiaroga cobitis*	E	AZ, NM
Minnow, Rio Grande silvery*	*Hybognathus amarus*	E	NM, TX
Pikeminnow (=squawfish), Colorado*	*Ptychocheilus lucius*	E	AZ, CA, NM, UT
Pupfish, desert*	*Cyprinodon macularius*	E	AZ, CA
Salmon, Atlantic	*Salmo salar*	E	MA, NH, RI
Shiner, Arkansas River*	*Notropis girardi*	T	NM, OK, TX
Shiner, beautiful*	*Cyprinella formosa*	T	AZ, NM
Shiner, Pecos bluntnose*	*Notropis simus pecosensis*	T	NM
Shiner, sharpnose	*Notropis oxyrhynchus*	E	TX
Shiner, smalleye	*Notropis buccula*	E	TX
Spikedace*	*Meda fulgida*	E	AZ, NM
Spinedace, Little Colorado*	*Lepidomeda vittata*	T	AZ
Stickleback, unarmored threespine	*Gasterosteus aculeatus williamsoni*	E	CA
Sucker, June*	*Chasmistes liorus*	E	UT
Sucker, Lost River	*Deltistes luxatus*	E	CA, OR
Sucker, razorback*	*Xyrauchen texanus*	E	AZ, CA, NV, NM, UT
Sucker, Santa Ana*	*Catostomus santaanae*	T	CA
Sucker, shortnose	*Chasmistes brevirostris*	E	CA, OR
Sucker, Warner*	*Catostomus warnerensis*	T	NV, OR
Sucker, Zuni bluehead	*Catostomus discobolus yarrowi*	E	AZ, NM
Topminnow, Gila (incl. Yaqui)	*Poeciliopsis occidentalis*	E	AZ, NM
Trout, Apache	*Oncorhynchus apache*	T	AZ

Common Name	Scientific Name	Status	State/Territory Range
Trout, bull*	*Salvelinus confluentus*	T	ID, NV, OR, WA
Trout, Gila	*Oncorhynchus gilae*	T	AZ, NM
Trout, greenback cutthroat	*Oncorhynchus clarki stomias*	T	UT
Trout, Lahontan cutthroat	*Oncorhynchus clarki henshawi*	T	CA, NV, OR
Woundfin*	*Plagopterus argentissimus*	E	AZ, NV, NM, UT
AMPHIBIANS			
Frog, mountain yellow-legged (northern California)	*Rana muscosa*	E	CA, NV
Frog, mountain yellow-legged (southern California)*	*Rana muscosa*	E	CA, NV
Frog, Oregon spotted	*Rana pretiosa*	T	CA, NV, WA
Guajon*	*Eleutherodactylus cooki*	T	PR
Salamander, California Tiger (Sonoma DPS)*	*Ambystoma californiense*	E	CA, NV
Toad, arroyo (=arroyo southwestern)*	*Bufo californicus (=microscaphus)*	E	CA
Toad, Houston*	*Bufo houstonensis*	E	TX
Treefrog, Arizona	*Hyla wrightorum*	C	AZ
REPTILES			
Alligator, American	*Alligator mississippiensis*	SAT	OK, TX
Plymouth Red-Bellied Turtle*	*Pseudemys rubriventris bangsi*	E	MA
Sea turtle, green (All other areas)	*Chelonia mydas*	T (NMFS/FWS)	AS, CA, CT, DE, GU, MD, MA, NH, NMI, OR, PR, RI, TX, WA
Sea turtle, green (Florida & Mexico's Pacific coast colonies)	*Chelonia mydas*	E (NMFS/FWS)	AS, CA, DE, GU, MD, MA, NH, NMI, OR, PR, RI, TX, WA, WK
Sea turtle, hawksbill	*Eretmochelys imbricate*	E (NMFS/FWS)	CA, DE, MD, MA, NH, PR, TX, WK

Common Name	Scientific Name	Status	State/Territory Range
Sea turtle, Kemp's ridley	*Lepidochelys kempii*	E (NMFS/FWS)	DE, MD, MA, RI, TX
Sea turtle, leatherback	*Dermochelys coriacea*	E (NMFS/FWS)	CA, DE, MD, MA, NH, OR, PR, RI, TX, WA, WK
Sea turtle, loggerhead, North Pacific Ocean	*Caretta caretta*	E (NMFS/FWS)	CA, OR, WA
Sea turtle, loggerhead, Northwest Atlantic Ocean	*Caretta caretta*	T (NMFS/FWS)	DE, MD, MA, NH, RI, PR, TX
Sea turtle, olive ridley (All other areas)	*Lepidochelys olivacea*	T (NMFS/FWS)	PR
Sea turtle, olive ridley (Mexico's Pacific coast breeding colonies)	*Lepidochelys olivacea*	E (NMFS/FWS)	CA
Snake, giant garter	*Thamnophis gigas*	T	CA
Turtle, bog (=Muhlenberg)	*Clemmys muhlenbergii*	T	DE, MD
Turtle, Sonoyta mud	*Kinosternon sonoriense longifemorale*	C	AZ
BIRDS			
Albatross, short-tailed	*Phoebastria (=Diomedea) albatrus*	E	CA, OR, WA
Crake, spotless	*Porzana tabuensis*	C	AS
Crane, whooping*	*Grus americana*	E	OK, TX
Curlew, Eskimo	*Numenius borealis*	E	OK, TX
Flycatcher, southwestern willow*	*Empidonax traillii extimus*	E	AZ, CA, NV, NM, TX, UT
Knot, red	*Calidris canutus rufa*	T	DE, LA, MD, MA, NH, TX
Moorhen, Mariana common	*Gallinula chloropus guami*	E	GU, NMI, WK
Murrelet, marbled*	*Brachyramphus marmoratus*	T	CA, OR, WA
Murrelet, Xantus's	*Synthliboramphus hypoleucus*	C	CA, NV, OR
Plover, piping*	*Charadrius melodus*	T	DE, MA, NH, OK, TX

Common Name	Scientific Name	Status	State/Territory Range
Plover, western snowy (Pacific Coast Population)*	*Charadrius alexandrinus nivosus*	T	CA, OR, WA
Rail, light-footed clapper	*Rallus longirostris levipes*	E	CA
Rail, Yuma clapper	*Rallus longirostris yumanensis*	E	AZ, CA, NV
Shearwater, Newell's Townsend's	*Puffinus auricularis newelli*	T	AS
Tern, California least	*Sterna antillarum browni*	E	AZ, CA
Tern, least	*Sterna antillarum*	E	NM, OK, TX
Tern, roseate	*Sterna dougallii dougallii*	E	MA, NH, PR
Warbler, nightingale reed (old world warbler)	*Acrocephalus luscinia*	E	GU, NMI, WK
MAMMALS			
Manatee, West Indian*	*Trichechus manatus*	E	TX
Mouse, salt marsh harvest	*Reithrodontomys raviventris*	E	CA, NV, OR
Shrew, Buena Vista Lake ornate*	*Sorex ornatus relictus*	E	CA, NV
PLANTS			
Beaked-rush, Knieskern's	*Rhynchospora knieskernii*	T	DE, MD
Bird's-beak, salt marsh	*Cordylanthus maritimus ssp. maritimus*	E	CA
Bluecurls, Hidden Lake	*Trichostema austromontanum ssp. compactum*	T	CA, NV
Brodiaea, Chinese Camp	*Brodiaea pallida*	T	CA, NV
Brodiaea, thread-leaved*	*Brodiaea filifolia*	T	CA
Bulrush, Northeastern	*Scirpus ancistrochaetus*	E	MD, MA, NH, VT
Buttercup, autumn	*Ranunculus aestivalis (=acriformis)*	E	UT
Button-celery, San Diego	*Eryngium aristulatum var. parishii*	E	CA
Checker-mallow, Kenwood Marsh	*Sidalcea oregana ssp. valida*	E	CA, NV, OR

Common Name	Scientific Name	Status	State/Territory Range
Checker-mallow, Nelson's	*Sidalcea nelsoniana*	T	OR, WA
Cobana negra	*Stahlia monosperma*	T	PR
Cress, Tahoe yellow	*Rorippa subumbellata*	C	CA, NV
Crownscale, San Jacinto Valley*	*Atriplex coronata var. notatior*	E	CA
Daisy, Willamette*	*Erigeron decumbens var. decumbens*	E	OR
Desert-parsley, Bradshaw's	*Lomatium bradshawii*	E	OR, WA
Grass, Colusa*	*Neostapfia colusana*	T	CA, NV
Higuero de sierra	*Crescentia portoricensis*	E	PR
Howellia, water	*Howellia aquatilis*	T	CA, ID, OR, WA
Joint-vetch, sensitive	*Aeschynomene virginica*	T	MD
Ladies'-tresses, Canelo Hills	*Spiranthes delitescens*	E	AZ
Ladies'-tresses, Navasota	*Spiranthes parksii*	E	TX
Ladies'-tresses, Ute	*Spiranthes diluvialis*	T	ID, NV, WA, UT
Lily, Pitkin Marsh	*Lilium pardalinum ssp. Pitkinense*	E	CA, OR, NV
Lily, Western	*Lilium occidentale*	E	CA, OR
Meadowfoam, Butte County*	*Limnanthes floccosa ssp. Californica*	E	CA, NV
Mesa-mint, Otay	*Pogogyne nudiuscula*	E	CA
Navarretia, few-flowered	*Navarretia leucocephala ssp. pauciflora (=N. pauciflora)*	E	CA, NV
Navarretia, many-flowered	*Navarretia leucocephala ssp. plieantha*	T	CA, NV, OR
Navarretia, spreading*	*Navarretia fossalis*	E	CA
No common name	*Gesneria pauciflora*	T	PR
Orchid, eastern prairie fringed	*Platanthera leucophaea*	T	OK
Orcutt grass, California	*Orcuttia californica*	E	CA
Orcutt grass, hairy*	*Orcuttia pilosa*	E	CA, NV
Orcutt grass, Sacramento*	*Orcuttia viscida*	E	CA, NV, OR
Orcutt grass, San Joaquin*	*Orcuttia inaequalis*	T	CA, NV, OR

Common Name	Scientific Name	Status	State/Territory Range
Orcutt grass, slender*	*Orcuttia tenuis*	T	CA
Owl's-clover, fleshy*	*Castilleja campestris ssp. succulenta*	T	CA, NV
Panic grass, Hirst Brothers'	*Dichanthelium (=Panicum) hirstii*	C	MD, DE
Pink, swamp	*Helonias bullata*	T	MD, DE
Primrose, Maguire	*Primula maguirei*	T	UT
Rose-mallow, Neches River	*Hibiscus dasycalyx*	T	TX
Seabeach Amaranth	*Amaranthus pumilus*	T	DE
Sedge, Navajo*	*Carex specuicola*	T	AZ, UT
Solano Grass	*Tuctoria mucronata*	E	CA, NV, OR
Spurge, Hoover's*	*Chamaesyce hooveri*	T	CA, NV
Stonecrop, Lake County	*Parvisedum leiocarpum*	E	CA, NV
Sunflower, Pecos (=puzzle, =paradox)*	*Helianthus paradoxus*	T	TX, NM
Sunshine, Sonoma	*Blennosperma bakeri*	E	CA, NV
Thistle, Loch Lomond coyote	*Eryngium constancei*	E	CA, NV, OR
Thistle, Sacramento Mountains	*Cirsium vinaceum*	T	NM
Thistle, Suisun*	*Cirsium hydrophilum var. hydrophilum*	E	CA, NV, OR
Vervain, Red Hills	*Verbena californica*	T	CA, NV, OR
Watercress, Gambel's	*Rorippa gambellii*	E	CA
Water-umbel, Huachuca*	*Lilaeopsis schaffneriana var. recurva*	E	AZ

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR 402.02) define the Environmental Baseline as the past and present impacts of all federal, state, or private actions and other human activities in the Action Area. Also included in the Environmental Baseline are the anticipated impacts of all proposed federal projects in the Action Area that have undergone section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation in progress.

The key purpose of the Environmental Baseline is to describe the condition of the listed species/critical habitat that exist in the Action Area in the absence of the action subject to consultation. Due to the nationwide scope of the proposed action and the numerous listed species and critical habitat designations in the Action Area, this Opinion will consider the Environmental Baseline at a broad scale. Many of the listed species and their designated critical habitats are exposed to multiple stressors comprising the past and present impacts of actions and activities that are described below. Many of the ongoing stressors are also intensified by population growth and development pressures as well as variable effects of climate change and, for some species, ocean acidification. This Environmental Baseline focuses primarily on the status and trends of the aquatic ecosystems in the United States and the consequences of that status for listed resources.

All of the endangered and threatened species and designated critical habitat considered in this Opinion depend on the health of aquatic ecosystems for their survival. Many of these species were listed as endangered or threatened, at least in part, because of the consequences of human activities on aquatic ecosystems (including estuaries, rivers, lakes, streams, and associated wetlands, floodplains, and riparian ecosystems of the United States, its Territories and possessions). The status and trends of those aquatic ecosystems has a profound impact on the status and trends of these species and the critical habitat that has been designated for them.

Habitat

Freshwater habitats are among the most threatened ecosystems in the world (Leidy and Moyle 1998). Reviews of aquatic species' conservation status over the past three decades have documented the cumulative effect of anthropogenic and natural stressors on freshwater aquatic ecosystems, resulting in a significant decline in the biodiversity and condition of indigenous fish, mussel and crayfish communities (Taylor et al. 2007; Jelks et al. 2008). Anthropogenic stressors are present to some degree in all water bodies of the United States, and are the result of many different impacts. These stressors often lead to long-term environmental degradation associated with lowered biodiversity, reduced primary and secondary production, and a lowered capacity or resiliency of the ecosystem to recover to its original state in response to natural perturbations (Rapport and Whitford 1999).

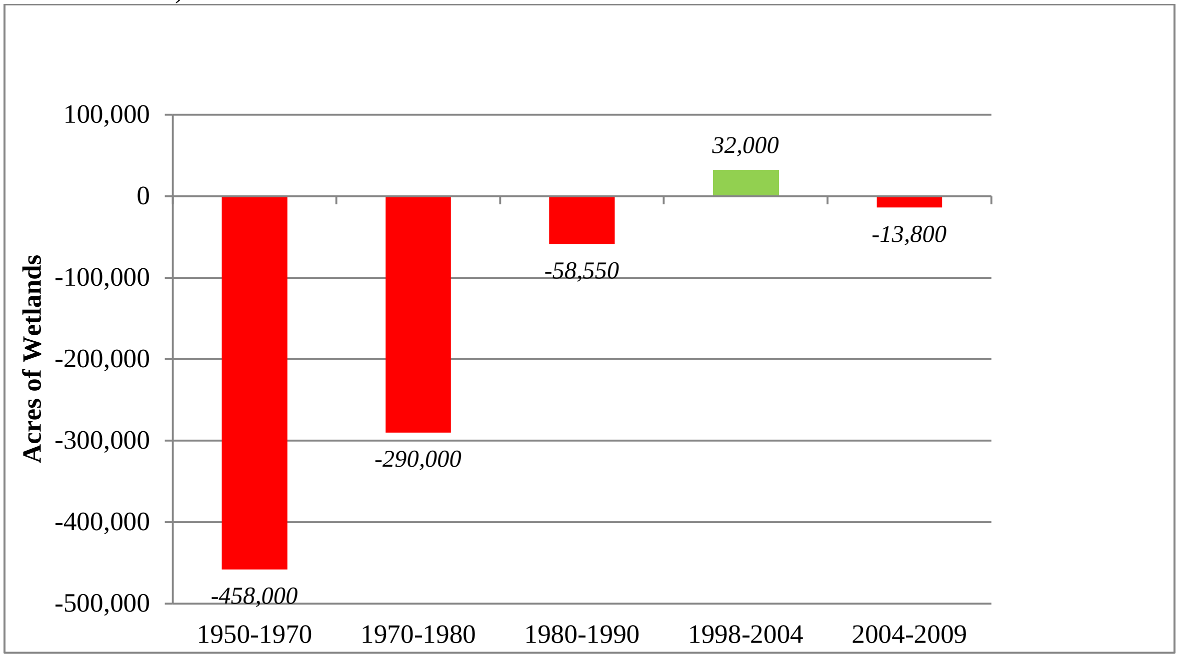
Many of our nation's rivers and streams have been altered by dams, stream channelization, and dredging to stabilize water levels in rivers or lakes. When examining the impacts of large dams alone, it is estimated that 75,000 large dams have modified at least 600,000 miles of rivers across the country (IWSRCC 2011). For example, more than 400 dams exist in the Columbia River

Basin alone (Columbia Basin Trust 2014). Habitat loss coupled with other stressors has led to impacts on fish communities as well. By the early 80's, approximately 81 percent of the native fish communities in the United States had been adversely affected by human activities (Judy et al. 1984).

Wetland habitats have been drained to make land available for agriculture; they have been filled to make land available for residential housing, commerce, and industry; they have been diked to control mosquitoes; and they have been flooded for water supply. 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 dramatically reduced the rate at which these ecosystems have been destroyed or degraded, but many aquatic habitats continue to be lost each year. Between 2006 and 2009, approximately 13,800 acres of wetlands were lost per year (Dahl 2011). While this is significantly less than losses experienced in the previous decades (Figure 3), an estimated 72 percent of U.S wetlands have already been lost when compared to historical estimates (Dahl 2011).

Estuaries are some of the most productive ecosystems in the world. Thousands of species of birds, mammals, fish, and other wildlife depend on estuarine habitats as places to live, feed, and reproduce. Many marine organisms, including most commercially-important species of fish, depend on estuaries at some point during their development. Estuaries are important nursery and rearing habitat for fishes such as salmon and sturgeon, sea turtles, and many other species. In estuaries that support salmon, changes in habitat and food-web dynamics have altered their capacity to support juvenile salmon (Bottom *et al.* 2005, Fresh *et al.* 2005, NMFS 2006d, LCFRB 2010). Diking and filling activities have reduced the tidal prism and eliminated emergent and forested wetlands and floodplain habitats. These changes likely have reduced these estuary's' salmon-rearing capacity. Restoration of estuarine habitats, particularly diked emergent and forested wetlands, reduction of avian predation by terns, and flow manipulations to restore historical flow patterns may have begun to enhance the estuary's productive capacity for salmon, although historical changes in population structure and salmon life histories may prevent salmon from making full use of the productive capacity of estuarine habitats.

Figure 3. Average annual net wetland acreage loss and gain estimates for the conterminous United States. (Taken from Dahl 2011)



Pollution

In addition to direct loss and alteration of aquatic habitat, many aquatic ecosystems have been impacted by various contaminants and pollutants. In 2008, the Heinz Center for Science, Economics and the Environment (Heinz Center) published a comprehensive report on the condition of our nation's ecosystems. In their report, the Heinz Center noted the following:

- From 1992 to 2001, benchmarks for the protection of aquatic life were exceeded in 50 percent of streams tested nationwide—83 percent of streams in urbanized areas—and 94 percent of streambed sediments.
- Contaminants were detected in approximately 80 percent of sampled freshwater fish and most of these detected contaminants exceeded wildlife benchmarks (1992–2001 data) (Gilliom et al 2006)
- Nearly all saltwater fish tested had at least five contaminants at detectable levels, and concentrations exceeded benchmarks for the protection of human health in one-third of fish tissue samples—most commonly DDT, PCBs, PAHs, and mercury (USEPA 2007.)

Toxic contaminants, as noted above have, been documented in the Lower Columbia River and its tributaries (LCREP 2007). More than 41,000 waters are listed as impaired by pollutants that include mercury, pathogens, sediment, other metals, nutrient, and oxygen depletion, and other causes (USEPA 2013a). Pennsylvania reported the greatest number of impaired waters (6,957), followed by Washington (2,420), Michigan (2,352), and Florida (2,292). These figures likely underestimate the true number of impaired waterbodies in the United States. For example, EPA's National Aquatic Resource Surveys (NARS) is a probability based survey that provides a national assessment of the nation's waters and is used to track changes in water quality over time. Through this method, EPA estimates that 50 percent of the nation's streams (approximately 300,000 miles) and 45 percent of the nation's lakes (approximately seven million acres) are in fair to poor condition for nitrogen or phosphorus levels relative to reference condition waters (USEPA 2013b). However, data submitted by the states indicates that only about half of the NARS estimate (155,000 miles of rivers and streams and about four million acres of lakes) have been identified on EPA's 303(d) impaired waters list for nutrient related causes (USEPA 2013b).

Water quality problems, particularly the problem of non-point sources of pollution, have resulted from changes humans have imposed on the landscapes of the United States over the past 100 to 200 years. The mosaic or land uses associated with urban and suburban centers has been cited as the primary cause of declining environmental conditions in the United States (Flather et al. 1998) and other areas of the world (Houghton 1994). Most land areas covered by natural vegetation are highly porous and have very little sheet flow; precipitation falling on these landscapes infiltrates the soil, is transpired by the vegetative cover or evaporates. The increased transformation of the landscapes of the United States into a mosaic of urban and suburban land uses has increased the area of impervious surfaces such as roads, rooftops, parking lots, driveways, sidewalks, etc., in those landscapes. Precipitation that would normally infiltrate soils in forests, grasslands and wetlands falls on and flows over impervious surfaces. That runoff is then channeled into storm sewers and released directly into surface waters (rivers and streams), which changes the magnitude and variability of water velocity and volume in those receiving waters.

Increases in polluted runoff have been linked to a loss of aquatic species diversity and abundance, including many important commercial and recreational fish species. Nonpoint source pollution has also contributed to coral reef degradation, fish kills, seagrass bed declines and algal blooms (including toxic algae) (NOAA 2013). In addition, many shellfish bed and swimming beach closures can be attributed to polluted runoff. As discussed in EPA's latest National Coastal Condition Report (NCCR), nonpoint sources have been identified as one of the stressors contributing to coastal water pollution (USEPA 2012). Since 2001, EPA has periodically released these reports detailing condition of the nation's costal bays and estuaries and assessing trends in water quality in coastal areas. The latest NCCR report indicates that coastal water conditions have remained "fair" and the trend assessment demonstrates no significant change in the water quality of United States' coastal waters since the publication of the NCCR II in 2004 (USEPA 2012).

In many estuaries, agricultural activities are major source of nutrients to the estuary and a contributor to the harmful algal blooms in summer, although according to McMahon and Woodside 1997 (EPA 2006a) nearly one-third of the total nitrogen inputs and one-fourth of the total phosphorus input to the estuary are from atmospheric sources. The National Estuary Program Condition Report found that nationally, 37% of national estuary program estuaries are in poor condition (http://water.epa.gov/type/oceb/nep/nepccr-factsheet.cfm).

Throughout the 20th century, mining, agriculture, paper and pulp mills, and municipalities contributed large quantities of pollutants to many estuaries. For example, the Roanoke River and the Albemarle-Pamlico Estuarine Complex which receives water from 43 counties in North Carolina and 38 counties and cities in Virginia. This estuarine system supports an array of ecological and economic functions that are of regional and national importance. Both the lands and waters of the estuarine system support rich natural resources that are intertwined with regional industries including forestry, agriculture, commercial and recreational fishing, tourism, mining, energy development, and others. The critical importance of sustaining the estuarine system was reflected in its Congressional designation as an estuary of national significance in 1987. Even so, today the Albemarle-Pamlico Estuarine Complex is rated in good to fair condition in the National Estuary Program Coastal Condition Report despite that over the past 40-year period data indicate some noticeable changes in the estuary, including increased dissolved oxygen levels, increased pH, decreased levels of suspended solids, and increased chlorophyll *a* levels (EPA 2006b).

Since 1993 EPA has compiled information on locally issued fish advisories and safe eating guidelines. This information is provided to the public to limit or avoid eating certain fish due to contamination of chemical pollutants. EPA's 2010 National Listing of Fish Advisories database indicates that 98 percent of the advisories are due (in order of importance) to: mercury, PCBs, chlordane, dioxins, and DDT (USEPA 2010). Fish advisories have been issued for 36 percent of the total river miles (approximately 1.3 million river miles) and 100 percent of the Great Lakes and connecting waterways (USEPA 2010). Fish advisories have been steadily increasing over the National Listing of Fish Advisories period of record (1993-2010), but EPA interprets these increases to reflect the increase in the number of waterbodies being monitored by states and advances in analytical methods rather than an increase in levels of problematic chemicals (USEPA 2010).

Water-quality concerns related to urban development include providing adequate sewage treatment and disposal, transport of contaminants to streams by storm runoff, and preservation of stream corridors. Water availability has been and will continue to be a major, long- term issue in many areas. It is now widely recognized that ground-water withdrawals can deplete streamflows (Morgan and Jones 1999), and one of the increasing demands for surface water is the need to maintain instream flows for fish and other aquatic biota.

Climate Change

All species discussed in this Opinion are or will be impacted by the direct and indirect effects of global climatic change. Climate change is projected to have substantial direct and indirect effects on individuals, populations, species, and the structure and function of marine ecosystems in the near future (IPCC 2002). 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 over the next 20 years.

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). 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). 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 (Karl et al. 2009; Littell et al. 2009; Mantua et al. 1997). 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).

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 may 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.

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 ships' ballast water or other sources (Ruiz et al. 1999, Philippart et al. 2011). Invasive species that are better adapted to warmer water temperatures would 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)

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 (Isaac 2008).

Clean Water Act

Several laws and regulations have been put in place to help improve the state of our aquatic resources, the principal one being the CWA. The original 1948 statute was totally re-written in 1972 to produce its current purpose: "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (Federal Water Pollution Control Act, Public Law 92 –500). Congress made substantial amendment to the CWA in the Water Quality Act of 1987 (P. L. 100-4) in response to the significant and persistent water quality problems.

To achieve its objectives, the CWA generally prohibits all point source discharges into the nation's waters, unless otherwise authorized under the CWA. One of the main ways that point source discharges are regulated is through permits issued under the NPDES authorized under the CWA. For example, the NPDES program regulates discharges of pollutants like bacteria, oxygen-consuming materials, and toxic pollutants like heavy metals, pesticides, and other organic chemicals. EPA has also promulgated regulations setting effluent limitations guidelines and standards under sections 301, 304, and 306 of the CWA for more than 50 industries [40 CFR parts 405 through 471]. These effluent limitations guidelines and standards for categories of industrial dischargers are based on pollutants of concern discharged by industry; the degree of control that can be attained using pollution control technology; consideration of various economic tests appropriate to each level of control; and other factors identified in sections 304 and 306 of the CWA (such as non-water quality environmental impacts including energy impacts) (F76 FR 22174-22288). These effluent limitations have been credited for helping reduce the amount of pollutants like toxic metals entering the aquatic environment (Smail et al 2012). While provisions of the CWA have helped significantly improve the quality of aquatic ecosystems, nonpoint sources of water pollution, which are believed to be responsible for the majority of modern water quality problems in the United States, are not subject to CWA permits or regulatory requirements. Instead, nonpoint sources of pollution are regulated by programs overseen by the states.

Water quality is important to all of the listed resources identified above in Table 3. In some cases, the deterioration of water quality has led to the endangerment of aquatic species; in all cases, activities that threaten water quality also threaten these listed resources. Endangered and threatened species have experienced population declines that leave them vulnerable to a multitude of threats. Because 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, whereas 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 CWIS's will have on endangered and threatened species and their designated critical habitats.

Water Quality

Changes in water temperature also affect water quality. Aquatic biota often require certain ranges of water temperatures for survival, growth, and reproduction; when water temperatures are modified beyond optimal ranges for species—or for their prey base or other species with which they share an obligate relationship, these life history functions can be significantly impacted. Human activities that can impact stream and other waterbody temperatures include removal of shading and insulating riparian vegetation, diversions of water for irrigation or other water supply needs, hypolimnetic releases of water from dams, and discharges of water (e.g., wastewater treatment plants, stormwater discharges, etc.). Carlisle et al. (2013) report that 17 percent of assessed streams in the United States had either cooler or warmer summer water temperatures than would be anticipated compared to natural conditions.

Other contaminants that have been identified in various aquatic habitats in the United States. Elevated salinities have been observed due to road-deicing salts, wastewater effluent, aging septic systems, irrigation, and fertilizer applications (Carlisle et al 2013)

EFFECTS OF THE ACTION

An agency's action is defined as activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies. The Act regulations define "effects of the action" as "the direct and indirect effects of an action on the species or 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 C.F.R. 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Effects of the action also include the effects of other activities that are interrelated or interdependent with that action. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

For this Opinion, our analysis of the probable effects of the proposed MSGP on listed resources under the Service's purview is presented using the Approach to the Analysis described previously in this Opinion. The *Effects of the Action* section of this Opinion is divided into three parts. First, in the *Stressors Overview* section, we briefly summarize the anticipated stressors related to the proposed action and the anticipated pathways of exposure to listed species and their designated critical habitats. We also summarize the anticipated responses of listed species and critical habitat PBFs to these stressors, using examples from the literature. As BMPs and other controls will vary across facility subsectors and geographic areas, we do not include a detailed analysis of how such measures would avoid or reduce the effects of the stressors to listed resources in this section. In the next section of the *Effects of the Action* section, the *Review of Permit Structure*, we examine whether and to what degree EPA has structured the MSGP (as well as its monitoring and compliance components) to ensure discharges into waters of the United States and other stressors of the action are not likely to jeopardize the continued existence of endangered species or threatened species or result in the destruction or adverse modification of critical habitat. We follow this analysis with a review of any cumulative effects and interrelated and interdependent activities identified for the proposed action. Finally, we summarize the analysis in the *Integration and Synthesis* section.

Section 1: Stressors Overview

The discharges and discharge-related activities authorized for coverage by the MSGP will introduce stressors into aquatic, riparian, and terrestrial habitats that support listed species and provide critical habitat. We anticipate most of the direct effects to individuals of listed species and critical habitat from the proposed action are likely to be related to exposure to chemical and physical stressors such as pollutants or discharge flow characteristics (e.g., volume, rate, temperature, etc.) Indirect effects to listed species and critical habitat are also expected to occur, including degradation of habitat features and/or quality, reductions or alterations in their forage base, and/or effects to other species they depend upon to complete their life cycles (e.g., host species).

Each of the main categories of stressors will be discussed in this section, roughly following the parameter divisions present in the BE. These include inorganic pollutants, organic pollutants, nutrients, and other pollutants. Due to the expansive number of contaminants and other stressors anticipated from the discharges and the wide variety of habitats within the Action Area, the Opinion will not include an exhaustive discussion of likely effects to all listed species from each stressor. Within each category, we will describe example constituents of specific stressor categories and types of anticipated effects to various taxa groups and critical habitat PBFs. As noted previously, this section provides a general discussion of the effects of potential stressors on listed resources, in the absence of protective measures (such as BMPs and other conservation measures). Section 2 will discuss how the proposed implementation of the permit would address these effects.

Pollutants

We anticipate most, if not all, facilities are likely to have one or more pollutants in their respective discharges, based on the nature of stormwater discharges. Stormwater pollutants vary widely and affect the physiology and/or behavior of exposed biota in ways that disrupt normal behaviors (i.e., free movement, feeding, and sheltering), and reduce growth, migratory success, and reproduction. In sufficient concentrations, stormwater pollutants can also result in acute toxicity and death. Acute effects to aquatic life from activities covered under the proposed permit are influenced by the size and dilution capacity of the receiving waterbody. Other factors that influence exposure and response of listed resources include background water quality conditions, concurrent discharges and/or background levels of other contaminants, frequency and duration of exposure, concentration and relative toxicity of the pollutant(s), biological uptake and availability, and life stage of the organism.

Upon entering the receiving waterbody, stormwater discharges will typically mix with and be diluted by flow and the ambient water quality conditions. In order to assess the potential for adverse effects stemming from acute exposures, it is necessary to know something of the physical and temporal extents of the pollutant mixing zone(s). Stormwater runoff is a complex chemical mixture. Even during the course of a single discharge event, physical and chemical properties (including pollutant concentrations) can vary by orders of magnitude (Glenn et al.

2002). Conditions in the receiving waterbody are also dynamic, and therefore estimates of the probable extent or duration of resulting mixing zones are imprecise and subject to uncertainty. Additional sources of uncertainty include the effect of intermittent, episodic, or transient exposures (Burton et al. 2000; Marsalek et al. 1999); variations in tolerance among exposed individuals and/or populations (Ellis 2000; Hodson 1988; Lloyd 1987); and the potential for synergistic or additive effects among pollutants with similar or the same modes of toxic action (Burton et al. 2000; Ellis 2000; Lloyd 1987).

The main categories of pollutants addressed under the MSGP are presented below. Each category includes a discussion of selected parameters and describes the types of anticipated effects to aquatic biota. Due to the large numbers of parameters and listed resources that have the potential to be affected, the discussion does not include all possible effects to all listed resources that are likely to occur as a result of implementation of the MSGP.

Inorganic Pollutants

In the BE, the EPA identified several types of inorganic pollutants that are most likely to be found in stormwater discharges covered under the permit. These pollutants include aluminum, ammonia, antimony, arsenic, beryllium, cadmium, chromium, copper, cyanide, fluoride, lead, magnesium, mercury, nickel, selenium, silver, and zinc. As the Opinion’s analysis will focus primarily on process, we will not evaluate the potential effects of all of the inorganic pollutants anticipated to be present in the discharges covered by the permit. To provide some context on the effects of the discharges, however, we will briefly discuss the effects of several examples of these chemicals, specifically: ammonia, selenium, and two metals (copper and zinc).

Ammonia

Although ammonia is a common water pollutant, it is also produced endogenously (i.e. within organisms). Under normal conditions, physiological processes, such as passive diffusion through fish gills, enable ammonia to be excreted from the body. However, when concentrations in ambient water are elevated, ammonia may not be effectively removed, and toxic effects can result. Ammonia occurs in two forms, ionized ($NH4+$) and unionized ($NH3$), depending on the pH. The unionized form is toxic and the toxic action in aquatic organisms has been attributed to several causes (EPA 2013) including; (1) proliferation of gill tissue, increased ventilation rates and damage to gill epithelium (Lang et al. 1987), (2) reduction in blood oxygen-carrying capacity due to progressive acidosis (Russo 1985), (3) uncoupling of oxidative phosphorlylation causing inhibition of production and depletion of adenosine triphosphate (ATP) in the brain (Camargo and Alonso 2006), and (4) the disruption of osmoregulatory and circulatory activity disrupting normal metabolic functioning of the liver and kidneys (Arillo et al. 1981, Tomasso et al. 1980). These pathways can lead to acute and chronic effects.

While much is known about the sensitivity of fish to ammonia, recent studies (Wang et al. 2007a; Wang et al. 2007b; Besser et al. 2009) have revealed that freshwater mollusks (mussels and snails) are also very sensitive. In fact, mollusks tend to be more sensitive than previously tested species, including fish. Mussel early life stages (glochidia and juveniles) are particularly sensitive to ammonia. Glochidia are the microscopic larval stage of mussels that live as temporary parasites on the gills of host fish where they develop into juveniles. Toxicity tests have shown that lethal effects to glochidia can occur rapidly (within 6 hours) following exposure to ammonia (Black 2001, Wang et al. 2007a) indicating short term exposures may be sufficient to cause adverse effects.

In 2013, the EPA revised their CWA 304(a) aquatic life ambient water quality criteria for ammonia to include mollusk data so that freshwater mussels, snails and other mollusks receive greater protection. The acute and chronic criteria are formulaic, that is, their magnitude is a function of water temperature and pH. For example, the acute criterion (CMC or criterion maximum concentration) at pH 7 and 20C is 17 mg TAN(total ammonia nitrogen)/L, whereas, at pH 8.5 and 25C the acute criterion is 0.98 mg TAN/L (EPA 2013; table 5a). This reflects the greater sensitivity of mollusks to ammonia in warmer, more alkaline waters. The ammonia benchmark in the MSGP, 2.14 mg/L, falls within this range, however, there are no references or guidance regarding applicable temperature or pH values. Knowledge of the temperature and pH of receiving waters would be important for interpreting ammonia benchmark monitoring data. In addition, benchmark exceedences, even for a single sampling period, may be of sufficient magnitude and duration to cause adverse effects to sensitive aquatic species.

Selenium

Selenium is a naturally occurring trace element and is also an essential micronutrient for animals. The physiological range of selenium that supports normal function is quite narrow. In fish, selenium is required in the diet at concentrations of about 0.15 to 0.5 ug/g dry weight (Watenabe et al.1997). Lower dietary selenium levels can cause effects that are symptomatic of selenium deficiencies, whereas, at higher concentrations (>3 ug/g) selenium becomes a poison (Lemly 1998).

Selenium can be acutely lethal at high concentrations, however, it is also a potent reproductive toxin at much lower levels. One of the more prominent outward manifestations of selenium toxicity in fish is teratogenic deformities (Lemly 1998). Selenium accumulated by adults is transferred to eggs and developing embryos. Because selenium is very similar to sulfur, selenium can replace sulfur in sulfur-containing amino acids. It is hypothesized that such substitutions can alter the tertiary structure of proteins and affect their function. This can result in deformities in both hard and soft structures in developing fish larvae and the prevalence of deformities increases when selenium concentrations in eggs exceed 10 ug/g (Lemly 1998). Typical examples of selenium-induced terata include: 1) lordosis – concave curvature of the spine; 2) scoliosis - lateral curvature of the spine; 3) kyphosis – convex curvature of the thorax region of the spine, resulting in “humpback” condition; 4) missing or deformed fins;5) missing or deformed gills or gill covers (opercle); 6) abnormally shaped head;7) missing or deformed eyes; and 8) deformed mouth (Lemly 1998). Mortality among deformed larvae can be high if the teratogenic effects are severe enough to impair critical body functions (Woock et al 1987). Similar teratogenic effects are also observed in birds that have been exposed to elevated concentrations of selenium in their diet.

There have been several incidents of fish and wildlife poisoning from selenium exposure in nature. Skorupa (1998) described 12 real-world examples. The source of selenium contamination in those cases ranged from coal and petroleum industrial activities, to agricultural drainage water in areas with selenium-rich soils, to mining. The affected waterbodies were offstream aquatic systems, such as, reservoirs, impoundments, lakes, and wetlands. In some cases, these were terminal systems (e.g. Kesterson Reservoir and Salton Sea), where selenium concentrated in the water column due to evaporation.

It is well known that selenium tends to bioaccumulate in the environment. In aquatic systems, selenium is bioconcentrated by living (primary producers such as algae) and non-living (detritus) particulate matter and then biomagnified in primary consumers and successively higher trophic levels. Aquatic and aquatic-dependent organisms that feed at the top of the food chain receive the highest dietary exposure to selenium. Presser and Luoma (2010) describe an ecosystem approach for modeling selenium dynamics in aquatic habitats that highlights the importance of food chain structure and composition in governing exposure to predator species. The EPA has adopted a similar approach in their recently updated draft aquatic life ambient water quality criterion for selenium (EPA 2014). The 2014 draft selenium criterion is comprised of fish-tissue based elements and water-based elements. The tissue-based elements include selenium concentrations in fish egg-ovary (15.2 mg/kg dry wt.), fish whole-body (8.1 mg/kg dry wt.), and fish muscle (11.8 mg/kg dry wt.). The water-based elements were extrapolated from the fish egg-ovary criterion element for both lentic aquatic systems (still waters), 1.3 ug/L, and lotic aquatic systems (flowing waters), 4.8 ug/L. The lentic and lotic water values reflect the apparent difference in enrichment from water into algae, detritus, and sediment in these two types of aquatic systems (EPA 2014).

Based on the information described above, the stormwater exposure scenario that poses the greatest risk to listed species is likely where discharges flow into or will influence lentic habitats, such as reservoirs, impoundments, lakes, or wetlands. In those habitats, the selenium benchmark of 5 ug/L, if achieved, may not ensure that adverse effects to species will not occur considering that the proposed water-based criterion for lentic systems (1.3 ug/L) is substantially lower. Exceedence of the selenium benchmark values for discharges to lentic or lotic systems would likely pose greater risk and could potentially cause adverse effects.

Metals

We anticipate that exposure to metals in stormwater will result in adverse effects to aquatic biota, unless sufficient measures are incorporated to avoid or reduce exposure to listed resources. In this Opinion, we will consider the effects of copper (CU) and zinc (ZN) to fish (and primarily salmonids) as examples of types of likely effects that would be expected to result from discharges of stormwater. As with the previous pollutants, our discussion does not include all anticipated effects from these and other metals to salmonids and other types of fish and aquatic biota. However, this discussion represents reasonable worst-case scenarios that are applicable to the proposed action.

There are three pathways by which salmonids may be directly exposed to and/or may uptake metals: (1) uptake of ionic metals at the gill surfaces (Niyogi et al. 2004); (2) dietary uptake; and (3) olfaction (sense of smell) involving receptor neurons (Baldwin et al. 2003). Of these three pathways, the mechanism of dietary uptake is least understood. For dissolved metals, the most direct pathway is through the gill surfaces. Measurements of total recoverable metal concentration include a fraction that is bound to suspended solids and/or complexed with organic matter or other ligands; this fraction is not available to bind to gill receptor sites. Most metal toxicity studies have examined the dissolved metal fraction which is more bioavailable and therefore of greater significance for acute exposure and toxicity.

The relative toxicity of a metal or metal species can be altered by hardness, water temperature, pH, organic content, phosphate concentration, suspended solid concentration, the presence of other metals or contaminants (i.e., synergistic effects), and other factors. Eisler (1998) and Playle (2004) found that some dissolved metal mixtures exhibit greater than additive toxicity. Water hardness affects the bio-available fraction of metals; as hardness increases, metals become less bio-available for uptake at the gill surfaces and therefore less toxic (Hansen et al. 2002; Niyogi et al. 2004). However, Baldwin et al. (2003) found water hardness did not influence the inhibiting effects of Cu on salmon olfactory functions. Additional analysis related to copper and zinc are presented below.

Copper

Even at low concentrations, Cu is acutely toxic to fish. Effects of Cu exposure include: 1) weakened immune function and impaired disease resistance; 2) impaired respiration; 3) disruptions to osmoregulation; 4) impaired function of olfactory organs and brain; 5) altered blood chemistry; 6) altered enzyme activity and function; and 7) pathology of the kidneys, liver, and gills (Eisler 1998).

Sprague (1964) and Sprague and Ramsay (1965) reported incipient lethal levels for dissolved Cu of 48 μg/L and 32 μg/L at water hardnesses of 20 and 14 mg/L, respectively. The Incipient Lethal Level is that concentration which is required to kill half of the fish tested within 1 week of exposure. Sprague and Ramsay (1965) found higher concentrations of Cu killed juvenile salmon much more rapidly than did lower concentrations at 14 mg/L hardness. Baldwin et al. (2003) found short pulses of dissolved Cu, at concentrations as low as 2 μg/L, reduced olfactory sensory responsiveness by approximately 10 percent within 10 minutes, and by 25 percent within 30 minutes. At 10 μg/L, responsiveness was reduced by 67 percent within 30 minutes. Baldwin et al. (2003) identified a Cu concentration neurotoxic threshold of an increase of 2.3 to 3.0 μg/L, when background levels are 3.0 μg/L or less. When exceeded, this threshold is associated with olfactory inhibition. The authors also reference three other studies examining long-duration Cu exposures (i.e., exceeding 4 hours); these studies found that long-duration exposures resulted in cell (olfactory receptor neuron) death in rainbow trout and Atlantic and Chinook salmon. Baldwin et al. (2003) found water hardness did not influence the toxicity of Cu to coho salmon sensory neurons.

More recently, Sandahl et al. (2007) documented sensory physiological impairment and related disruption to predator avoidance behaviors, in juvenile coho at concentrations as low as 2 μg/L dissolved Cu. The effects of short-term Cu exposure may persist for hours and possibly longer. Although salmonids may actively avoid surface waters containing an excess of dissolved Cu, those exposed individuals may experience olfactory function inhibition within minutes of exposure. Furthermore, avoidance of a chemical plume may cause fish to leave refugia or preferred habitats in favor of less suitable or less productive habitats. This, in turn, can make fish more vulnerable to predation and can impair foraging success, feeding efficiency, and thereby growth.

Folmar (1976) observed avoidance responses in rainbow trout fry when exposed to a lowest observed effect concentration of 0.1 μg/L dissolved Cu (hardness of 90 mg/L). The EPA (1980a) also documented avoidance by rainbow trout fry of dissolved Cu concentrations as low as 0.1 μg/L during a 1-hour exposure, as well as a LC_{10} for smolts exposed to 7.0 μg/L for 200 hours, and a LC_{10} for juveniles exposed to 9.0 μg/L for 200 hours.

Zinc (Zn)

Zn occurs naturally in the environment and is an essential trace element for most organisms. However, in sufficient concentrations and when bioavailable for uptake by aquatic organisms, excess Zn is toxic. Toxicity in the aquatic environment and for exposed aquatic organisms is influenced by water hardness, pH, organic matter content, levels of dissolved oxygen, phosphate, and suspended solids, the presence of mixtures (i.e., synergistic effects), trophic level, and exposure frequency and duration (Eisler 1993). Bioavailability of Zn increases under conditions of high dissolved oxygen, low salinity, low pH, and/or high levels of inorganic oxides and humic substances. Most of the Zn introduced into aquatic environments is eventually partitioned into sediments (Eisler 1993).

Effects of Zn exposure include: 1) weakened immune function and impaired disease resistance (Ghanmi et al. 1989); 2) impaired respiration, including potentially lethal destruction of gill epithelium (Eisler 1993); 3) altered blood and serum chemistry, and enzyme activity and function (Hilmy et al. 1987a; Hilmy et al. 1987b); 4) interference with gall bladder and gill metabolism (Eisler 1993); 5) hyperglycemia; and 6) jaw and branchial abnormalities (Eisler 1993).

Hansen et al. (2002) determined 120-day lethal concentrations of Zn for test subjects that included bull trout and rainbow trout fry. Multiple pairs of tests were performed with a nominal pH of 7.5, hardness of 30 mg/L, and at a temperature of 8 °C. Bull trout LC_{50} values ranged from 35.6 to 80.0 μg/L, with an average of 56.1 μg/L. Hansen et al. (2002) found that rainbow trout fry are more sensitive to Zn (i.e., exhibit a lower LC_{50}) than are bull trout fry. The authors also report that older, more active juvenile bull trout are more sensitive than younger, more docile juvenile bull trout based on observed changes in behavior at the juvenile life stage. The authors argue that the timing of Zn exposure and the activity level of the exposed fish are germane to predicting toxicity in the field.

The mode of action for Zn toxicity relates to net loss of calcium. Studies suggest that Zn exposure inhibits calcium uptake, although it appears this effect is reversible once fish return to clean water. The apparent difference in sensitivity between rainbow trout and bull trout may be due to the lesser susceptibility of bull trout to calcium loss. Hansen et al. (2002) state that differences in sensitivity between these two salmonids may reflect different physiological strategies for regulating calcium uptake. These strategies may include gills that differ structurally, differences in the mechanisms for calcium uptake, and/or variation in resistance to or tolerance for calcium loss.

In addition to the physiological effects of Zn exposure, studies have also documented a variety of behavioral responses. Among these, Eisler (1993) includes altered avoidance behavior, decreased swimming ability, and hyperactivity. The author suggests these effects have implications for growth, reproduction, and survival. Sub-lethal endpoints have been evaluated with test subjects that include both juvenile and adult rainbow trout (Eisler 1993; USEPA 1980b; USEPA 1987). Some of these test results clearly indicate that juvenile rainbow trout are more sensitive than adult rainbow trout. Using juvenile rainbow trout as test subjects, studies have found that sub-lethal effects occur at concentrations approximately 75 percent lower (5.6 μg/L) than the concentrations that result in lethal effects (24 μg/L) (Eisler 1993; Hansen et al. 2002). Sprague (1968) found that at concentrations as low as 5.6 μg/L juvenile rainbow trout exhibit avoidance behavior.

Although salmonids may actively avoid surface waters containing an excess of dissolved Zn, it is likely that stormwater runoff contains a mixture of pollutants, including some known to affect the olfactory system, such as dissolved Cu. Bull trout exposed to these mixtures may not always be capable of detecting and avoiding elevated levels of dissolved Zn. Furthermore, avoidance of a chemical plume may cause fish to leave refugia or preferred habitats in favor of less suitable or less productive habitats. This can make fish more vulnerable to predation and can impair foraging success, feeding efficiency, and thereby growth.

Organic Pollutants

The MSGP identifies the following seven organic pollutants as requiring effluent limit guidelines (ELGs) monitoring in stormwater discharges; alpha terpineol, benzoic acid, aniline, pyridine, naphthalene, p-cresol, and phenol. There are no benchmarks for organic pollutants in the permit and therefore no benchmark monitoring is required for organic pollutants.

As an example of an organic pollutant, we look briefly at polyaromatic hydrocarbons (PAH). Heintz et al. (2000) have reported findings that suggest a link between PAH exposure during egg incubation and subsequent rates of marine survival and growth for salmonids. The study found that statistically significant reductions in marine survival, or increases in delayed rates of mortality, resulted from exposure to concentrations as low as 5.4 ppb total PAH. The study also found that juvenile salmon surviving embryonic exposure exhibited reduced growth in response to doses as low as 18 ppb total PAH. The authors suggest that reductions in marine survival and growth are most likely attributable to biochemical impairment of gene and/or enzyme function, and that fish populations whose natal habitats are contaminated with PAHs "…can be expected to experience the compound effects of mortality during exposure, reduced survivorship afterwards, and reduced reproductive output at maturity." (Heintz et al. 2000)

Although there are likely to be other organic pollutants in stormwater discharges from some facilities, we assume PAHs and other pollutants in this category will not cause adverse effects if appropriate BMPs are in place, are operational, and are maintained such that the discharges are controlled to avoid hazardous exposures to listed species. We also assume the EPA will provide the oversight needed as described in their permit to ensure the BMPs are effective and that listed species are not exposed to hazardous concentrations of organic pollutants in stormwater discharges authorized under the MSGP.

Nutrients

Nutrient loadings in the form of nitrogen and phosphorus to waterbodies impact water quality by stimulating plant and algae growth which subsequently may result in depletion of dissolved oxygen, degradation of habitat, development of harmful algal blooms, impairment of the waterbody's designated use, and impairment of drinking water sources. In general, nitrogen is most often the limiting nutrient in estuarine waters, and phosphorus is more often limiting in freshwater systems. This means that the growth of phytoplankton is substantially controlled by the concentration and availability of phosphorus in freshwater systems. Increased phosphorus concentrations can lead to changes in composition of flora and fauna present, increased eutrophication of a water body, rates of ecosystem functioning, nutrient uptake, recycling rates of the ecosystem, and decomposition rates (WERF, 2010). Determining risk to aquatic life from excess nutrients (e.g.,eutrophication) is complicated because nitrogen and phosphorus are essential for primary production in aquatic ecosystems, and over-enrichment problems involve multiple interrelated variables. The most visible symptom of eutrophication is the excessive algal growth that reduces water clarity. Eutrophication can also significantly affect phytoplankton community structure resulting in a greater abundance of less desirable taxa such as blue-green algae. These changes in the phytoplankton community can have cascading effects on higher trophic levels and the eventual transfer of organic carbon from the primary producers to less desired species – for example, the replacement of seagrasses with less desirable vegetation types (WERF, 2010)

Suspended Sediments and Turbidity

We anticipate both discharges and certain discharge-associated activities are likely to result in elevated levels of suspended sediment and turbidity in the aquatic environment. Several facility subsectors are subject to either water quality benchmarks or ELGs (9 subsectors) associated with TSS, and one sector (metal mining) has a benchmark for both TSS and turbidity (Appendix E of this Opinion). We anticipate that inputs of sediment are likely to result in both direct and indirect effects to aquatic biota and aquatic critical habitat. Suspended sediment and turbidity may directly affect listed resources, their prey, hosts, or habitat, or may provide a future source of exposure from contaminants where these substances adsorb to sediments before and/or during discharges. As TSS and turbidity can result in direct effects to aquatic biota and can also serve as a substrate for adsorption or sink for other pollutants, we have selected it as an example to discuss in more detail in the following section. Examples related to fish (in the context of bull trout and other salmonids) and aquatic invertebrates are discussed briefly below.

The introduction of sediment in excess of natural amounts can have multiple adverse effects on fish and their habitat (Rhodes et al. 1994; Berry et al 2003), related to either suspended sediments or sediments that have settled into or onto the substrate. In either case, the effect of sediment beyond natural background conditions can be fatal at high levels. Several types of effects from sediments are described in Table 4 below. For example, embryo survival and subsequent fry emergence success have been highly correlated to the percentage of fine material within the streambed (Shepard et al. 1984). Low levels of sediment may result in sublethal and behavioral effects such as increased activity, stress, and emigration rates; loss or reduction of foraging capability; reduced growth and resistance to disease; physical abrasion; clogging of gills; and interference with orientation in homing and migration (McLeay et al. 1987; Newcombe and MacDonald 1991; Barrett et al 1992; Lake and Hinch 1999; Bash et al 2001; Watts et al. 2003; Vondracek et al. 2003; Berry, Rubinstein, Melzian, and Hill 2003). The effects of increased suspended sediments can cause changes in the abundance and/or type of food organisms, alterations in fish habitat, and long-term impacts to fish populations (Anderson et al. 1996; Reid and Anderson 1999). No threshold has been determined at which the addition of fine sediment to a stream is harmless (Suttle et al. 2004). Even at low concentrations, fine sediment deposition can decrease growth and survival of juvenile salmonids.

Table 4. Summary of adverse effects to fish resulting from elevated sediment levels.

Sediment Impacts to Fish (Examples)	**Summary of Adverse Effects Related to Sediment Impacts**
Gill trauma	Clogs gills which impedes circulation of water over the gills and interferes with respiration
Other Physiological Effects	Increases stress, resulting in decreased immunological competence, growth and reproductive success
Behavioral	Results in avoidance and abandonment of preferred habitat
Feeding efficiency	Reduces visibility and impacts feeding rates and prey selection
Prey base	Disrupts both habitat for and reproductive success of macroinvertebrates and other salmonids (bull trout prey) that spawn and rear downstream of the
Habitat	Fills pools, simplifies and reduces suitable habitat

In the absence of detailed local information on population dynamics and habitat use, any increase in the proportion of fines in substrates should be considered a risk to the productivity of an environment and to the persistence of associated bull trout populations (Rieman and McIntyre 1993). Specific effects of sediment on fish and their habitat can be put into three classes that include (Bash et al. 2001; Newcombe and MacDonald 1991; Waters 1995)

> Lethal: Direct mortality to any life stage, reduction in egg-to-fry survival, and loss of spawning or rearing habitat. These effects damage the capacity of affected fish to produce fish and sustain populations.
>
> Sublethal: Reduction in feeding and growth rates, decrease in habitat quality, reduced tolerance to disease and toxicants, respiratory impairment, and physiological stress. While not leading to immediate death, such effects and responses may produce mortalities and population decline over time.

> Behavioral: Avoidance and distribution, homing and migration, and foraging and predation. Behavioral effects change the activity patterns or alter the kinds of activity usually associated with an unperturbed environment. Behavior effects may lead to immediate death or population decline or mortality over time.

The following paragraphs provide more detailed discussion of the effects listed in Table 4 related to aquatic species using bull trout and other salmonids as exemplar species/taxa grouping. However, these effects are reasonably expected to manifest in other fish and invertebrate species (discussed below as prey for salmonids) as well.

Gill Trauma

High levels of suspended sediment and turbidity can result in direct mortality of fish by damaging and clogging gills (Curry and MacNeill 2004). Fish gills are delicate and easily damaged by abrasive silt particles (Bash et al. 2001). As sediment begins to accumulate in the gill filaments, fish excessively open and close their gills to expunge the silt. If irritation continues, mucus is produced to protect the gill surface, which may impede the circulation of water over the gills and interfere with fish respiration (Bash et al. 2001). Gill flaring or coughing abruptly changes buccal cavity pressure and is a means of clearing the buccal cavity of sediment. Gill sediment accumulation may result when fish become too fatigued to continue clearing particles via the cough reflex (Servizi and Martens 1991).

Fish are more susceptible to increased suspended sediment concentrations at different times of the year or in watersheds with naturally high sediment such as glaciated streams. Fish secrete protective mucous to clean the gills (Erman and Ligon 1985). In glaciated systems or during winter and spring high flow conditions when sediment concentrations are naturally high, the secretion of mucous can keep gills clean of sediment. Protective mucous secretions are inadequate during the summer months, when natural sediment levels are low in a stream system. Consequently, sediment introduction at this time may increase the vulnerability of fish to stress and disease (Bash et al. 2001).

Other Physiological Effects

Sublethal levels of suspended sediment may cause undue physiological stress on fish, which may reduce the ability of the fish to perform vital functions (Cederholm and Reid 1987). Stress is defined as a condition perceived by an organism that threatens a biological function of the organism, and a set of physiological and behavioral responses is mounted to counteract the condition (Overli 2001, p. 7). A stressor is any anthropogenic or natural environmental change severe enough to require a physiological response on the part of a fish, population, or ecosystem (Anderson et al. 1996; Jacobson et al. 2003; EPA 2001). At the individual level, stress may affect physiological systems, reduce growth, increase disease, and reduce the individual’s ability to tolerate additional stress (Anderson et al. 1996; Bash et al. 2001). At the population level, the effects of stress may include reduced spawning success, increased larval mortality, and reduced recruitment to succeeding life stages and, therefore, overall population declines (Bash et al. 2001).

Upon encountering a stressor, the fish responds through a series of chemical releases in its body. These primary chemical and hormonal releases include catecholamine (e.g. epinephrine, norepinehprine) in the circulatory system, corticosteroids (e.g. cortisol) from the interrenal tissue, and hypothalamic activation of the pituitary gland (Barton 2002; Davis 2006; Gregory and Wood 1999; Schreck et al. 2001). Primary chemical releases result in secondary releases or changes in plasma, glucose, tissue ion, metabolite levels, and hematological features. These secondary responses relate to physiological adjustments in metabolism, respiration, immune and cellular function (Barton 2002; Haukenes and Buck 2006; Mazeaud et al. 1977). After secondary responses, continued stress results in tertiary stress responses that affect whole-animal performance such as changes in growth, condition, resistance to disease, metabolic scope for activity, behavior, and ultimately survival (Barton 2002; Pickering et al. 1982; Portz et al. 2006).

Stress in a fish occurs when the homeostatic or stabilizing process in the organism exceed the capability of the organism to compensate for the biotic or abiotic challenge (Anderson et al. 1996). The response to a stressor is an adaptive mechanism that allows the fish to cope with the real or perceived stressor in order to maintain its normal or homeostatic state (Barton 2002). Acclimation to a stressor can occur if compensatory physiological responses by the fish are able to re-establish a satisfactory relationship between the changed environment and the organism (Anderson et al. 1996). The ability of an individual fish to acclimate or tolerate the stress will depend on the severity of the stress and the physiological limits of the organism (Anderson et al. 1996). In a natural system, fish are exposed to multiple chemical and physical stressors that can combine to cause adverse effects (Berry et al. 2003). The chemical releases from each stressor results in a cumulative or additive response (Barton et al.1986; Cobleigh 2003; Milston et al. 2006; EPA 2001).

Stress in fish results in extra cost and energy demands. Elevated oxygen consumption and increased metabolic rate result from the reallocation of energy to cope with the stress (Barton and Schreck 1987; Contreras-Sanchez et al. 1998; McCormick et al. 1998). An approximate 25 percent increase in metabolic cost, over standard metabolism requirements, is needed to compensate for a perceived stress (Barton and Schreck 1987; Davis 2006). Stressed fish would thus have less energy available for other life functions such as seawater adaptation, disease resistance, reproduction, or swimming stamina (Barton and Schreck 1987; Contreras-Sanchez et al. 1998).

Tolerance to suspended sediment may be the net result of a combination of physical and physiological factors related to oxygen availability and uptake by fish (Servizi and Martens 1991). The energy needed to perform repeated coughing (see Gill trauma section) increases metabolic oxygen demand. Metabolic oxygen demand is related to water temperature. As temperatures increase, so does metabolic oxygen demand, but concentrations of oxygen available in the water decreases. Therefore, a fish's tolerance to suspended sediment may be primarily related to the capacity of the fish to perform work associated with the cough reflex. However, as sediment increases, fish have less capability to do work, and therefore less tolerance for suspended sediment (Servizi and Martens 1991).

Once exposed to a stressor, the primary chemical releases can take one-half to twenty-four hours to peak (Barton 2002; Quigley and Hinch 2006; Schreck 1981). Recovery or return of the primary chemical release to normal or resting levels can take two hours to two weeks (Mazeaud et al. 1977; Schreck et al. 2001). In a study of handling stress, chemical release of cortisol peaked at two hours and returned to normal in four hours. However, complete recovery took 2 weeks (Pickering et al. 1982). Fish exposed to two or more stresses require longer recovery times than fish exposed only to one stressor indicating the cumulative effects of stress (Sigismondi and Weber 1988).

Redding el al. (1987) observed higher mortality in young steelhead trout exposed to a combination of suspended sediment (2500 mg/L) and a bacteria pathogen, than when exposed to the bacteria alone. Physiological stress in fishes may decrease immunological competence, growth, and reproductive success (Bash et al. 2001).

Behavioral effects

Increased turbidity and suspended sediment may result in behavior changes in salmonids. Such changes are often the first effects evoked from increased levels of turbidity and suspended sediment (Anderson et al. 1996). Behavioral changes include avoidance of habitat, reduction in feeding, increased activity, redistribution and migration to other habitats and locations, disruption of territoriality, and altered homing (Anderson et al. 1996; Bash et al. 2001; Suttle et al. 2004). Many behavioral effects result from changes in stream habitat (see Habitat effects section). As suspended sediment concentration increases, habitat may be lost which results in abandonment and avoidance of preferred habitat. Stream reach emigration can result in a bioenergetic demand that may affect the growth or reproductive success of the individual fish (Bash et al. 2001). Pulses of sediment result in downstream migration of fish, which disrupts social structures, causes downstream displacement of other fish and increases intraspecific aggression (Bash et al. 2001; McLeay et al. 1987; Suttle et al. 2004). Loss of territoriality and the breakdown of social structure can lead to secondary effects of decreased growth and feeding rates, which may lead to mortality (Bash et al. 2001; Berg and Northcote 1985).

Downstream migration by bull trout provides access to more prey, better protection from avian and terrestrial predators, and alleviates potential intraspecific competition or cannibalism in rearing areas (MBTSG 1998). Benefits of migration from tributary rearing areas to larger rivers or estuaries may be increased growth potential. Increased sedimentation may result in premature or early migration of both juveniles and adults or avoidance of habitat and migration of nonmigratory resident bull trout. High turbidity may delay migration back to spawning sites, although turbidity alone does not seem to affect homing. Delays in spawning migration and associated energy expenditure may reduce spawning success and therefore population size (Bash et al. 2001). It is reasonable to assume that these effects would apply to other migratory species as well.

Feeding Efficiency

Increased turbidity and suspended sediment can affect a number of factors related to feeding in salmonids, including feeding rates, reaction distance, prey selection, and prey abundance (Barrett et al. 1992; Bash et al. 2001; Henley et al. 2000). Changes in feeding behavior are primarily related to the reduction in visibility that occurs in turbid water. Effects on feeding ability are important as salmonids must meet energy demands to compete with other fishes for resources and to avoid predators. Reduced feeding efficiency would result in lower growth and fitness of bull trout and other salmonids (Barrett et al. 1992; Sweka and Hartman 2001).

Distance of prey capture and prey capture success both were found to decrease significantly when turbidity was increased (Berg and Northcote 1985; Sweka and Hartman 2001; Zamor and Grossman 2007). Waters (1995) states that loss of visual capability, leading to reduced feeding, is one of the major sublethal effects of high suspended sediment. Increases in turbidity were reported to decrease reactive distance and the percentage of prey captured (Bash et al. 2001; Klein 2003; Sweka and Hartman 2001). At 0 Nephelometric Turbidity Units (NTUs), 100 percent of the prey items were consumed; at 10 NTUs, fish frequently were unable to capture prey species; at 60 NTUs, only 35 percent of the prey items were captured. At 20 to 60 NTUs, significant delay in the response of fish to prey was observed (Bash et al. 2001). Loss of visual capability and capture of prey leads to depressed growth and reproductive capability.

To compensate for reduced encounter rates with prey under turbid conditions, prey density must increase substantially or salmonids must increase their active searches for prey (Sweka and Hartman 2001). Such an increase in activity and feeding rates under turbid conditions reduces net energy gain from each prey item consumed (Sweka and Hartman 2001).

Sigler et al. (1984) found that a reduction in growth occurred in steelhead and coho salmon when turbidity was as little as 25 NTUs. The slower growth was presumed to be from a reduced ability to feed; however, more complex mechanisms such as the quality of light may also affect feeding success rates. Redding et al. (1987) found that suspended sediment may inhibit normal feeding activity, as a result of a loss of visual ability or as an indirect consequence of increased stress.

Prey Base[25]

Sedimentation can have an indirect effect on fish populations through impacts or alterations to the macroinvertebrate communities or population (Anderson et al. 1996). Increased turbidity and suspended sediment can reduce primary productivity by decreasing light intensity and periphytic

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[25] The following analysis applies both to the invertebrates in the context of the prey base for other species (including listed species such as salmonids and other fish), but is also applicable to some of the listed invertebrates addressed in this Opinion where appropriate.

(attached) algal and other plant communities (Anderson et al. 1996; Henley et al. 2000; Suren and Jowett 2001). This results in decreased macroinvertebrates that graze on the periphyton.

Sedimentation also alters the habitat for macroinvertebrates, changing the species density, diversity and structure of the area (Anderson et al. 1996; Reid and Anderson 1999; Shaw and Richardson 2001; Waters 1995). Certain groups of macroinvertebrates are favored by salmonids as food items. These include mayflies, caddisflies, and stoneflies. These species prefer large substrate particles in riffles and are negatively affected by fine sediment (Everest et al. 1987; Waters 1995). Increased sediment can affect macroinvertebrate habitat by filling of interstitial space and rendering attachment sites unsuitable. This may cause invertebrates to seek more favorable habitat (Rosenberg and Snow 1975). With increasing fine sediment, invertebrate composition and density changes from available, preferred species (i.e., mayflies, caddisflies, and stoneflies) to non-preferred, more unavailable species (i.e., aquatic worms and other burrowing species) (Henley et al. 2000; Reid and Anderson 1999; Shaw and Richardson 2001; Suren and Jowett 2001; Suttle et al. 2004). The degree to which substrate particles are surrounded by fine material was found to have a strong correlation with macroinvertebrate abundance and composition (Birtwell 1999). At higher levels of embeddednes, insect abundance can decline, especially for riffle-inhabiting taxa; one study in central Idaho, for example, noted an approximate 50 percent decline of insect abundance when embeddness was increased above natural conditions (Bjornn et al 1974 and 1977, as reported in Waters 1995).

Increased turbidity and suspended solids can affect macroinvertebrates in multiple ways through increased invertebrate drift, respiratory problems, and feeding impacts (Berry et al. 2003; Cederholm and Reid 1987; Shaw and Richardson 2001). For example, the effect of turbidity on light transmission has been well documented and results in increased invertebrate drift (Birtwell 1999; Waters 1995). This may be a behavioral response associated with the night-active diel drift patterns of macroinvertebrates. Some effects related to insect drift may result in impacts to habitat quality, where a temporary reduction in prey items may affect invertivores within a given reach of stream or other water body. However, drift can also help to improve prey availability in a previously disturbed stream. Invertebrate drift is an important mechanism in the repopulation, recolonization, or recovery of a macroinvertebrate community after a localized disturbance (Anderson et al. 1996; Reid and Anderson 1999). While increased turbidity results in increased macroinvertebrate drift, it is thought that the overall invertebrate populations would not fall below the point of severe depletion (Waters 1995).

Increased suspended sediment can affect macroinvertebrates by abrasion of respiratory surface and interference with food uptake for filter-feeders (Anderson et al. 1996; Berry et al. 2003; Birtwell 1999; Shaw and Richardson 2001; Suren and Jowett 2001). Increased suspended sediment levels tend to clog feeding structures and reduce feeding efficiencies, which results in reduced growth rates, increased stress, or death of the invertebrates (Newcombe and MacDonald 1991). Invertebrates living in the substrate are also subject to scouring or abrasion, which can damage respiratory organs (Bash et al. 2001).

Habitat Effects

Increases in sediment can alter fish habitat or the utilization of habitats by fish (Anderson et al. 1996). The physical implications of sediment in streams include changes in water quality, degradation of spawning and rearing habitat, simplification and damage to habitat structure and complexity, loss of habitat, and decreased connectivity between habitats (Anderson et al. 1996; Bash et al. 2001). Biological implications of this habitat damage include underutilization of stream habitat, abandonment of traditional spawning habitat, displacement of fish from their preferred habitat, and avoidance of habitat (Newcombe and Jensen 1996).

As sediment enters a stream it is transported downstream under normal fluvial processes and deposited in areas of low shear stress (MacDonald and Ritland 1989). These areas are usually behind obstructions, near banks (shallow water) or within interstitial spaces. This episodic filling of successive storage compartments continues in a cascading fashion downstream until the flow drops below the threshold required for movement or all pools have reached their storage capacities (MacDonald and Ritland 1989). As sediment load increases, the stream compensates by geomorphologic changes in increased slope, increased channel width, decreased depths, and decreased flows (Castro and Reckendorf 1995). These processes contribute to increased erosion and sediment deposition that further degrade salmonid habitat.

Loss of acceptable habitat and refugia, as well as decreased connectivity between habitats, reduces the carrying capacity of streams for salmonids (Bash et al. 2001). This loss of habitat or exclusion of fish from their habitat, if timed inappropriately, could impact a fish population if the habitat within the affected stream reach is critical to the population during the period of the sediment release (Anderson et al. 1996; Reid and Anderson 1999). For example, if summer pool habitat used by adults as holding habitat prior to spawning is a limiting factor within a stream, increased sediment and reduced pool habitat during the summer can decrease the carrying capacity of the stream reach and decrease the fish population. In systems lacking adequate connectivity of habitats, fish may travel longer distances or use less desirable habitats, increasing biological demands and reducing their fitness.

The addition of fine sediment (less than 6.4 mm) to natural streams during summer decreased abundance of juvenile Chinook salmon in almost direct proportion to the amount of pool volume lost to fine sediment (Bjornn et al. 1977). Similarly, the inverse relationship between fine sediment and densities of rearing Chinook salmon indicates the importance of winter habitat and high sediment loads (Bjornn et al. 1977). As fine sediments fill the interstitial spaces between the cobble substrate, juvenile Chinook salmon were forced to leave preferred habitat and to utilize cover that may be more susceptible to ice scouring, predation, and decreased food availability (Hillman et al. 1987). Deposition of sediment on substrate may lower winter carrying capacity for bull trout (Shepard et al. 1984). Food production in the form of aquatic invertebrates may also be reduced.

For example, bull trout have more specific habitat requirements and many other salmonids species, and these requirements appear to influence their distribution and abundance (Rieman and McIntyre 1993). All life history stages are associated with complex forms of cover including large woody debris, undercut banks, boulders, and pools. Other habitat characteristics important to bull trout include channel and hydrologic stability, substrate composition, temperature, and the presence of migration corridors (Rieman and McIntyre 1993).

Juvenile bull trout densities are highly influenced by substrate composition (MBTSG 1998; Rieman and McIntyre 1993; Shepard et al. 1984). During the summer, juvenile bull trout hold positions close to the stream bottom and often seek cover within the substrate itself. When streambed substrate contains more than 30 percent fine materials, juvenile bull trout densities drop off sharply (Shepard et al. 1984). Any loss of interstitial space or streambed complexity through the deposition of sediment would result in a loss of summer and winter habitats (MBTSG 1998). The reduction of rearing habitat will ultimately reduce the potential number of recruited juveniles and therefore reducing population numbers (Shepard et al. 1984). In fact, Johnston et al. (2007) found that density-dependent survival during the earliest of the juvenile stages (between egg and age-1) regulated recruitment of adult bull trout in the population.

Although an avoidance response by fish to increased sediment may be an initial adaptive survival strategy, displacement from cover could be detrimental. It is possible that the consequences of fish moving from preferred habitat, to avoid increasing levels of suspended sediment, may not be beneficial if displacement is to sub-optimal habitat, because they may be stressed and more vulnerable to predation (Birtwell 1999).

In addition to altering streambed composition, anthropogenic input of sediment into a stream can change channel hydrology and geometry (Owens et al. 2005). Sediment release can reduce the depth of pools and riffle areas (Anderson et al. 1996). This can reduce available fish habitat, decrease fish holding capacity, and decrease fish populations (Anderson et al. 1996).

Examples of Other Effects

Spawning, Redds, Eggs, and Alevins. The effects of suspended sediment, deposited in a redd and potentially reducing water flow and smothering eggs or alevins or impeding fry emergence, are related to sediment particle sizes of the spawning habitat (Bjornn and Reiser 1991). Sediment particle size determines the pore openings in the redd gravel. With small pore openings, more suspended sediments are deposited and water flow is reduced compared to large pore openings.

Survival of eggs is dependent on a continuous supply of well-oxygenated water through the streambed gravels (Anderson et al. 1996; Cederholm and Reid 1987). Eggs and alevins are generally more susceptible to stress by suspended solids than are adults. Accelerated sedimentation can reduce the flow of water and, therefore, oxygen to eggs and alevins. This can decrease egg survival, decrease fry emergence rates (Bash et al. 2001; Cederholm and Reid 1987; Chapman 1988), delay development of alevins (Everest et al. 1987), reduce growth and cause premature hatching and emergence (Birtwell 1999). Fry delayed in their emergence are also less able to compete for environmental resources than fish that have undergone normal development and emergence (intra- or interspecific competition) (Everest et al. 1987). Sedimentation fills the interstitial spaces and can prevent alevins from emerging from the gravel (Anderson et al. 1996; Suttle et al. 2004).

Several studies have documented that fine sediment can reduce the reproductive success of salmonids. Natural egg-to-fry survival of coho salmon, sockeye and kokanee has been measured at 23 percent, 23 percent and 12 percent, respectively (Slaney et al. 1977). Substrates containing 20 percent fines can reduce emergence success by 30-40 percent (MacDonald et al. 1991). A decrease of 30 percent in mean egg-to-fry survival can be expected to reduce salmonid fry production to extremely low levels (Slaney et al. 1977).

Source for other Pollutants. Additionally, suspended sediment may serve as a pathway for exposure to other contaminants. Some pollutants and contaminants of concern have a strong affinity for suspended solids and the particulate-phase or fraction of treated and untreated runoff (Grant et al. 2003; Wong et al. 2000). As a result, a large fraction of the toxic (inorganic and non-polar organic) contaminant load in treated and untreated stormwater is in particulate form, either sorbed onto, or complexed with solids (Fan et al. 2001; Grant et al. 2003; Marsalek et al. 1999; Muthukrishnan and Selvakumar 2006; Wong et al. 2000). The heavy metals, especially Cu, chromium (Cr), lead (Pb), and nickel (Ni) are closely associated with the particulate fraction (Grant et al. 2003; Wong et al. 2000); and Zn and cadmium (Cd) are to a somewhat lesser extent. PAHs, oils and petroleum hydrocarbons generally, and other non-polar organic contaminants are also closely associated with the particulate-phase or fraction. We anticipate that most of the PAH load in treated and untreated stormwater would be bound to solids.

Particle size distribution exerts a strong influence on contaminant-particulate dynamics and association. Heavy metals, PAHs, and other non-polar organic contaminants are generally bound in greatest concentration to the smallest of particles and colloids. For non-polar organic contaminants, particulate organic matter content also exerts a strong influence, but total particulate surface area is probably of greater significance. The smallest particles have the greatest “surface area to volume ratio,” and therefore provide a comparatively larger total surface area to which contaminants may bind, sorb, and complex (Fan et al. 2001; Herngren et al. 2005; John and Leventhal 1995; Pettersson 2002).

Ambient conditions determine whether contaminated sediments will act as continuing sources or sinks for toxic metals and non-polar organic contaminants. Because ambient conditions are dynamic and can change over time and space, equilibrium levels of metals and organic contaminants in sediments, in interstitial/pore water, and the water column, are also variable. As noted in John and Leventhal (1995), “[b]ioavailability is a complex function of many factors ... Many of these factors vary seasonally and temporally, and most factors are interrelated”. Changes in ambient water and sediment chemistry, including redox state, dissolved oxygen concentration, pH, temperature, and buffering capacity/carbonate concentration/hardness, can release sequestered contamination to interstitial pore water or the water column (Chen et al.1996, p. ab; Marsalek et al. 2002; Muthukrishnan and Selvakumar 2006; Wong et al.2000). Bostick et al. (1998), Chen et al. (1996), and John and Leventhal (1995) each describe changes in Zn partitioning and bioavailability in response to altered chemical environments. Bostick et al. (1998) found that changes in redox state within a contaminated wetland influenced the size of fractions complexed to sorbents with varying properties. Chen et al. (1996) found that 74 percent of Zn from bottom sediments of urban reservoirs was in easily remobilized fractions.

John and Leventhal (1995) found that contaminated sediments can release significant amounts of Zn to the dissolved phase when oxidized or exposed to acidic conditions.

In fluvial environments, hydrology and fine and coarse sediment dynamics also exert a strong influence on patterns of sediment contamination. Rhoads and Cahill (1999) describe variation in levels of sediment metal contamination reflecting distance from the source (outfalls), reach-scale variation in geomorphic conditions, and the degree of bed material sorting. Foster and Charlesworth (1996) and Marsalek et al. (2002) also emphasize the role of sediment deposition, accumulation, and remobilization. Baun et al. (2003) and Chen et al. (1996) suggest that hydraulic resuspension of contaminated sediments, and sporadic disturbance and release of contaminated interstitial pore water, influences bioavailability. Ellis (2000) has argued that understanding the "…probability of biotic uptake and ecosystem response … requires incorporation of water quality effects with impacts on sediment and pore waters as well as habitat impairments resulting from flow hydraulics".

Heavy metals do not degrade in the environment (Glenn et al. 2002; Muthukrishnan and Selvakumar 2006), and organic contaminants easily persist for durations that exceed the life spans of individual fish or multiple generations of fish (Heintz et al. 2000). Chronic effects to individuals stem from repeated exposures over time, through multiple exposure pathways, and from multiple stressors and combinations of stressors (Burton et al. 2000; Ellis 2000; Heintz et al. 2000). Ellis (2000) has argued that sediment-mediated exposures and effects have not yet been given adequate attention, and furthermore that "…procedures for the identification of chronic, sub-lethal no effects limits are still to be achieved." Emphasizing the tendency for accumulation in sediments, both Hodson (1988) and Pettersson (2002) have argued that loads and not simply water concentrations should be a focus for management where discharges of metals and persistent organic pollutants are concerned.

Summary of Effects to Listed Resources from Contaminants

In the absence of mitigation measures, the types of expected effects to individuals of listed species from the implementation of the permit would likely range from severe acute effects (lethal/sublethal), to behavioral and/or indirect effects (e.g., with effects to prey base or host species, or exposure to contaminants that are stored within the sediments but are resuspended and made available at a later time). At the scale of the Action Area, it is difficult to definitively determine the degree of likely effects and species responses related to chemical and sediment releases and bioavailability of contaminants stored in the sediments over the life of the permit. It is also difficult to predict the level of exposure and response to listed resources based on the frequency and duration of releases as a wide variety of flow and habitat conditions will complicate a site- or species-level analysis. Furthermore, it is difficult to separate the effects of individual discharges covered under the MSGP from other non-point sources of stormwater and inputs of contaminants and sediments into the receiving waters in the Action Area. The level of effects from exposure to and response of listed species is expected to be highly variable. We anticipate the magnitude of effects will vary among discharge events, watersheds, and species, and will be dependent on the conditions of the receiving waters, amount of contaminants and sediments released, and sensitivity of the life stages of listed species during exposure.

It is reasonable to assume the pollutants covered under the MSGP would, at minimum, contribute to the effect of the stressors affecting listed species during and after precipitation events. It is also reasonable to assume that contaminant and sediment-related effects to listed resources from the proposed Action would be more likely to occur and/or more pronounced where (1) multiple dischargers to a receiving waterbody occur in close proximity to each other, and/or (2) one or more dischargers release contaminants in concentrations that are not protective of listed species. We anticipate that the use of benchmarks and ELGs as guidelines may address some of the effects to listed species, although their use cannot be considered reliable for this purpose as the benchmarks and ELGs have not been previously undergone section 7 consultation for listed species or critical habitat.

We anticipate the controls and other measures required under the permit are likely to reduce the amount of sediments and associated contaminants released from facilities covered under the MSGP. However, we do not anticipate that facilities covered under the permit will necessarily be able to completely avoid releases of sediments that would result in appreciable effects to listed species. In fact, past monitoring efforts have demonstrated that some facilities have exceeded benchmarks for aluminum, biological oxygen demand, chemical oxygen demand, copper, iron, lead, magnesium, nitrate + nitrite, pH, TSS, zinc during one or more sampling events, sometimes by orders of magnitude. The use of corrective measures (as needed) are intended to prevent or reduce similar exceedences after the initial exceedence has occurred; however, it is reasonable to assume there will be adverse effects to listed species where exposure occurs (1) during the discharge where the exceedence is initially documented and potentially until the corrective measures are implemented; (2) during and after discharges where no monitoring occurs and thus stressors are not observed or recognized; and/or (3) during or after discharges where contaminants contained within the sediments are resuspended at a later time.

For critical habitat, we anticipate that the stressors described above would likely contribute to degradation of the overall conditions of critical habitat for listed aquatic species through incremental effects to the prey base and water quality components of critical habitat (as applicable).

Physical Effects

In addition to effects from chemicals and other pollutants in the discharges, the proposed action is also expected to affect aquatic habitats of the receiving waters and the organisms they support through physical effects of the discharges. Physical effects may occur from the impacts of flow and other characteristics of the discharge waters as they enter the receiving waters such as the timing of releases of stormwater discharges or flow volumes. For example, erosion may occur as water passes over terrestrial portions of the site into stormwater controls, or through the erosion of shorelines or banks of receiving waters, particularly where controls or other measures have not been implemented to reduce or distribute energy from the inflows of the discharge into the receiving water. Other physical effects related to the characteristics and timing of the releases of stormwater discharges into receiving waters may also occur, such as differences in flow volumes related to the receiving waters during or after precipitation events. (Some of the potential consequences of erosive effects were described previously under *Habitat Effects*.)

Another physical effect that is expected to result from some of the covered discharges is related to the differences in water temperatures between the discharges and the receiving waters. The temperature of the discharge waters may be of particular concern where: (1) the discharge water temperature is substantially different that the receiving water temperature and comprises a large proportion of the flow of the receiving water, and (2) the discharge water temperature is much warmer or much cooler than the requirements of listed species that reside in or migrate through the receiving water. Some aquatic species require optimal temperature ranges for survival, growth, and/or reproduction, and inputs of elevated or low temperatures (depending on the optimal range for a given species) may affect the species directly or degrade important critical habitat PBFs. For example, certain species are sensitive to water temperatures, with optimal or required temperatures specified for one or more life stages. Examples include, but are not limited to, the following species:

- Apache trout (<25°C; USFWS 2009)
- Greenback cutthroat trout (5-8° C, during spawning; USFWS 1998)
- Gila trout (<25°C; USFWS 2003)
- Bull trout (<9°C, spawning; <15°C overall; USFWS 2005)
- Three forks springsnail[26] (near 22°C)
- San Bernadino springsnail[27] (14 to 22°C)
- Banbury springs lanx (15 to 16°C; USFWS 1995)

The volume of discharge flows compared to that of the receiving waters may also affect listed species and critical habitat. In some cases, flows from stormwater discharges may augment lower flows in the receiving waters, increasing the volume of water in the receiving body, which may have beneficial or negative impacts to biota, depending on their life history and habitat requirements. Where discharge flows constitute a large proportion of the receiving water flows, beneficial effects may be tempered (and negative effects exacerbated) by the reduced effectiveness of dilution and assimilative capacity of the receiving waters to address contaminants in the discharge.

Riparian/Upland Effects

We anticipate that riparian and terrestrial effects would be most likely to occur as a result of discharge-related activities, where construction or modification of upland-sited controls or other features would directly or indirectly affect listed species and critical habitat if either is present in or near the activity area. The installation and use of controls are encouraged for use as part of the SWPPP to avoid or reduce introduction of contaminants into the aquatic and riparian environments, although unintentional impacts to terrestrial species may also occur where these activities overlap with listed resources. Under these conditions, we anticipate that a variety of effects could occur, depending on the nature of the activities conducted, types of equipment used, life history stage and behavior(s) of listed species present, and other site-specific

[26] Critical habitat designation (77 FR 23060 23092)
[27] Critical habitat designation (77 FR 23060 23092)

considerations. Some stressors related to discharge-related activities may be temporary (as in the case of brief noise or disturbance during construction) or longer-term (e.g., removal of habitat features). It is possible that pollutants from the discharges could affect listed species and designated critical habitats in the terrestrial environment (including riparian areas), such as through the creation of an attractive nuisance (e.g., infiltration pond holding water and pollutants may temporarily attract birds, amphibians, and other organisms) under certain conditions. The mechanisms by which stormwater pollutants affect listed species are described in previous sections and will not be repeated here.

The following paragraphs will describe the types of effects that would most likely be expected from discharge-related activities and generalizations on the pathways of effect and likely responses from listed resources. Mechanisms in the permit structure that are expected to avoid or reduce the potential for adverse effects are described in a subsequent section of this Opinion and will not be addressed in this section.

The construction of new controls and modification of existing controls have the potential to result in a variety of effects. Construction-related effects to individuals may result from use of heavy equipment and vehicles, human presence and activity at the site, and temporary or permanent changes to habitat features that are used by listed species, their prey, hosts, pollinators, other species they depend upon. We anticipate that in some cases where overlap of listed species and/or critical habitat exists, the likely effects would include one or more of the following: potential injury or death of individuals, failed nesting or breeding attempts, and significant disruption of normal behavior and/or use of the site during or after the construction or implementation of the discharge-related activities. In the absence of sufficient measures to address these impacts, the most acute direct effects that would be anticipated include direct injury or death of individuals of listed species due to: (1) interactions with heavy equipment or vehicles (e.g., crushing, collisions); (2) removal of vegetation or other habitat features are providing shelter for listed species (e.g., nests with eggs or young); or (3) temporary or permanent abandonment of eggs, nests, or juveniles leading to loss of offspring. These activities would likely be of most concern where individuals are attached (e.g., plant), or are in life stages that are sessile, less mobile, and/or cryptic (e.g., eggs, altricial young [28], hibernating or estivating individuals, etc.). Other effects include short-term or long-term disturbance or displacement of individuals of listed species due to human activities, and may result in abandonment of important foraging, nesting, roosting, or sheltering habitat that is necessary for survival, growth, and motionless reproduction.

Injurious and disturbance effects associated with human activities have been observed for some species, and we would anticipate similar effects to occur during activities associated with construction or modification of controls or other discharge-associated activities if sufficient BMPs are not followed to address these concerns. For example, the western snowy plover Recovery Plan lists a number of sources reporting loss or destruction of western snowy plover and piping plover nests, eggs, and chicks and disturbance to chicks and adults from a variety of anthropogenic sources, including pedestrians and motor vehicles (USFWS 2007). Both chicks

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[28] *Altricial young* refers generally to offspring that require significant parental attention after hatching or birth, due to an inability or limited ability to move, forage, or otherwise survive without aid.

and adults have been observed using footprints and tire tracks for loafing (Powell and Collier 1994 and U.S. District Court of Massachusetts 1998 *in* USFWS 2007); deeper tire tracks may be difficult for very young chicks in particular to escape, increasing their risk of accidental crushing, although both adults and juveniles may be crushed in tire tracks when vehicles reuse them. While some individuals may evade such effects by leaving the area if they are able, others may respond by remaining motionless as a natural defense mechanism (e.g., piping plovers as described in USFWS 2007). Where vehicles, heavy equipment, and/or workers' activities are used or occur in the vicinity of nesting, rearing, foraging, or other important habitat for listed species and their critical habitat during the breeding season, we would anticipate similar effects to these listed resources in the absence of protective measures to avoid these effects.

Other effects related to construction and disturbance have also been reported in other actions. For example, construction activities can result in an attractive nuisance to native or non-native predators through generation of trash or debris disposal. Many listed species are particularly susceptible to predation or competition, and activities that attract native or non-native predators (e.g., rats, corvids, raccoons, etc.) can result in injury or mortality to individuals (e.g., predation of California red legged frogs by raccoons; USFWS 2002). Where these activities overlap with listed species that are unlikely to evade predators, we anticipate they would be similarly affected.

Summary of Stressors

The types of activities covered by the proposed action are generally expected to result in a number of effects to listed species and their critical habitat. In the absence of effective BMPs and control measures, we anticipate that contaminants and other pollutants in the facilities' discharges, physical effects from the discharges related to flow characteristics, and disturbance and injurious effects from discharge-associated activities will affect listed resources where overlap occurs. However, the MSGP requires the use of controls and other measures to address the effects of discharges covered under the permit. The assumptions and uncertainties related to the implementation of the permit are discussed in the next section.

<u>Section 2: Review of Permit Structure</u>

In this evaluation, we specifically ask whether or to what degree EPA has structured its proposed permits so that the agency (1) understands the scope of its action; (2) reliably estimates the physical, chemical, or biotic stressors that are likely to be produced as a direct or indirect result of their action; (3) reliably estimates the exposure of ESA-listed resources (species and designated critical habitat) to these stressors; (4) collects and monitors information on authorized activities throughout the life of the permit; (5) evaluates the information to assess how its actions have affected listed resources; (6) monitors and enforces permit compliance; and (7) modifies its action if new information (including inadequate protection for species or low levels of compliance) becomes available. Where applicable and appropriate, we will use examples from previous permit cycles, relevant literature regarding species effects and/or specific contaminants, and reasonable worst-case scenarios (e.g., stream reaches with numerous aggregate discharges). In the following section, we also include a discussion of important provisions in the 2015 MSGP that are expected to reduce, and, in many cases, avoid or minimize the effects of the stressors described in Section 1.

1. Scope

In this section, we ask whether EPA is aware of the scope of its Action. As described earlier, the scope of the Action includes all aspects of EPA's issuance and implementation of the MSGP, including the monitoring of discharges authorized by the permits and enforcement of the permits. To reliably estimate the probable individual or accumulative effects to ESA listed species or designated critical habitat, the EPA would need to know or reliably estimate the probable number of facilities that it would authorize to discharge under the MSGP. Therefore, we also ask whether EPA has structured their permit accordingly.

EPA requires an NOI for all facilities seeking coverage under the permit. The NOI must be submitted electronically no later than 90 days after issuance of the permit for existing facilities and 30 days prior to initiating discharges for new facilities or discharges. The NOI requires the submission of location information, including facility location, number and location of outfalls, receiving waters, and other site-specific information. The NOI also requires information on the types of contaminants expected in the discharges and controls and other measures that will be implemented to address these contaminants and other effects from the discharge and discharge-related activities. The EPA used NOI and monitoring data from the 2008 MSGP to estimate the number of discharges that would be authorized under the 2015 MSGP. Based on this information, EPA was also able to estimate the location and relative timing of discharges (related to stormwater events).

While EPA is able to estimate the approximate number of anticipated new dischargers/facilities over the life of the 2015 permit, they are unable to determine precisely where such new discharges will occur. However, facilities can only seek coverage under the MSGP in locations where EPA retains permitting jurisdiction. Thus, at a coarse scale, all facilities will be limited to these finite geographical areas as specified in the Description of the Action section of this Opinion, and thus EPA can reliably estimate the relative geographic limits of the locations of the facilities. It is reasonable to assume that the distribution of existing facilities is representative of the likely locations of most of the new facilities or discharges (comprising approximately 10% of the total facilities), and the coarser scale results in geographic bounds to the remaining facilities seeking coverage under the permit. While the numbers of existing and future dischargers may vary slightly under the new permit, no information has been provided that suggests there will be substantially greater (or fewer) numbers of facilities seeking coverage under the permit.

The MSGP also includes several references to monitoring, compliance, and enforcement, all of which will be conducted by EPA as part of its Action. As summarized in the BE, EPA has broad inspection authority under the CWA §308(a)(B) to conduct compliance monitoring and access to the facilities's records. In addition to this authority, EPA notes in the BE (p. 6-12):

> *Additionally, under CWA section 308, EPA may request other information from permittees (e.g., the SWPPP). In addition, permittees must certify under penalty of law that any information they submit to EPA is true, accurate, and complete, and signed by a responsible party. 40 CFR §122.22. Failure to comply with the information requirements is enforceable under CWA § 309. The proposed MSGP provides that noncompliance with any of the requirements of the permit constitutes a violation, issued under the CWA. CWA 309 authorizes EPA to seek both civil penalties and injunctive relief to redress violations*

> *of the Act. Violators are subject to civil penalties up to $37,500 per day for each violation. Once a violation is established, civil penalties are generally considered mandatory, though the amount is discretionary. EPA may seek injunctive relief to restrain violations or to require future compliance. The government's injunctive authority has been interpreted broadly to enable it to require mitigation-type activities, such as sediment remediation, wetlands restoration, and other measures intended to "complement" permit requirements*

EPA requires permit compliance under the MSGP and affirms its authority to determine enforcement responses to permit violations including fines, requirements, and schedules for taking corrective actions. In addition to their authorities, EPA has outlined specific monitoring and implementation requirements of the permit, including but not limited to the triggers for and reporting of corrective actions. Through the course of our consultation, EPA has also committed to several activities related to monitoring and compliance, discussed in the sections below (see 4, 6, and 7). Therefore, we conclude that EPA is aware of the full scope of its action.

2. Stressors

Here we ask whether the EPA has reliably estimated the physical, chemical or biotic stressors that are likely to be produced as a direct or indirect result of the discharges and discharge-related activities that would be authorized by the MSGP. We also ask whether the EPA would know or be able to reliably estimate whether the discharges have occurred in concentrations, frequencies, or for durations that violate the terms of the proposed MSGP. As the MSGP does not limit the frequency or duration of stormwater discharges that are covered under the MSGP, based on their intermittent nature and relatively short durations, we focus primarily on reliable estimation of stressors and, in regards to chemical pollutants, their concentrations in discharges.

In their BE, EPA summarized the various categories of stressors that are likely to be associated with the proposed action and provided a brief description of some of the potential effects of most of the contaminants and other stressors within each category (some of which we discussed in more detail in the previous section). Thus, we anticipate that EPA will have the ability to reliably estimate the types of stressors associated with the MSGP. In some cases, we also assume that EPA will also be able to reliably estimate whether the discharges have occurred in concentrations that violate the terms of the proposed MSGP in regards to the CWA, although this is most likely to occur where timely and representative analytical monitoring is conducted as part of the facilities' SWPPPs. There are several scenarios where we are less certain of EPA's ability to estimate stressors and/or concentrations covered by the MSGP, and these are briefly described below. We describe these uncertainties in the paragraphs below.

Type of Anticipated Contaminants

The EPA has identified the list of contaminants that are most likely to be present in the stormwater discharges of various industry sectors and subsectors covered by the MSGP. The list was compiled based on observed stormwater discharge constituents for each of the industry sectors and is expected to reflect the most common and/or expected types of pollutants that would be discharged incidentally with stormwater from the facilities within a given sector or subsector. Other contaminants may be present in the facilities' discharges that have not been identified as applicable to a given subsector. Such contaminants would most likely not be distinguished unless they were detected during inspections (e.g., in visual monitoring or samples), as all required analytical monitoring will focus on the benchmarks and ELGs of concern and is not expected to detect additional contaminants.

While we acknowledge uncertainty associated with the possibility of additional contaminants in the covered discharges, we recognize the risk to listed resources may be relatively low, particularly since the covered discharges should not include exposure to process-related contaminants (in most cases) or other non-stormwater discharges that are not explicitly described in the permit.

Analytical Monitoring

The 2015 MSGP permit outlines an analytical monitoring procedure for a number of facility types that can apply for coverage. For these facilities, EPA will be able to estimate concentrations discharged by these facilities, particularly where the monitoring results submitted are typical for each facility throughout the year. The EPA's ability to estimate concentrations of discharged contaminants is less certain for facilities that: (1) are not required to perform analytical monitoring either at all or for one or more benchmarks; (2) are not required to perform analytical monitoring for one or more ELGs; (3) are allowed to suspend analytical monitoring during the permit term based on averaged quarterly results and anticipated compliance;and (4) are required to monitor but are unable to do so in a timely or effective manner and thus may under-report stressor presence or levels in their discharges.

The MSGP defines the benchmarks and ELGs that must be met for certain pollutants according to industry sector and/or subsector that are expected in the discharge. Not all facilities have established benchmarks or ELGs, and are thus not required to perform analytical monitoring under the permit. It is reasonable to assume stormwater discharges from at least some of the facilities will include contaminants that are not included or addressed as benchmarks or ELGs. However, the BE states that EPA does not believe these other contaminants pose a risk to water quality concerns.

Facilities in industrial subsectors that have benchmarks and/or ELGs must monitor for the constituents associated with those values; however, these facilities are not required to perform analytical monitoring for other potential pollutants in their discharge. The MSGP stipulates that if the average of four quarterly sampling results exceeds an applicable benchmark, the operator must review the facility's SWPPP to determine whether revisions are needed. If this occurs, operators may make the necessary modifications and continue monitoring until benchmarks are met, or they may make a determination that no further pollutant reductions are technologically available and economically practicable. If the latter determination is made, no corrective actions will be implemented and pollutant concentrations in discharges may continue to exceed benchmark values for the duration of the permit, resulting in potentially harmful exposures to listed species. Alternatively, if after collection of four quarterly samples, the average of the values for any parameter does not exceed the benchmark, the facility is not required to monitor for that parameter for the remainder of the term. Relying on averages to assess benchmark attainment allows for the possibility that one or more of the quarterly samples exceeds benchmark values while the four-quarter average does not. Hazardous exposures to listed species may have occurred, yet because the annual average did not exceed benchmarks, no SWPPP review or corrective actions will be required, so this uncertainty remains.

There are also uncertainties regarding the protectiveness of ELGs and benchmarks. ELGs are developed by EPA on an industry-by-industry basis and are intended to represent the greatest reductions that are economically achievable for an industry. EPA identifies the best available technology that is economically achievable for a particular industry and sets the ELG based on the performance of that technology. Unlike water quality-based effluent limits, ELGs are not derived with the intent of achieving a particular level of environmental protection. Thus, the level of protection afforded listed species by ELGs is uncertain. For some pollutants, ELGs may meet water quality standards at the "end of pipe" while others may require mixing zones to dilute pollutant loads before water quality standards are met in the receiving water. The size of the mixing zone is dependent on a number of factors including the hydrologic characteristics of the discharge and receiving water, the mass loading of pollutants from the discharge, and the assimilative capacity of the receiving water. For receiving waters with low assimilative capacity, large mixing zones may be necessary in order to dilute pollutant concentrations. The consequences for listed species would be a larger proportion of aquatic habitat where hazardous exposures are more likely to occur.

Most of the benchmark values included in the MSGP are based on EPAs aquatic life ambient water quality criteria. Some benchmarks are equivalent to acute criteria while others are equal to chronic criteria. Chronic criteria are typically lower than acute criteria and would therefore result in lower exposures, if attained. However, the process for deriving water quality criteria does not explicitly assess effects to listed species and among the criteria included as benchmarks in the MSGP, none have undergone ESA Section 7 consultation for all species that may be affected by MSGP-authorized discharges. Thus, the extent to which stormwater pollutants at benchmark concentrations affect listed species is uncertain.

Additionally, some of the reporting exceptions that are granted to certain categories of facilities may result in stressors that are not adequately evaluated. For example, the MSGP states that inactive and unstaffed sites are only required to conduct an annual site inspection (i.e., the quarterly monitoring requirement is waived) if the facility operator can demonstrate that no industrial materials or activities would be exposed to stormwater. We agree that the risk of exposure is likely to be relatively low as a single, annual site inspection in such cases may be adequate to determine site conditions and compliance with the MSGP's water quality requirements. However, EPA specifically provides the following exception in the MSGP that is more problematic: "Operators of inactive and unstaffed mining sites may exercise this waiver without demonstrating their industrial materials or activities are not exposed to stormwater, due to the unique issues affecting such facilities (e.g., the remoteness of many mining sites)." We anticipate that inactive and unstaffed mining sites may be inactive for a variety of reasons and that cessation of operations may or may not have included implementation of measures to avoid or reduce contact of stormwater with contaminants. In cases where discharges overlap with listed species or critical habitat, we anticipate that the risk of exposure of listed resources to contaminants is likely to be higher where it cannot be demonstrated that industrial materials or activities are not exposed to stormwater. We recognize the remoteness of a facility may impede or affect opportunities for access, although the remoteness of a facility does not reduce the likelihood that listed resources are present. Some listed species are found in remote geographic areas (e.g., bull trout in headwater streams).

The timing and effectiveness of inspections and/or analytical monitoring may also affect EPA's ability evaluate concentrations of discharge pollutants. The inspection and monitoring schedules allow for a degree of flexibility in scheduling routine facility inspections, evaluating controls, and collection of samples. For example, the permit requires samples to be representative of stormwater discharge and collected (1) within the first 30 minutes of an actual discharge (except for snowmelt) and (2) on discharges that occur at least 72 hours (3 days) from the previous discharge. However, if assessors determine it is not possible to collect a sample within the first 30 minutes, they are directed to collect a sample as soon as practicable after the first 30 minutes and provide a rationale for the delay. Adverse weather conditions may also affect sampling, with contingencies in the permit stipulating sample collection during the next qualifying storm event if conditions are unsafe. While accessibility and safe sampling conditions are necessary and certainly advisable in the latter situation, there is inherent subjectivity related to what is "practicable." For example, if facilities routinely do not find it practicable to collect samples within the first 30 minutes of an actual discharge, detection of water quality issues may go unnoticed. While this uncertainty exists, trends in timing of sample collection (and thus potential understated effects) should be determinable through the reporting process EPA has proposed.

While these uncertainties are difficult to analyze, the EPA nontheless requires that facilities seeking covereage under the MSGP do not have measurable impacts to listed species or critical habitat (except under Criterion D and E as previously described), and thus these facilities remain subject to the other requirements of the permit related to stressors and water quality. These considerations, coupled with the NOI submittal and review process, will promote transparency to reduce inappropriate coverage of facilities under the MSGP.

3. Overlap

In this section, we ask whether EPA has reliably estimated whether and to what degree listed resources are likely to be exposed to potentially harmful impacts of discharges authorized by the permit. Determination of overlap requires consideration of two things: 1) the action area of a given facility; and 2) the listed species and designated critical habitat within that facility's action area. By delineating a facility's action area, the operator identifies where the farthest-reaching effects of the facility's proposed activities are likely to extend. Facility action areas are anticipated to include the receiving waterbody(ies) for stormwater and allowable non-stormwater discharges as well as certain upland areas where terrestrially based discharge-related activities occur. When listed species, their prey, obligate hosts (e.g., as required by certain species of freshwater mussels and snails), habitat, and/or designated critical habitat are present within the aquatic or terrestrial (when applicable) portions of a facility's action area, the effects of the proposed activities are considered to overlap with these listed resources, even where such overlap would not occur year-round (e.g., as with certain migratory species). If listed species and/or the resources they depend on for survival, growth, and reproduction overlap with effects from the proposed activities, these listed resources may be exposed to potentially harmful stressors authorized by the proposed permit.

Of particular concern for listed resources are instances where overlap occurs but is not recognized or identified as such by a facility. In these cases, the potential for adverse effects to listed resources would not be analyzed. While it is reasonable to assume that the measures required in the MSGP to protect water quality may also adequately protect listed resources, this may not be true for all facilities and/or listed resources. Thus, EPA's ability to reliably estimate overlap of listed resources and the action areas of the various facilities is instrumental in the identification of facilities that may require additional measures to avoid adverse impacts to listed species or critical habitat impacts or that would require an alternative permit (e.g., an individual permit) where avoidance of adverse effects is not feasible or practicable.

The EPA has specifically designed the MSGP to address the question of overlap of listed resources with effects from discharges and discharge-related activities covered under the permit. Two of the ESA criteria selected by facility operators (Criteria A and C) directly address overlap. Any facilities that are unable to claim coverage under another operator (Criterion B), a previous ESA section 7 consultation (Criterion D), or an ESA section 10 permit (Criterion E)[29] are required to determine whether their proposed activities overlap with listed species or designated critical habitat. Where facility operators accurately complete the criterion selection process, EPA will be able to determine the degree of overlap with listed species and designated critical habitat.

EPA has revised the MSGP significantly since the previous permit cycle to more clearly address concerns regarding listed resources, including concerns associated with improving accuracy in identification overlap. The following paragraphs describe some of the measures that EPA has included to address these uncertainties. Overall, we anticipate that the measures will greatly improve EPA's ability to identify and coordinate with applicants to avoid potential errors in criterion selection related to overlap prior to the coverage of the facilities under the permit.

Use of the E4 Criterion Selection Worksheet

All applicants are required to use the process outlined in the MSGP's *E4 Criterion Selection worksheet* to determine which criterion is applicable to their facilities' proposed activities. Operators are required to retain the worksheet and associated documentation (including the species list) as part of their facilities' SWPPPs. The permit further requires facilities to make their SWPPPs available to EPA and other reviewers either via a direct website link or provided upon request. Facility operators that request coverage under Criterion A (concluding no overlap) must provide the rationale for criterion selection as they complete the NOI, providing EPA an opportunity for review of their rationale prior to the start of coverage. Criteria C facilities must submit additional documentation prior to submitting their NOI, including a species list and description of their action area.

Guidance for Determining a Facility's Action Area

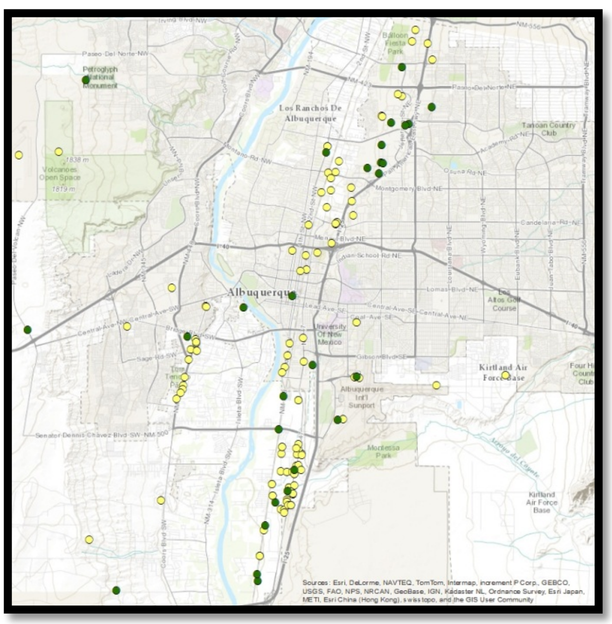
The EPA has provided additional guidance for applicants in the 2015 MSGP to improve accuracy and consistency among facility operators in their efforts to determine overlap and non-

[29] Where facilities claim coverage under Criteria B, D, or E, overlap is addressed through these other mechanisms.

overlap with listed resources when seeking coverage under the MSGP. In previous permit cycles, the basis and rationale for an operator's selection of either Criterion A (no overlap) and Criterion C (overlap) appears to have varied in quality and consistency. Our review of preliminary data from the 2008 MSGP suggests that facilities have had difficulty selecting the appropriate criteria or evaluating the action area for their facility's discharges.

For example, most of the facilities shown in Figure 4 (below) discharge to the Rio Grande River near Albuquerque, New Mexico. This reach of the Rio Grande River contains both listed species and designated critical habitat. A large proportion of the facilities discharging to this reach of the stream selected Criterion A while other nearby facilities selected a criterion indicating overlap (Criterion D and E in 2008 MSGP). While it is possible that some of these facilities selected Criterion A appropriately in this instance (e.g., based on site-specific characteristics or locations of their discharge), it is unclear from the available data whether the action area for the facility was determined correctly, or what information was used to support their selection of no overlap with listed resources. Based on the available information, it is reasonable to assume in this example that at least some, if not most, of these facilities selecting Criterion A under the 2008 MSGP did so in error, as the majority of the facilities discharge directly (or indirectly) to the Rio Grande River, and the reach contains both listed species and designated critical habitat.

Figure 4. Facility locations selecting Criterion A (no overlap with listed resources, light/yellow circles) and Criterion E (overlap with listed resources under the 2008 MSGP, dark/green circles) discharging to the Rio Grande River near Albuquerque, New Mexico. (*Data points are from preliminary monitoring data provided from EPA. Circles indicate approximate facility locations, not discharge points.)*



The EPA has included additional guidance in the 2015 MSGP to facility operators seeking coverage that is intended reduce the errors in determining overlap with listed resources under the

Service's jurisdiction. The ESA procedures listed in Appendix E of the permit direct the facility operators seeking coverage under both Criteria A and C to obtain an official species list using the Service's Information, Planning, and Conservation (IPaC) website[30]. The 2015 MSGP provides guidance to applicants when considering the extent of their respective action areas (which are required in IPaC to create a species list), and describes considerations that should be included in the delineation of an action area. The following statements are excerpted from the guidance in Appendix E of the MSGP:

- *When evaluating the potential effects of your activities, you must consider effects to listed species or critical habitats within the "action area." Action area is defined in Appendix A* [of the MSGP] *as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. This includes areas beyond the footprint of the facility that are likely to be affected by stormwater discharges, discharge-related activities, and allowable non-stormwater discharges. For example, discharges of pollutants into downstream areas can increase the "action area" beyond the footprint of the facility.*

- *Consider the following in determining the action area for your facility:*
  - *Discharges of pollutants into downstream areas can expand the action area well beyond the footprint of your facility and the discharge point(s). Take into account the controls you will be implementing to minimize pollutants and the receiving waterbody characteristics (e.g., perennial, intermittent, ephemeral) in determining the extent of physical, chemical, and/or biotic effects of the discharges. All receiving waterbodies that could receive pollutants from your facility must be included in your action area.*
  - *Discharge-related activities must also be accounted for in determining your action area. Discharge-related activities are any activities that cause, contribute to, or result in stormwater and allowable non-stormwater point source discharges, and measures such as the siting, construction, and operation of stormwater controls to control, reduce, or prevent pollutants from being discharged. For example, any new or modified stormwater controls that will have noise or other similar effects, and any disturbances associated with vehicle access or construction of controls, are part of your action area.*
  - *If you have any questions about determining the extent of your action area, you may choose to contact EPA or the Services for assistance.*
  - *You must describe the action area of your facility in Attachment 1 of this Appendix* [of the MSGP, i.e., the worksheet].

[30] As of the date of this Opinion, official species lists are available for many states and counties directly on the website, and contact information is provided in IPaC for the remaining Service offices that have not yet made official species lists available.

Criterion C Eligibility Form Reviews

Facilities selecting Criterion C will submit their Eligibility Form to EPA for review at least 30 days prior to submitting their NOI. The *E4 Criterion Selection worksheet*[31] directs applicants to attach the official species list they received from the Service to the Eligibility Form so that is available for EPA and the Service's respective reviews. In most cases[32], the official species list would include the map drawn by the applicant indicating the action area for the facility. The Eligibility Form also requires a written description of the action area. The inclusion of these two components will allow EPA to quickly verify during their review whether the action area (and thus overlap with listed resources) was appropriately determined. Thus, EPA will have the ability to verify whether the applicant described a reasonable action area (e.g., a line or polygon extending an appropriate distance downstream from the outfall to characterize the action area), or simply listed a point location (such as an outfall or facility location) or a mixing zone estimation.

After reviewing the Eligibility Form for completeness (estimated to be ≤5 days), EPA will forward the document and any attachments to the Service(s) for review. Once the Service has received the Eligibility Form, Service reviewers will have the opportunity to comment within 25 days should they notice that the species list appears to be incomplete or if the action area does not appear to be drawn correctly, as well as any other concerns. In such a case, a reviewer can then contact the EPA (or with their concerns so that EPA can address them prior to finalization of coverage. [33]

Evaluation of a Subsample of Criterion A Facilities

The EPA has proposed an additional method of further reducing the likelihood of facility operators selecting Criterion A in error. According to additional information submitted via email July 28, 2014:

> *After the permit is issued, EPA intends to do a "compliance check" on a subset of facilities who have selected Criterion A on their Notice of Intent (NOI) for coverage under the MSGP during the 30 day waiting period. EPA envisions that the compliance check would consist of a GIS analysis to determine if the facility's action area is within designated critical habitat or within the range of a threatened or endangered species. For any incorrect Criterion A determinations, EPA would place the NOI on hold, and require the facility to submit a Criterion C worksheet* [Eligibility Form] *for coverage under Criterion C.*

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[31] The *E4 Criterion Selection Worksheet* contains both guidance for selection of all the criteria as well as the Eligibility Form

[32] Where an official species list is not available in IPaC and applicants contact the appropriate Service office, a map may not be included as part of an official species list; however, direct coordination with the Service in these instances should reduce the likelihood of an incorrectly estimated action area for the facility.

[33] While the potential for the Service(s) to provide feedback to the EPA exists through this process, the Service considers its review of the Criterion C Eligibility Form to be advisory. The level of review will likely be affected by workload and priorities of the reviewing office. The Service's review is expected to assist EPA, in some caes, but will not ensure that all errors in action area delineation would be detected by the Service reviewers.

EPA would like to work with the Services to identify the Criterion A sample, perhaps based on priority watersheds for threatened and endangered species and/or critical habitat protection. EPA envisions that this focused Criterion A compliance check would occur in the 6 months following the permit reissuance (when the majority of facilities will be submitting NOIs for permit coverage). EPA envisions that the focused Criterion A compliance check would look at no greater than 100 separate facility NOIs.

With these proposed changes to the 2015 MSGP, EPA will have an improved ability to detect errors in operators' efforts to calculate the action area for their facilities and determine the degree of overlap with listed resources. Neither underestimating nor overestimating the action area and degree of overlap is preferable for implementation of the permit. Underestimating the action area and degree of overlap would be more problematic for listed resources than underestimating overlap, as the risk of adverse effects would not be considered where overlap is not assumed to occur.

If the proposed measures described above are fully implemented by the facility operators, most overlap errors are likely to be avoided prior to the coverage decision by EPA. For example, based on the revised guidance for determining a facility's action area, we do not anticipate that facilities are likely to assume overlap where none exists (i.e., erroneously selecting Criterion C instead of Criterion A). However, there is less certainty as to whether facilities erroneously selecting Criterion A will be consistently detected in the proposed process. We anticipate that EPA has the ability to assess the degree of overlap of facilities' effects and the presence of listed resources using the tools and procedures described previously. EPA also has access to IPaC to assist them in evaluating action areas and associated species lists during the application for coverage process should a question arise. EPA has not indicated that they will review every proposal under the MSGP to determine whether the criteria were selected appropriately in every case. However, the proposed measures are anticipated to improve accuracy through spot-checking potential instances of erroneous selections of Criterion A facilities.

Summary of Uncertainties

Potential uncertainties include the following:

- The likelihood of facility operators adequately following the new guidance for drawing action areas and acquiring species lists. Although EPA directs the operators to follow the guidance when delineating their action areas and determining overlap, EPA does not require the operators to submit the action area description or the species list unless they are requested to do so[34], except where a facility operator selects Criterion C and submits an Eligibility Form with an attached species list and action area. Therefore, if applicants underestimate the action area and erroneously conclude Criterion A, EPA will be unlikely to detect such an error unless: 1) a facility denotes a receiving waterbody identified on the Service-generated list referenced above, 2) the facility is part of the

[34] While EPA requires each facility operator to post a facility's SWPPP online or provide a copy if requested, this does not mean that EPA will review all of the SWPPPs.

subsample in the compliance check, or 3) another entity (e.g., the Service(s), general public, local government, or other entity) notifies EPA.

- The permit timeline requires that all existing dischargers submit requests for coverage within 90 days of reissuance of the permit. The large number of applicants that are existing dischargers from the previous permit cycle (~2,400) facilities, and the large percentage of facilities selecting Criterion A (76% per the BE, based on previous cycles) may affect the amount and/or level of oversight EPA conducts on this part of the review process.
- Based on preliminary review of 2008 MSGP data, it appears that a substantial number of facilities that previously selected Criterion A may instead be prompted to select Criterion C. At this time, it is unclear exactly how many facilities may be more likely to select Criterion C. However, if a large proportion of the facilities find discover Criterion C is more applicable than in previous permit cycles, the number of facilities selecting Criterion A may be reduced, and the measures proposed above may be more effective at addressing potential errors.
- If facility operators do not recognize that overlap occurs, they would not be expected to consider whether additional measures would be needed to avoid or minimize adverse effects to listed resources. In a reasonable worst case scenario for aquatic or aquatic-dependent species, one or more facilities discharging to a receiving waterbody with listed species may use controls and other measures to meet water quality standards and support designated uses, but may not include measures that would be needed to avoid direct exposure of individuals of listed species that are present and exposed to the pollutants in the discharges. It is reasonable to assume that such effects may be accumulative or magnified where multiple facilities erroneously assume no overlap and discharge into the same receiving waters (such as those shown in the example in Figure 4 above) without sufficient controls to avoid exposure to pollutants.

The MSGP has been designed to allow for estimation and tracking of *overlap*, as defined above. We anticipate that errors related to facilities assuming overlap where none exists are unlikely to occur based on the new permit guidance for delineation of a facility's action area. Additionally, EPA has committed to implementing certain measures that would allow the agency's reviewers to determine whether a large proportion of the facilities have accurately determined their proposed activities would have no overlap with listed resources. We recognize the large number of facilities and streamlined permit coverage process as proposed is likely to inhibit the EPA's ability to confirm the accuracy of facility-specific action areas and associated determination of overlap in a consistent manner for all Criterion A facilities. However, we assume that EPA will continue to endeavor to address this issue and the annual compilation of facility coverage and monitoring information will allow opportunities for review of process implementation.

4. Monitoring and Feedback

In this section, we ask whether EPA proposes to identify, collect, and analyze information about its authorized discharges that may expose listed resources to harmful stressors. The EPA requires facility operators to self-monitor their discharges as one means to identify, collect, and analyze information to determine whether discharges into waters of the United States expose listed resources to pollutants at concentrations, durations, or frequencies that are known or suspected to produce adverse effects.

The MSGP outlines monitoring requirements for the various industrial sectors. All facilities are required to perform quarterly visual monitoring and inspections. A relatively small proportion of facilities are also required to perform quarterly analytical testing for all or a portion of the permit cycle (with duration related in part to their results), based on the sector or subsector category and anticipated pollutants. In most cases, reporting is limited to annual monitoring reports submitted to EPA, although ELG exceedences or other serious conditions are to be reported in the facilities end of year reports. Annual reports will be uploaded into the EPA's new tracking system by the facility operators, which will allow for improved availability of reports for review by EPA (and other interested entities such as other agencies, public, etc.).

We conclude that EPA is likely to identify, collect, and analyze important information about its authorized discharges under its MSG, although, in most cases, the results would not provide a direct justification for insignificant or discountable effects to listed resources. We recognize that the benchmarks and ELGs are more directly relatable to water quality conditions and effects than to listed species and critical habitat, and most, if not all, of the benchmarks and ELGs have not undergone ESA section 7 consultation. Thus, while the benchmarks, ELGs, and visual inspections and monitoring may be helpful in suggesting the avoidance (or existence) of certain effects to listed resources from stressors from a given facility, we do not expect the reports alone will provide a complete rationale for the avoidance or minimization of adverse effects to listed resources. Nonetheless, the use of these tools will provide EPA with information that may help to indicate problem discharges that should be re-evaluated and addressed with corrective actions or other solutions.

5. Responses of Listed Resources

Here we ask whether EPA has used 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, 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.

Due to the large number of listed species and critical habitat designations in the Action Area of the permit, EPA elected to evaluate representative species and critical habitat as example taxa that were then extrapolated to the remaining species and critical habitat covered under the consultation. While this method allows for discussion of types of stressors and related effects to listed resources, consideration of status and trends of listed resources to provide context for the analysis is less likely to be specifically captured. However, EPA addressed these issues by first discussing broad applicable habitat types in the Action Area and environmental baseline stressors affecting biota in the Action Area and discussed various factors in the context of a representative exemplar listed species. While this analysis strategy does not fully capture the subtleties associated with status and trends of all listed species and designated critical habitat addressed by the BE, or their demographic and ecological status in the context of an environmental baseline, it does nonetheless frame the analysis using habitat as a surrogate for more detailed species-specific information.

The BE does address the direct and indirect pathways of exposure of listed resources to the stressors of the proposed action. For each type of stressor and representative taxa/critical habitat, EPA describes the most likely effects and then compares benchmarks and ELGs to selected toxicity values for each stressor (BE Tables 6-5 and 6-7) to determine whether acute lethal effects are likely to occur. For a given taxa–stressor combination, if the toxicity value is above the benchmark and ELG, EPA concludes that the proposed permit terms are sufficiently protective to ensure no likely adverse effects to listed species with that taxa. If the toxicity value was lower than the benchmark or ELG, EPA acknowledged that the pollutant may affect the species, but that those effects are not likely to raise population-level concerns because of the numerous species/habitat safeguards in both obtaining permit coverage and complying with the permit terms (permitting structure) and considering the transitory nature of MSGP-authorized discharges.

From the Service's perspective, situations where operators are able to control their discharge such that concentrations of pollutants in stormwater achieve no effect or acceptably low effect concentrations (for a listed species of concern), at "end-of-pipe," provide the greatest assurance that individuals of the species occurring in receiving waters are not likely to be adversely affected. This scenario would be comparable to EPA's effects assessment (described above) where, (1) toxicity values, used by EPA to represent the sensitivity of listed species, were equivalent to no effect or acceptably low effect concentrations (e.g., insignificant or discountable effects resulting in a "may affect, not likely to adversely affect" determination), (2) benchmarks are equal to or less than toxicity values, and (3) pollutant concentrations in stormwater discharges are less than or equal to benchmarks (i.e. no exceedences). Under these circumstances it would be reasonable to arrive at a "may affect, not likely to adversely affect" determination without having to rely on, or make assumptions about, site-specific discharge and/or receiving water information. However, the toxicity values used by EPA to represent the sensitivity of taxa/species to individual pollutants (in Tables 6-5 and 6-7 of the BE) are not equivalent to no effect or acceptably low effect concentrations, rather, they are concentrations expected to kill 50% of exposed individuals, i.e. LC_{50}s. We do not consider the LC_{50} to be an acceptably low effect concentration, and would expect some individuals to be adversely affected if exposed to pollutants at the LC_{50}. If a given benchmark value is lower than the toxicity value (LC_{50}) for a taxa/species, it may be possible to conclude effects would be insignificant or discountable, without additional site-specific information, if the benchmark is sufficiently lower than the toxicity value such that no or acceptably low levels of effect would be expected. If a benchmark is greater than the toxicity value for a given taxa/species, it would not be reasonable to make a “may affect, not likely to adversely affect” determination without consideration of site-specific information about the discharge and/or receiving water. Similarly, if benchmark exceedences have occurred or are expected to occur it is not reasonable to conclude effects would be insignificant or discountable, without considering site-specific information about the discharge, receiving water, species location and species sensitivity.

Site-specific factors may need to be considered to assess whether conditions are consistent with a not likely to be adversely affected determination, particularly where concentrations of stormwater pollutants at “end of pipe” suggest that effects to listed resources may be more than minimal (i.e., “insignificant”). This will be necessary when pollutant benchmarks are not adequately protective of listed species (described above), for example, when past performance indicates benchmarks are likely to be exceeded, and/or when exceedences are reported in the current permit cycle. Based on the EPA’s effects analysis in the BE, there are several taxa–benchmark combinations where benchmark values are above toxicity values (Tables 6-5in the BE), indicating that, for those combinations, exposure of species at benchmark concentrations would cause adverse effects. Similarly, benchmark monitoring data reported by the EPA for the previous permit cycle (2008) show that a large number of responding facilities had at least one annual benchmark exceedance. In both cases, benchmark exceedance and underprotective benchmark values, the EPA assumed adverse effects to listed species were not likely because dilution of stormwater pollutants in receiving waters would reduce exposures below concentrations that affect listed species. While this may be true for some facilities, is not reasonable to assume that potential adverse effects will be ameliorated in all instances without knowledge of site-specific information.

The EPA’s assumptions that adequate control (meeting benchmarks etc.) or adequate dilution (in cases where there are exceedences and/or permit conditions do not ensure protection, i.e. under-protective benchmarks) are sufficient to avoid adverse effects to listed species can be evaluated for specific facilities by individuals reviewing the facilities Eligibility Form and NOI. Site-specific information regarding the discharge, receiving water, occurrence of other stormwater discharges in the vicinity, assimilative capacity of the receiving water, proximity of the species to stormwater discharges, lifestage likely to be exposed, and the SWPPP will help inform the assessment. If, after review, conditions are not consistent with a “not likely to adversely affect” determination, the EPA will direct the facility to revise their SWPPP, improve their performance, or determine that the facility is not eligible for coverage under the MSGP and the operator needs to seek an alternative permit (i.e. an individual permit).

The EPA identified uncertainties in both their exposure and response analyses. In section 6.9 of the BE, the EPA provided a discussion of uncertainties associated with pollutant exposure concentrations, toxicity data, extrapolation of effects from representative species to other listed species, effects of mixtures, aggregate discharges (i.e., co-occurrences of discharges), chronic effects, sediment bound pollutants, and other discharge- and species-related issues. In order to address whether the EPA has demonstrated sufficient knowledge of the effects on listed species resulting from exposures to discharges authorized by the MSGP, we must first review these uncertainties for the BE’s assessment and how EPA addressed them, then evaluate the additional uncertainties.

Pollutant Exposure Concentrations

In an effort to ensure facilities comply with water quality standards, EPA outlines benchmarks and ELGs for some subsectors to be used as indicators of compliance with the permit and, in the case of benchmarks, as tools to help facility operators evaluate the effectiveness of their controls. However, we are not certain that the proposed benchmarks and ELG values are necessarily protective of listed species and critical habitat. The BE notes that the use of benchmark concentrations are considered to be a conservative method of measuring the effectiveness of the implementation of the SWPPPs. However, the proposed benchmarks and ELGs related to the contaminants listed in the BE have generally not undergone section 7 consultation, and thus an evaluation of the proposed levels has not been done for listed species or critical habitat. As the MSGP is intended to provide coverage to facilities that would not result in adverse effects to listed resources (or are covered under another nexus under Criteria B, D, or E), simply meeting these levels does not necessarily ensure that listed resources are sufficiently addressed. The BE notes these levels are to be met at end-of-pipe, before the discharge meets the receiving waters, and suggests that the intermittent and short-term nature of discharges considered along with anticipated dilution of pollutants is likely to further reduce the concentrations of the contaminants to levels that would not measurably affect listed resources. In some cases, this may be a reasonable assumption, particularly where the discharge comprises a very small proportion of the volume of flows in the receiving waters. However, there are several uncertainties that must be evaluated. We anticipate that conditions of both discharges and receiving waters will vary significantly across the Action Area of the MSGP. We also expect that facilities may not consistently meet benchmarks and ELGs based on the relatively large number of facilities that had at least one annual benchmark/ELG exceedance during the 2008 permit cycle. Given these uncertainties it is not reasonable to assume there will always be adequate dilution and that listed species will not be adversely affected. As discussed in the previous section, site-specific information will be needed to determine whether hazardous concentrations of pollutants in stormwater, resulting from under-protective benchmarks or benchmark exceedances, are likely to affect listed species in receiving waters. Considering the hundreds of facilities that will seek coverage under Criterion C, there are likely to be reasonable worst-case situations at some facilities where dilution will not be adequate to avoid hazardous exposures.

Other Sources of Uncertainty

Other important sources of uncertainty addressed by EPA in their BE include extrapolation of representative species effects information to other listed species, effects of mixtures and co-occurrences of discharges, chronic effects, and effects resulting from exposure to sediment-bound pollutants. Unfortunately, ESA section 7 consultations have not been completed for the water quality criteria on which most of the benchmark values were based. Those consultations and their species-specific analyses would have provided greater certainty as to the degree of protection afforded to listed species. The representative species approach adopted by EPA in their BE could not match the rigor of individual criteria consultations, but was a reasonable approach given the scope of the action. Nevertheless, data gaps identified by EPA along with variation in species sensitivity within taxa, contribute to the uncertainty in using such an approach.

Stormwater discharges, by their very nature, typically contain a complex mixture of naturally occurring and anthropogenic pollutants. Predicting the toxicity of mixtures is challenging. For the MSGP BE, the EPA considered the toxicity of each pollutant in stormwater (which required monitoring) individually, not as a mixture. Because pollutants can act additively, synergistically (super additive), and/or antagonistically, the combined effects of multiple pollutants can be greater that the effect of any one pollutant in the mixture.

The EPA did not consider chronic effects in their effects analysis because of the episodic nature of stormwater discharges covered under the MSGP. This may be reasonable for non-bioacumulative pollutants when there are long intervals between discharges. However, bioaccumulative pollutants such as selenium and mercury will accumulate and persist in aquatic food chains, thereby providing and pathway for chronic dietary exposure to listed species that feed on aquatic organisms. Omitting chronic toxicity data/endpoints from the effects analysis for these pollutants would likely result in an underestimation of the effects of stormwater discharges that contain these pollutants. Similarly, exposure of listed species to sediment-associated pollutants was not consider in the effects analysis. Stormwater pollutants that sorb to suspended sediment will be transported downstream and settle in depositional zones. Benthic organisms may be directly exposed to sediment-bound pollutants and/or pollutants that partition into pore water. These chronic exposures may persist well beyond the stormwater event and potentially beyond the distance(s) were effects from water-born exposure would be expected. Species in higher trophic levels may also be affected if the sediment-bound pollutants are bioaccumulative.

Riparian/Terrestrial Effects

The MSGP coverage application process has been designed to address the riparian/terrestrial stressors described above. These stressors are most likely to be related to discharge-related activities. The installation of controls and other similar discharge-related activities are expected to serve an important role for the facilities' ability to reduce pollutants in their discharges. Consequently, the installation and improvement of controls is encouraged, as are methods to avoid or reduce unintentional impacts from their construction and use. The Eligibility Form includes a section that provides guidance to the facility operators that are proposing discharge-related activities for coverage to help them determine whether they can avoid adverse effects to listed species in the terrestrial environment. In particular, facility operators must comply with all of the following measures if discharge-related activities are proposed and listed species and/or critical habitat is present in the facility's action area:

- a) *All discharge-related activities will occur on previously cleared/developed areas of the site where maintenance and operation of the facility are currently occurring or where existing conditions of the area(s) in which the discharge-related activities will occur precludes its use by listed species (e.g., work on existing impervious surfaces, work occurring inside buildings, area is not used by species), and*
- b) *if discharge-related activities will include establishment of structures (including but not limited to infiltration ponds and other controls)or any related disturbances, these structures and/or disturbances will be sited in areas that will not result in isolation or degradation of nesting, breeding, or foraging habitat or other habitat functions for listed animal species (or their designated*

critical habitat), and will avoid the destruction of native vegetation (including listed plant species)

c) If vegetation removal (e.g., brush clearing) or other similar activities will occur, no terrestrial listed species that use these areas for habitat would be expected to be present during vegetation removal.

If the facility can comply with these measures, they must submit the Eligibility Form to EPA as certification of their compliance. EPA will review the Eligibility Form for completeness and submit it to the Service for review as described previously. If the facility is unable to comply with one or more of these measures, they can submit the Eligibility Form to EPA and request technical assistance to identify additional measures that would help to avoid or minimize adverse effects to listed species or critical habitat prior to submitting an NOI.

The vast majority of the facilities are not expected to propose discharge-related activities, as relatively few facilities are anticipated to request coverage for new facility discharges (or additional discharge points) under the MSGP. Most existing facilities are anticipated to limit their requests for coverage to stormwater and allowable non-stormwater discharges, although contaminants and other discharge-associated effects have the potential to affect riparian habitats and food webs as well. While it is possible that no discharge-related activities would overlap with listed species, the exact locations of these facilities cannot be predicted or discerned until the applicant begins the coverage application process. If no proposed discharge-related activities are proposed in the vicinity of listed resources during the life of the permit, we would not expect exposure to occur.

However, since EPA estimates that an average of 52 facilities will seek coverage for new discharges each year, we anticipate that some proportion of these facilities will seek coverage for discharge-related activities. It is also reasonable to assume that at least some of the existing facilities may decide to install new or modified controls and would thus request coverage for discharge-related activities. We must also assume that discharge-related activities could occur anywhere in the Action Area where EPA has retained permitting authority.

In summary, it is reasonable to assume that exposure to aquatic and upland stressors and associated adverse effects may occur from time to time. However, it is difficult to predict the likelihood of exposure and level and frequency of adverse effects in every watershed for every precipitation and discharge event. The EPA may not be able to evaluate effects to individuals of a listed species related to discrete discharge events. However, by evaluating past information related to water quality conditions in the various watersheds, coupled with facility monitoring and inspection reporting, the EPA will be able generally evaluate physical, physiological, behavior, 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.

6. Compliance

Here we ask whether EPA has a mechanism to reliably determine whether and to what degree operators have complied with the conditions, restrictions, or mitigation measures required of the MSGP.

To know or be able to determine reliably estimate compliance for dischargers participating in general permits, EPA must have an effective means of oversight. EPA collects information on NPDES permit compliance through Integrated Compliance Information System - National Pollutant Discharge Elimination System (ICIS-NPDES) database. The ICIS-NPDES database track the number of inspections and enforcement actions over 5 years, along with the number of non-compliance and effluent exceedances over three years. The data are classified for major and minor dischargers. While we cannot know in advance the compliance rate for the MSGP, we agree that EPA has established a mechanism to reliably determine compliance with the permit.

7. Adequacy of Controls

Finally, we ask whether EPA has a mechanism to prevent or minimize listed resources' exposure to stressors in discharges if (1) EPA finds that these stressors occur at concentrations, durations, or frequencies that are potentially harmful to individual listed organisms, populations, or species; or (2) EPA identifies that the discharges lead directly or indirectly to ecological consequences that are potentially harmful to individual listed organisms, populations, species, or PBFs of designated critical habitat.

The MSGP has been designed in part with the goal of avoiding adverse effects to listed species and designated critical habitat. With the exception of facilities that can demonstrate that their effects were addressed under a completed ESA section 7 consultation under a separate federal nexus or ESA section 10 permit (or conceivably under another operator with either of these outcomes), all facilities must provide rationale supporting the conclusion that there would be no overlap with listed resources, or that any effects would be limited to insignificant, discountable, or wholly beneficial effects. The mechanism used for addressing adequacy of controls at the permit implementation scale can be characterized as twofold: 1) application for coverage under the MSGP, and 2) compliance with the conditions and requirements of the permit after coverage begins. Each of these categories addresses the potential for addressing exposure to discharges at concentrations, durations or frequencies that are potential harmful to individuals, populations, or the species as a whole, as well as to ecological consequences that are potentially harmful to listed species and critical habitat.

Application for Coverage

The EPA limits coverage under the MSGP to facilities that meet the five ESA criteria previously. Facility operators must determine whether they can seek coverage under a previously completed process that satisfactorily addressed effects to listed species (i.e., Criteria B, D, or E). If not, operators must determine whether their proposed activities would have either no overlap with listed species (i.e., Criterion A), or would be expected to have only insignificant or discountable effects if overlap occurred (i.e., Criterion C). Facilities that could not meet these criteria would not be eligible for coverage under the MSGP.

The mechanism for determining whether the facilities would avoid adverse effects to listed species is outlined in the permit. Uncertainties remain regarding the level of oversight and review that EPA would be able to perform to determine whether adverse effects would be avoided by the coverage of each facility. EPA has worked with the Services to identify procedures for criterion selection to reduce some of the potential uncertainties as described in earlier parts of this Opinion. In particular, we anticipate improved descriptions of the action area for each facility and more accurate and consistent selection of Criteria A and C based on the improved guidance.

Additionally, and as described earlier, the 2015 MSGP will include an opportunity for the Service to provide input on a site-by-site basis for facilities whose discharges overlap with listed species and their designated critical habitats. The additional step for facilities considering selection of Criterion C and the associated Eligibility Form review by the EPA and the Service is expected to assist the EPA in identifing discharges or other activities authorized by the permit for a subset of facilities where risk to listed resources would be most likely to occur. While the Service field offices' reviews will be volitional based on their other workload, priorities, and deadlines, this approach is due in large part in response to the structure of the EPA's permit, which has been designed with deadlines that do not easily accommodate the timelines of a traditional programmatic consultation process. Although the lack of a Service response to a request for Eligibility Form review under the 2015 MSGP would not constitute an official Service concurrence with a "may affect, not likely to adversely affect" determination by EPA for a given facility's proposed activities, but we anticipate that this new step in the process will greatly reduce the frequency of instances in which coverage is extended to facilities that do not meet the terms of the permit (i.e., result in adverse effects).

Thus, while the stressors described above have the potential to result in measurable effects to listed species and designated critical habitat if not adequately mitigated, the 2015 permit has included key changes in implementation that are expected to 1) significantly reduce or eliminate errors in determining overlap with listed resources, and 2) reduce the likelihood of mistakenly providing coverage to facilities that cannot demonstrate adverse effects would be avoided or minimized.

Compliance with Permit Conditions and Requirements

Once coverage begins, facilities must abide by the MSGP's requirements and conditions for inspections, monitoring, and reporting, and must implement corrective actions as needed.

As with application for coverage, the basic mechanism for addressing potential impacts to listed resources associated with permit compliance. Uncertainties remain with recognizing or detecting actual occurrence of adverse effects and ensuring implementation of appropriate measures to fully avoid or minimize adverse effects is less certain.

Based on these considerations, specifically, the coverage application process and permit compliance, the EPA has demonstrated that they have developed a reasonable mechanism to prevent or minimize listed resources' exposure to stressors in discharges and other activities authorized for facilities applying for coverage under the permit.

Summary of Effects

The MSGP requires the use of controls and BMPs in an effort to address many of concerns related to the potential stressors of the action to both listed resources and water quality. We anticipate that effects related to the various pollutants are less likely to occur if effective and well-designed controls and BMPs are in place and operational, and if facilities select the appropriate criteria that apply to their discharges and discharge-related activities. We expect implementation of the permit, including, but not limited to such measures, will likely reduce the amount and/or concentrations of pollutants that are discharged into receiving waters in the Action Area. However, we do not assume that all impacts will be avoided, particularly from 1) aggregate discharges in to a receiving waterbody; 2) one or more facilities are unable to reduce the stressors in their discharges to levels that harass or harm listed species, their prey, their host species, and/or their habitat; and/or (3) where facilities discharge chemical pollutants which adsorb to suspended sediments and are re-released into the aquatic environment at a later time (as described in Section 2 of the Effects Section of the Opinion). Thus, the effects of the potential stressors described above are expected to apply to at least some of the facilities and listed resources within the Action Area, although the exact contaminant concentrations, frequency and degree of exposure, and responses of listed individuals and critical habitat to each exposure event is difficult, if not impossible, to predict at the Action Area scale in advance.

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 Act.

The biological evaluation that EPA submitted to support its request for formal consultation and which is required to discuss cumulative effects (as they are defined for the purposes of section 7 of the ESA) did not identify future state, tribal, local, or private actions that were reasonably certain to occur in the Action Area. During this consultation, we searched for information on future State, Tribal, local or private actions that were reasonably certain to occur in the Action Area and we determined the following types of activities are likely to occur.

We anticipate that human population expansion and associated infrastructure development; construction and operation of dams along major waterways; water retention, diversion, or dewatering of springs, wetlands, or streams; recreation, including off-road vehicle activity; expansion of agricultural or grazing activities, including alteration or clearing of native habitats for domestic animals or crops; and introductions of non-native plant, wildlife, or fish or other aquatic species, which can alter native habitats or out-compete or prey upon native species will occur in the Action Area due to state, tribal, local or private actions. Given the Action Area has been identified as waters over which EPA has jurisdiction, from which existing facilities discharge stormwater and allowable non-stormwater releases, many of these activities are expected within the range of various federally protected wildlife, fish, and plant species, and could contribute to cumulative effects to the species within the Action Area. Species with small population sizes, endemic locations, or slow reproductive rates will generally be more susceptible to cumulative effects.

INTEGRATION AND SYNTHESIS OF EFFECTS

EPA proposes to issue the MSGP to authorize stormwater discharges associated with industrial activity from 30 sectors into waters of the United States over the permit period from 2015 to 2020. EPA expects the permit to cover just under 3,000 facilities, based on previous permit cycles, with the majority of the facilities comprised of existing discharges covered under the 2008 MSGP. The proposed action is likely to adversely affect the species and critical habitats listed previously. Here, we integrate information presented in this Opinion to summarize stressors and the likely consequences of exposing listed resources to these stressors.

A significant portion of the nation's waters have been impacted by anthropogenic stressors described within this Opinion. In the Environmental Baseline, Status of the Species, Status of Critical Habitat, and Cumulative Effects sections of the Opinion, we established that the effects of past and ongoing activities in the Action Area would maintain the existing degraded habitat conditions that are prevalent. Listing documents and recovery plans for the listed species in the Action Area describe numerous causes of decline and threats to these species throughout their ranges. Species and the habitats that are needed for carrying out their various life history requirements have been impacted by development and other stressors. In the *Effects of the Action* section, we provided an overview of the types of effects that would typically be expected from the stressors associated with activities proposed by the facilities for coverage under the MSGP, and then described the how EPA has structured the MSGP to address their oversight of the permit as it relates to effects to listed resources.

Review of Permit Structure

Our Effects Analysis assesses whether, and to what degree, EPA structured the MSGP to establish processes that require EPA and the applicant, and the Directors to collectively implement the permit in a manner that addresses adverse effects to listed resources, and ensures the operation of facilities subject to the permit are not likely to jeopardize the continued existence of endangered or threatened species or destroy or adversely modify designated critical habitat. We addressed this by answering seven questions.

First, we concluded that EPA understands that the scope of their action includes issuance and implementation of the MSGP, which addresses the coverage application process, monitoring, and compliance. Second, we expect EPA will understand the types of stressors from the action, although there are some gaps in EPA's identification of stressors of the action on a site-specific or sector-specific basis. However, EPA has identified the most likely contaminant stressors associated with the facility subsectors and has focused on these contaminants for their analytical monitoring requirements and visual inspections as specified in the permit. Third, EPA was unable to reliably estimate exposure of ESA listed resources to these stressors; however, they will use monitoring programs to reduce the likelihood of exposure from individual facilities through the life of the permit. EPA has also included additional completeness and consistency review measures during the coverage application process, which is expected to reduce errors and improve accuracy during this process. Fourth, EPA will collect and monitor information on authorized activities throughout the life of the permit, aided through the more efficient electronic submission of annual inspection and monitoring reports. Fifth, EPA concluded the proposed discharges and discharge-related activities may affect listed resources. While direct observation of adverse effects on listed species is not likely to occur based on the life history and distributions of listed species, types of behavioral and sublethal effects anticipated, and other factors, EPA will be able to use the results from the monitoring program and facility reports to determine the relative effectiveness of the SWPPPs and corrective measures employed by the facilities. Sixth, EPA has programs in place for the MSGP to monitor for compliance, and they have the authority to enforce the permit as needed. Finally, EPA has the ability to modify their action if new information (including inadequate protection for species or low levels of compliance) becomes available and coordinating with facility operator where corrective actions are needed or violations occur. Modifications may include additional actions or requirements, and reinitiation of section 7 consultation. This review of the permit structure gives us confidence in EPA's ability to ensure that discharges into waters of the United States are not likely to jeopardize the continued existence of endangered species or threatened species or result in the destruction or adverse modification of critical habitat that has been designated for those species.

Types of Anticipated Effects and Exposure

EPA has worked to improve the language and implementation of the permit over previous cycles to better address potential effects to listed species, and reduce the amount of error during application for coverage under the permit. EPA has also provided improved guidance and clarification of permit language and expectations so that both facility operators and EPA staff are better able to ensure compliance with the permit. We expect these changes will help to address some of the uncertainties and reduce adverse effects resulting from the implementation of the permit, but will not avoid all adverse effects to listed species from stressors covered under the action. The measures proposed by EPA are expected to reduce the severity of effects and allow for site-specific flexibility to address targeted stressors through requirements for controls and other measures as well as appropriate corrective actions where inspections and/or monitoring indicates such actions are needed. The proposed action may result in both short-term and long-term effects to listed species and designated critical habitat through the permitting of the proposed activities. The proposed action is anticipated to generate primarily physical and chemical stressors to listed species and critical habitat due to the presence of chemical constituents and other characteristics of the discharges. We anticipate the most significant effects to listed species and critical habitat from the proposed action will result from:

- Direct exposure of listed individuals to pollutants within the stormwater discharges;
- Direct exposure to physical stressors from the discharges, and related habitat changes (e.g., erosion, scouring);
- Reduced or degraded forage base;
- Effects to other species on which listed species depend to complete their life cycle (e.g., fish host species in the case of mussels); and
- Direct effects to critical habitat through short-term and/or long-term effects to PBFs that give the designated area value for the conservation of listed species.

In the short-term, stormwater discharges and allowable non-stormwater discharges may directly affect listed individuals and critical habitat. The stormwater discharges and allowable non-stormwater discharges authorized by the MSGP are anticipated to contain a variety of chemicals or other pollutants, including organic and inorganic constituents, sediments, and nutrients.

Individuals may be exposed to pollutants associated with the discharges during and immediately after storm events. In some cases, listed species may also be exposed to significant water temperature differences between discharges and the receiving waters they inhabit. Other direct effects to listed species may occur from increased flow velocities downstream of the discharge point(s) of facilities that are covered by the MSGP. These stressors are also likely to affect the prey base and habitat for listed species, sometimes leading to long-term effects where the prey base and/or habitats are unable to recover sufficiently to adequately support individuals of a listed species. Additionally, certain long-lived pollutants and associated degradates may accumulate in prey items or habitat features (e.g., benthic sediments), extending the duration of exposure of listed species to contaminants. Where discharges are not adequately attenuated, erosion of banks, shorelines, substrates, and habitat features (e.g., in-water spawning habitat) can be degraded or eliminated. Where multiple discharges occur within the same reach of stream or other waterbody, aggregate effects from combinations of multiple stressors are likely to have a greater overall effect to listed species, their prey, and their habitat than single discharges, in some cases and/or watersheds. Critical habitat may also be affected through similar routes of exposure.

Based on the life histories of many of the species, and types of habitat used, it is unlikely that EPA or the facilities will directly observe the expected adverse effects with the exception of very noticeable, unexpected events (such as a large fish kill, which is not anticipated to occur as a result of this proposed action). For example, listed species such as fish and aquatic invertebrates may not be easily observable in streams or aquatic habitat, or mobile species or life stages of species may move great distances from the exposure site after exposure occurs. However, the expected lack of likely observations of sublethal, behavioral, or other effects from the discharges (even in combination with discharges from other sources, does not confirm that they have not occurred. Because of the limited ability for direct observation of effects to listed resources, the components of the MSGP that address criterion selection, inspections, monitoring (both visual and analytical), use of corrective actions, and reporting will be most important in EPA's ability to determine whether facilities are meeting the requirements of the MSGP, including avoidance and/or minimization of effects to listed resources. Each of these is discussed in the subsequent paragraphs:

<u>Criterion Selection</u>

We anticipate that accurate selection of Criteria A and C will be the most challenging to address. The EPA has included several measures within the permit that provide clarified guidance and requirements to reduce the instances of potential error in selection of these criteria. For example, EPA will not review the individual action area of every facility submitting an NOI under Criterion A (indicating no overlap with listed resources); however, they will selectively review a subset of NOIs (not to exceed 100 facilities), and have provided additional guidance to facilities for delineating an action area within IPaC to acquire an official species list from the Service. For Criterion C, EPA will review the submitted Eligibility Forms for completeness prior to sending them to the Service for a consistency review. These measures are expected to improve clarity, consistency, and accuracy among applicants as they determine which criterion applies to their facilities, and for EPA as they review the applications for coverage.

While it is possible that erroneous selections of Criterion A could still occur, we expect the number of inappropriate selections will be appreciably reduced. However, the delineation of an action area remains a subjective exercise, and without direct oversight of every facility, it is reasonable to assume that at least a portion of the applicants will underestimate their facilities' action areas and erroneously select Criterion A, even with the measures that EPA has included in their proposed action.

We do not anticipate that every facility that is erroneously covered under Criterion A of the MSGP would necessarily generate stressors that would rise to the level of adverse effects to listed resources. However, without recognition of the presence of listed species and/or critical habitat it is reasonable to assume that a subset of facilities selecting Criterion A in error would not be detected through EPA's oversight process. It is also reasonable to assume that in some of those instances, the facilities' SWPPPs may include measures that would avoid or reduce the potential for adverse effects to listed species and critical habitat related to stressors covered by the permit.

We also assume that, in other instances, the proposed measures may not fully avoid or reduce adverse effects to listed resources to an insignificant or discountable level. We anticipate that there will be some degree of adverse effect to listed species albeit of a temporal nature or of short duration.

There are several uncertainties that factor into the analysis of the likelihood of exposure and response for listed resources. The condition of the receiving waters, proportion of discharge flows to receiving water flows, and sensitivity of the listed resources to the MSGP's stressors will all influence how individuals, populations, species, and critical habitat are affected by the proposed action. Additionally, other uncertainties exist related to the effects of mixtures in receiving waters (e.g., either related to background levels of pollutants or from coverage of multiple facilities). Finally, we are not certain whether facilities that have had difficulties meeting benchmarks or other requirements under previous permit cycles where no or insufficient corrective actions have been clearly implemented (or deemed feasible) would be provided coverage under the MSGP.

Exposure and Response Scenarios

Due to the often unpredictable nature and frequency of precipitation events resulting in stormwater discharges, it is not possible to predict every discharge event (including duration and volume) that would result in adverse effects to listed resources from discharge stressors. However, it is reasonable to assume that at least some of the discharges that occur during the 5-year permit cycle will generate stressors that will measurably affect listed resources. We anticipate that measurable effects are most likely to occur in the following scenarios (either singly or in combination), where:

- Relatively large numbers of facilities discharge into the same reach of a receiving waterbody,
- Assimilative capacity of the waterbody during discharges is not sufficient for the pollutant concentrations from the facility(ies) discharging to the waterbody,
- Facilities are unable to meet their required benchmarks during one or more sampling events,
- Facilities observe evidence of pollutants during visual inspections,

- A need for corrective measures is triggered especially where there have been observations or suspected releases of pollutants as described in Part 4 of the permit, or where a required control measure was not installed or correctly installed, or
- Corrective measures for benchmark exceedences or other suspected or observed chemical or physical stressors are determined to be infeasible and are not implemented.

The frequency and duration of exposure will likely vary across habitats and species. Some highly mobile aquatic or aquatic-associated individuals may be able to avoid periodic and/or in frequent plumes of contaminants or the vicinity of a mixing zone if they are able to detect pollutants or other stressors, although the avoidance may result in other effects (e.g., increased energy use, increased risk of predation, delayed migration or reproduction), if they are unable to migrate through, forage or reproduce in a preferred area. In other cases, individuals will be unable to detect contaminants (e.g., copper, in the case of salmonids) and thus be unable to avoid exposure resulting in decreased ability to perform necessary life history functions (e.g., avoid predation or detect forage items, for example). Where species are highly mobile and multiple discharges exist in a receiving waterbody, they may encounter multiple discharges during the same event. Alternatively, attached and/or sessile individuals (or life history stages) or those that are confined to limited areas within or adjacent to waterbodies, will in most cases be unable to avoid exposure to stressors from the action, even if they are able to detect pollutants or other stressors. Thus, we anticipate that where discharges include constituents in concentrations that would result in sublethal effects to listed species (either mobile or sessile), exposure to these substances would impair essential behavior patterns of these individuals, including breeding, feeding, or sheltering. Where these and other stressors of the action result in avoidance or delay in accessing habitats important for foraging, migration, reproduction, or other critical life history functions, or where effects to prey base and/or host species occur, we anticipate these stressors will significantly disrupt normal behavioral patterns of listed species.

<u>Uncertainties</u>

Due to the nature of the proposed action (a national general permit for stormwater discharges), adverse effects from the discharges covered by the MSGP within a given watershed may be difficult to distinguish from effects of other point or non-point discharges during increased runoff and/or high flow levels following precipitation events, particularly in urban areas or other areas where high levels of impervious surfaces are present. The stressors from the covered discharges may result in adverse effects related to the discharge pollutants or physical characteristics, or may contribute to the overall short- or long-term degradation within the receiving waters from all sources. Direct effects to individuals of listed resources would include sublethal effects or induce behavioral responses that affect the fitness of individuals exposed to the discharges. Indirect effects would include, but are not limited to, reductions in and/or or changes to prey base and host species (e.g., for mussels), and degradation of habitat conditions in the receiving waters, and in certain cases may contribute to reductions in fitness of listed species. We do not necessarily assume that all discharges would result in measurable effects to listed resources. However, we acknowledge that variable precipitation events, receiving water conditions and individual and combined discharge events are expected to result in episodic adverse effects to listed species and designated critical habitat, even though the specific timing and duration of such effects are difficult to predict at the scale of the Action Area.

Summary

As described in the BE and this Opinion, discharges and discharge-related activities may affect listed species and designated critical habitat. However, we expect that these effects will be mitigated in large part by the changes to the application and review process whereby EPA will have the ability to evaluate, monitor, and determine compliance of covered facilities under the permit. We are unable to describe the full extent of facility- or site-specific adverse effects and species responses, although we are able to describe the overall extent of anticipated effects related to the proposed action. We expect that the geographical extent of disturbance and injurious effects, where they occur, will be highly variable over the life of the permit, based on differences between precipitation/discharge events, seasonal changes in the receiving waters, and other site-specific conditions. Thus, we anticipate the geographical extent of disturbance and injurious effects will vary by location and event and may range from a few meters to many kilometers downstream of the discharge point, or in many cases, aggregated discharge points. While low levels of disturbance and sublethal effects may occur for individuals of species within the receiving waters in the Action Area, these effects are not expected to rise to the level of loss of individuals or population-level effects.

It is our Opinion that issuance of the MSGP is not likely to result in an appreciable reduction in the likelihood of both the survival and recovery of any listed species by reducing the reproduction, numbers, or distribution of that species. It is also our Opinion that the MSGP is not likely to result in destruction or adverse modification of designated critical habitat. The process achieves this through a comprehensive suite of requirements, including, but not limited to:

- Improved guidance to facility operators to identify the presence of listed resources in their individual action areas;
- Additional evaluation of facilities that overlap with listed resources via the Eligibility Forms;
- Opportunities for technical assistance and consistency review from the Service field offices for facilities requesting coverage under Criterion C; and
- Limiting coverage to facilities that are not expected to have adverse effects on listed resources and requiring inspections, analytical monitoring and the use of corrective measures when needed.

CONCLUSION

After reviewing the current Status of Species, the Environmental Baseline for the Action Area, the effects of the proposed reissuance of the MSGP and the cumulative effects, it is the Service's Biological Opinion that the (action), as proposed, is not likely to jeopardize the continued existence of the species covered in this consultation, and is not likely to destroy or adversely modify designated critical habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. 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. *Harm* is defined by the Service as an act that actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). *Harass* is defined by the Service as an intentional or negligent act or omission which creates 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 (50 CFR 17.3). 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 Incidental Take Statement.

AMOUNT OR EXTENT OF TAKE

This consultation has focused on whether the EPA has ensured that their issuance of the general permit is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. It does not identify the individual facilities expected to be covered by the MSGP, nor does it describe details of the specific effects and conservation measures related to individual facilities, although the jeopardy analysis does, in fact, include the activities authorized under the 2015 permit. Because of the large scale and broad scope of the proposed action, however, even the best scientific and commercial data available are not sufficient to enable the Service to estimate the the exact amounts of anticipated incidental take[35] associated with the action on a facility-by-facility (or species-by-species) basis related to discrete precipitation and discharge events; however, the incidental take described in the following paragraphs does apply to the activities authorized by the 2015 permit. We address types of incidental take associated with the proposed action that are reasonably certain to occur in the action area in the paragraphs below.

Harassment

The proposed action will result in appreciable disturbance of aquatic and semi-aquatic species during feeding, breeding, sheltering or other important behaviors. Such disturbance is also expected to occur via delays to migration to foraging, spawning, or rearing habitats, and/or impacts to their prey base, host species, and/or habitat. All aquatic listed individuals present in the receiving waterbodies downstream of the discharge points are expected to experience disturbance to some degree of over the course of the 5-year permit.

[35] i.e., exact numbers of individuals of each species.

Harm

The proposed action will result in harm of listed aquatic species through injurious sublethal (but not lethal) effects due to direct exposure to pollutants released during implementation of the proposed action. This take will include disruption of normal behavioral patterns for aquatic species such as feeding, breeding, or sheltering through delays to migration to foraging, spawning, or rearing habitats, and/or impacts to their prey base or habitat. We anticipate that all sessile individuals (or life history stages) and individuals that are unable to detect and thus avoid the relevant stressors will experience harm in conditions where the assimilative capacity of the receiving waters is insufficient to reduce concentrations to required levels to avoid injurious effects. The extent of this area is anticipated to be in the receiving waterbodies from the discharge point(s) of the facility(ies) to the furthermost area downstream of the discharge point(s) where the pollutants exceed levels that would result in sublethal harmful effects (e.g., injury) to listed species. The duration associated with each qualifying event will generally range from a few hours to a few days for most cases based on the anticipated decrease in contaminant load over time in response to a stormwater-generating event In rare cases, the duration may extend to 14 days for a given facility if corrective actions are needed to address unforeseen emergency situations.

For both categories, we anticipate that incidental take will most frequently occur when there are: (1) aggregate effects from multiple discharges within the same receiving waters; (2) one or more facilities are unable to reduce the stressors in their discharges to levels that harass or harm listed species, their prey, their host species, and/or their habitat; and (3) where facilities discharge chemical pollutants which adsorb to suspended sediments and are re-released into the aquatic environment at a later time.

The Service anticipates incidental take of all listed species as described above in the action area will be difficult to detect for the following reasons**:**

- finding an impaired specimen is unlikely;
- sublethal/delayed effects to growth and reproduction would not generally be observed;
- the species occurs in habitat (e.g., streams, wetlands, lakes, and other off-site locations) that makes detection difficult; and
- the relationship between habitat conditions and distribution and abundance of individuals is imprecise such that the number of specific individuals affected cannot be practicably obtained.

REASONABLE AND PRUDENT MEASURES

The following reasonable and prudent measure is necessary and appropriate to minimize impacts of incidental take to species identified in Table 3.

1. EPA will use its authorities under the CWA to minimize impacts to listed species pursuant to the MSGP and CWA.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the EPA must comply with the following terms and conditions, which implement the reasonable and prudent measure described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following Terms and Conditions are required for the implementation of RPM 1:

1. If, during review of the Criterion C Eligibility Form, the reviewing Service field office requests future notification by and/or coordination with EPA regarding unexpected developments once a facility is provided coverage under the MSGP, EPA shall comply with the request.
   A. Such requests would generally be expected to relate to:
      i. unexpected issues that arise after coverage has begun, for a given facility or group of facilities, especially where unexpected exceedences of benchmarks or ELGs occurred,
      ii. or where a proposed/required control or other measure was not installed or was not installed properly.
   B. Additional scenarios may be identified by the Service reviewer during the consistency reviews.

2. EPA shall compile and provide to the Service an annual report that is comprised of data from EPA's Integrated Compliance Information System (ICIS) summarizing the covered facilities as well as reporting and monitoring data submitted by the facilities to EPA pursuant to the MSGP. (This annual report should not be confused with the annual reports provided to EPA from the covered facilities.)

   A. The report shall include, at minimum, the following data:
      i. Locations of facilities covered under the MSGP by selected criterion (these should be provided in an electronic spreadsheet including at minimum: facility sector/subsector, name, ESA criterion selection, state, and geographic point data for the facilities and their outfall locations).
      ii. All instances of facilities covered under any ESA criteria that exceeded benchmarks and numeric ELGs for their subsector(s) during one or more quarterly monitoring efforts and data associated with these exceedences.
      iii. All instances where an operator (or EPA) determined there was a need to consider corrective actions at facilities covered under any criteria. This listing shall also include, if available, the trigger for corrective actions (e.g., spill, lack of required control, etc.) and the outcome (e.g., any actions taken or implemented to correct the problem).
      iv. A brief description of any instances of coverage provided under the MSGP where the reviewing Service field office initially noted, in writing, that the facility's proposal did not appear to support coverage under the permit. The

description shall include how the Service's concerns were addressed, and shall specify whether the reviewing Service field office provided confirmation that any additional information and/or changes to the proposal (including but not limited to additional BMPs) were sufficient to address the Service's concerns.

v. Any observed/reported impacts to ESA-listed species or critical habitat as documented by facilities during or between the required inspection and/or monitoring efforts conducted at the facility[36].

vi. All data in bullets 2(A)(2-3) above should be provided to the Service Headquarters office (see accompanying cover letter) along with a brief summary, and:

a) If possible, data should be submitted in a format that is sortable (such as an electronic spreadsheet that can be sorted by sector/subsector, state, county, receiving waters, and parameter measured/exceeded at minimum).

b) The data should be clearly linked to sector type, geographic location (e.g., point data) to enable efficient review by the Service that can be linked to the data specified in 2(A)(1) above (e.g., to facility ID and location to allow for review by receiving water).

B. The first annual report shall be submitted to the Service no later than 3 months after the deadline for submitting results from the fourth quarterly inspection after issuance of the permit, as described by the MSGP.

i. Subsequent annual reports to the Service should be submitted at 12-month intervals after this date.

ii. For the first monitoring report to the Service, EPA may request a 3-month extension to the report submission deadline to address unforeseen challenges with querying and compiling information from the new reporting system.

C. A preliminary report listing facility locations as described in Term and Condition 3(A)(i) above should be submitted to the Service no later than 12 months after the issuance of the permit.

The reasonable and prudent measure, with its 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, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

[36] While we recognize the ICIS system does not specifically request this information, if such information is provided in the narrative section of the report, EPA should forward this to the Service as part of their annual report of implementation of the MSGP.

The Service is to be notified within three working days upon locating a dead, injured, or sick endangered or threatened species specimen, nest, and/or egg(s). Initial notification must be made to the nearest Service Law Enforcement Office. Notification must include the date, time, and precise location of the injured animal, carcass, nest, and/or egg and any other pertinent information. Care should be taken in handling sick or injured specimens to preserve biological materials in the best possible state for later analysis of cause of death, if that occurs. In conjunction with the care of sick or injured endangered or threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed. Contact the Service Law Enforcement Office at (425) 883-8122, the appropriate Service Regional Office or Field Office as provided to EPA during consultation, or the Service's Headquarters Office at (703) 358-2171. All such instances should also be documented in the annual report described above.

CONSERVATION RECOMMENDATIONS

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

1. We recommend that the EPA develop additional tools to assist facility operators with further measures and considerations that will improve both EPA's and the facilities' efforts to consistently avoid, reduce, or minimize effects to listed species and designated critical habitat associated with the MSGP. To assist EPA with this effort, we are providing some examples based on coordination with some of our Regions:

    A. We have attached a list of measures to this Opinion that can be used for facilities in the Pacific Islands that will provide greater assurances to EPA that any terrestrial effects from discharge-related activities are truly insignificant or discountable for discharge-associated activities (Appendix F). We recommend that EPA encourage applicants to clearly communicate that they will implement the relevant measures when constructing controls or other measures in the geographic areas applicable to these activities. This will help avoid and minimize effects to listed resources and streamline the review of Criterion C Eligibility Forms during Service review.

    B. For facilities in New Mexico, we recommend that EPA encourage applicants whose discharge points are within one mile of critical habitat for aquatic species to complete a Criterion C Eligibility Form instead of selecting Criterion A when seeking coverage under the MSGP. Of particular concern are facilities that discharge to the mainstem or tributaries of the following rivers, or are within one mile of these rivers in New Mexico:

        - Pecos River

- San Juan River
- Rio Grande River, from the reach north of Elephant Butte upstream to Cochiti

2. We recommend that EPA 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 listed species and/or critical habitat are likely to occur either through notification by the Service Headquarters Office, ROs, or FOs, or through other means (e.g., EPA's proposed review of a subsample of Criterion A facilities), the list and crosscheck should be expanded accordingly. For example, facilities discharging to the following receiving waters should generally not be allowed to proceed with coverage under Criterion A:

    - New Mexico: Pecos River; San Juan River; and Rio Grande River (from the reach north of Elephant Butte upstream to Cochiti)

    - Washington: Puget Sound; tributaries to eastern Puget Sound, from the Puyallup River north; mainstem Columbia River; and certain tributaries to the Upper and Lower Yakima River

3. We recommend that the EPA encourage facilities to describe and ensure control maintenance schedules are clearly defined and adhered to as part of their SWPPP, and that these activities are addressed both in the NOIs, and, where applicable, in Criterion C Eligibility Forms. For example, facilities that include settling ponds or other controls that allow contaminants to settle out prior to discharge into the receiving waters should specify the maintenance schedule for removing contaminants and confirm such maintenance was performed in annual reporting. This would be of particular concern in dry areas (such as portions of the desert Southwest), where contaminants that are successfully filtered out during a storm event may be resuspended and discharged in future storm events occurring many months later. At minimum, we recommend that this particular control measure and associated maintenance be specifically addressed in the NOIs, Criterion C Eligibility Forms, and annual reporting for facilities in Arizona, New Mexico, and western Texas.

4. We recommend that the EPA, in coordination with states and other water quality regulating entities in the Action Area (as applicable), consider and develop monitoring plans or programs, or other assessment tools that enable the agency to better discern the impacts of aggregate discharges of stormwater from facilities covered under general or individual permits, particularly in reaches of water bodies receiving stormwater discharges from multiple facilities and that also contain listed resources.

5. We recommend that the EPA review and update the contents of the Sector Specific Fact Sheets to ensure that the pollutants listed within the permit and recommended BMPs to

address the pollutants are up to date and ensure all relevant emerging issues are addressed. For example:

A. The fact sheets should systematically reviewed and revised as necessary to clearly identify measures with similar levels of detail.
B. The analysis that was originally performed to establish the types of stormwater pollutants likely to be generated from the various facility subsectors should be periodically reanalyzed and peer-reviewed to ensure that the most updated information is being used for stormwater permits (i.e., for both general permits and individual permits).
C. Ensure the permit includes any additional measures necessary to address emerging issues related to stormwater contaminants that might not be measured or observed in quarterly sampling or inspections (e.g., PAHs in runoff after coal tar application to parking areas and other surfaces).

6. Finally, we recommend that the EPA begin informal ESA Section 7 consultation with the Service early in the development of the next draft MSGP permit and incorporate monitoring results and trends from the reporting generated during this permit cycle. Such informal consultation should also include a joint evaluation of the effectiveness of the consistency review process from the 2015 permit cycle, or whether a more formalized, programmatic consultation would be more appropriate for the next permit cycle.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations by contacting the Service's Headquarters Office at the address listed on the cover letter to this document.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the reinitiation request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. For example, reinitiation may be warranted if EPA makes modifications to the permit that would result in changes to the coverage process related to consideration or analysis of effects to listed resources, including, but not limited to reductions or elimination of certain types of inspections, analytical monitoring, or reporting. Such modifications may occur prior to issuance of the permit or during the life of the MSGP. Additionally, in instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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