

Supplemental Environmental Assessment

Reducing the Impact on At-risk
Salmon and Steelhead by California Sea Lions
in the Area Downstream of Bonneville Dam
on the Columbia River, Oregon and Washington



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Cover Sheet

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Salmon and Steelhead by California Sea Lions
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on the Columbia River, Oregon and Washington

Proposed Action: The Issuance of a Letter of Authorization for the Intentional
Take of Predatory California Sea Lions at Bonneville Dam
Pursuant to Section 120 of the Marine Mammal Protection Act

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List of Acronyms

ACC	Animal Care Committee
BRT	Biological Review Team
BRZ	Boat Restricted Zone
Corps	U.S. Army Corps of Engineers
CRITFC	Columbia River Inter-Tribal Fish Commission
DPS	Distinct Population Segment
Ecology	Washington State Department of Ecology
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FCRPS	Federal Columbia River Power System
ICC	Incident Command Center
IDFG	Idaho Department of Fish and Game
LOA	Letter of Authorization
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
ODFW	Oregon Department of Fish and Wildlife
ODEQ	Oregon Department of Environmental Quality
OSP	Optimum Sustainable Population
PBR	Potential Biological Removal
SIR	Supplemental Information Report
SWCAA	Southwest Clean Air Agency
WDFW	Washington Department of Fish and Wildlife

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1 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 Introduction and Background

The National Marine Fisheries Service (NMFS) has prepared this Supplemental Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA). This EA supplements the 2008 *Final Environmental Assessment: Reducing the Impact on At-risk Salmon and Steelhead by California Sea Lions in the Area Downstream of Bonneville Dam on the Columbia River, Oregon and Washington* (hereafter, 2008 Final EA), and the 2012 *Supplemental Information Report: In Response to the August 18, 2011 Application by Idaho, Oregon, and Washington for Lethal Removal Authority under Section 120 of the Marine Mammal Protection Act* (hereafter, 2012 SIR). This document considers the environmental consequences of alternative actions to continue to reduce California sea lion predation on salmonids listed as threatened and endangered under the ESA below Bonneville Dam as detailed in the states' January 27, 2016, application (Figure 1-1). The analysis will inform NMFS' decision-making to either approve or deny the states of Idaho, Oregon, and Washington (states) to lethally kill California sea lions by intentional means in accordance with section 120 of the Marine Mammal Protection Act (MMPA). This SEA provides updates, information, and analysis regarding the proposed action. Information from the 2008 EA and 2012 SIR is incorporated by reference.

1.1.1 Proposed Action

On January 27, 2016, NMFS received an application from the states requesting an extension of five years to the 2012 Letter of Authorization¹ (LOA) to continue to conduct a sea lion lethal removal program, with terms and conditions identical to the LOA issued in 2012. The Pinniped-Fishery Interaction Task Force (Task Force) convened by NMFS on May 31, 2016, to consider the states' application recommended (with one of the 14 members dissenting) that NMFS approve the states' application for lethal take authority. NMFS proposes to approve the states' section 120 application for lethal removal of California

¹ On March 15, 2012, NMFS issued an LOA under section 120 of the MMPA to the States for the intentional take, by lethal methods, of individually identifiable California sea lions (*Zalophus californianus*) in the vicinity of Bonneville Dam, on the Columbia River in Washington and Oregon, that are having a significant negative impact on Pacific salmon and steelhead (*Oncorhynchus* spp.) listed as threatened or endangered under the Endangered Species Act (ESA). The 2012 LOA expires on June 30, 2016.

sea lions at Bonneville Dam, under certain conditions, in accordance with the MMPA. These conditions are described in more detail in Section 2 under Alternative 2.

Updated Action

Lethal Removal of California Sea Lions

The proposed authorization would allow the states to permanently remove (i.e., kill or place in permanent captivity) up to 92 California sea lions annually (1 percent of the potential biological removal (PBR) level for the population (Carretta et al. 2014²; Carretta et al. 2015)). Those animals would be removed from the action area described in Subsection 2.1.1 and shown in Figure 1-1 by (1) catching them in a trap (a floating dock-like structure that animals jump onto to rest and dry off) and either placing them in a display facility or killing them with lethal injection or gunshot, or (2) shooting them when present in the area below the dam. Various measures will be implemented to ensure that: trapped animals are held, transported, and/or killed humanely; Steller sea lions are not accidentally killed; and public safety is maintained.

New Elements of the Proposed Action

Capture, Marking, and Relocation

Sea lions would be captured at the dam using up to four or more caged floating platforms that would be placed in locations readily accessible to the animals. A detailed description of these techniques was provided in the 2008 Final EA, and is incorporated herein by reference.

In 2015, there were three accidental mortalities, two California sea lions and one Steller sea lion, at Bonneville Dam associated with trapping operations. Since then the states have taken additional steps, described below, to further reduce the likelihood of unintended mortalities associated with trapping.

² In the States' 2006 application, the PBR was 8,333 animals out of an estimated population of 237,000. In 2007 the population estimate, based on pup counts, was revised to 238,000 with a minimum population size (N_{\min}) of 141,842 and the calculated PBR was 8,511. In 2008, NMFS authorized removal of 1% of the PBR, which was 85 animals. Carretta et al. (2011) estimated the California sea lion population to be 296,750. The new PBR was calculated at 9,200. This population estimate has not been revised since 2011 (Carretta et al. 2015). As such, NMFS' evaluation of the States' 2016 application request to remove 92 animals per year remains at 1% of PBR evaluated in our 2012 LOA.

When stored for long periods between dedicated trapping operations, both trap doors are shut and secured. During trapping seasons, when trapping is not expected to occur within about 24 hours, the small rear door is tied closed with line and the front door is secured in the open position with heavy chain and a keyed padlock. In anticipation of trapping animals sometime in the coming 24 hour period, traps equipped with electromagnetic door releases are unlocked, unchained, set, and left open. Beginning in the spring of 2016, traps that use a remote release electromagnetic door closing system may be equipped with a sensing device that detects and reports (via a cell phone text message) if the trap door has closed unintentionally. If such an event occurs, then traps will be checked as soon as possible following receipt of the closed door message.

Trapping operations may take place any time of the day or night, depending primarily on the behavior of the animals in a particular area and when they choose to use the trap float as a resting area. Night vision equipment is used to observe the trap prior to closing when operations take place at night. To capture the sea lions resting inside the trap, the front vertically sliding door is let down to the trap deck surface. This may be accomplished in several ways, including pulling a tethering line to remove a metal pin supporting the door or rushing the door in a small boat to unlock a chain and let the door down manually. Traps equipped with an electromagnet mounted on a transom over the top of the door holding the door open (up) use a remote triggering device (similar to a garage door opener) to interrupt the electrical circuit which deactivates the magnet allowing the door to fall vertically, closing under its own weight.

1.1.2 Pinniped Predation at Bonneville Dam

California sea lions hunt for and eat migrating adult salmonids as they move through the tailrace below Bonneville Dam and pass into one of eight fishway entrances that lead to fish ladders located on the Oregon and Washington sides of the Columbia River. Five ESA-listed salmon and steelhead and one salmon of conservation concern are impacted by pinniped predation at Bonneville Dam, as shown in Table 1-1. Pinniped predation at Bonneville Dam is cause for concern in adult salmonid survival because it is a recent source of increased mortality and past efforts to control it have proven ineffective.

Table 1-1 Endangered Species Act status of Columbia and Snake River Basin salmon and steelhead impacted by pinniped predation at Bonneville Dam.

Species ¹	ESU/DPS	Current Endangered Species Act Listing Status
Chinook salmon (<i>Oncorhynchus tshawytscha</i>)	Upper Columbia River Spring-run ²	Endangered 5/26/2016 (81 Fed. Reg. 33468)
	Snake River Spring/Summer-run ²	Threatened 5/26/2016 (81 Fed. Reg. 33468)
Steelhead (<i>Oncorhynchus mykiss</i>)	Snake River Basin	Threatened 5/26/2016 (81 Fed. Reg. 33468)
	Middle Columbia River ²	Threatened 5/26/2016 (81 Fed. Reg. 33468)
	Lower Columbia River ²	Threatened 5/26/2016 (81 Fed. Reg. 33468)

¹The ESA defines a “species” to include any distinct population segment (DPS) of any species of vertebrate fish or wildlife. For Pacific salmon, NOAA Fisheries Service considers an evolutionarily significant unit, or ESU, a “species” under the ESA. For Pacific steelhead, NOAA Fisheries Service has delineated DPSs for consideration as “species” under the ESA.

²These ESUs/DPSs have populations particularly vulnerable to predation because their run timing coincides with peak abundance of sea lions in the tailrace at Bonneville Dam.

Until 2001, few seals and sea lions were observed feeding in the area immediately downstream of Bonneville Dam. In April 2001, the U.S. Army Corps of Engineers (Corps) began to monitor marine mammal predation on ESA-listed salmonids in the tailrace of the Bonneville Dam, and has documented pinniped predation on fish, principally adult salmon and steelhead, for the past 13 years. The monitoring was called for in NMFS’ 2000 Biological Opinion for Operation of the Federal Columbia River Power System (FCRPS) (NMFS 2000). As a result of the Corps’ monitoring efforts, it is now possible to quantify a minimum level of California sea lion predation on listed salmonids at Bonneville Dam.

The Corps expanded its monitoring program at Bonneville Dam in 2002 and has since conducted systematic observations of pinniped predation on salmonids from January through May during 2002 to 2015. Table 1-2 and Table 1-3 summarize the Corps' monitoring data for this 13 year period.

Table 1-2. Estimates of salmonids caught by California and Steller sea lions based on surface observations 2002 through 2015 (Corps 2016).

Year	Total Hours Observed	Total Salmonid Passage	All Pinnipeds		California Sea Lions		Steller Sea Lions	
			Estimated Salmonid Catch	% Run Taken	Estimated Salmonid Catch	% Run Taken	Estimated Salmonid Catch	% Run Taken
2002	662	284,732	1,010	0.35	1,010	0.35	0	0.00
2003	1,356	217,934	2,329	1.06	2,329	1.06	0	0.00
2004	516	186,771	3,533	1.86	3,516	1.85	7	0.00
2005	1,109	81,252	2,920	3.47	2,904	3.45	16	0.02
2006	3,650	105,063	3,023	2.80	2,944	2.72	76	0.07
2007	4,433	88,474	3,859	4.18	3,846	4.17	13	0.01
2008	5,131	147,558	4,466	2.94	4,292	2.82	174	0.11
2009	3,455	186,056	4,489	2.36	4,037	2.12	452	0.24
2010	3,609	267,167	6,081	2.23	5,095	1.86	986	0.36
2011	3,315	223,380	3,557	1.57	2,527	1.11	1,030	0.45
2012	3,404	171,665	2,107	1.21	998	0.57	1,109	0.64
2013	3,247	120,619	2,714	2.20	1,402	1.14	1,312	1.06
2014	2,947	219,929	4,313	1.92	2,615	1.17	1,699	0.76
2015	2,995	239,326	9,981	4.00	7,779	3.12	2,202	0.88

Table 1-3. Minimum estimated number of individual pinnipeds observed at Bonneville Dam tailrace from January 1 to May 31, 2002 to 2015 (Corps 2016).

Year	CSL	SSL	Harbor seals	Total pinnipeds
2002	30	0	1	31
2003	104	3	2	109
2004	99	3	2	104
2005	81	4	1	86
2006	72	11	3	86
2007	71	9	2	82
2008	82	39	2	123
2009	54	26	2	82
2010	89	75	2	166
2011	54	89	1	144
2012	39	73	0	112
2013	56	80	0	136
2014	71	65	1	137
2015	195	69	0	264



Figure 1-1. Action Area: Bonneville Dam and Dam Complex.

1.1.3 Purpose and Need for Action

An increasing level of California sea lion predation on listed salmon and steelhead species is well documented at Bonneville Dam in the Columbia River Basin (subsection 1.1.2, Pinniped Predation at Bonneville Dam). To reduce this predation, the states applied for lethal take authority under section 120 of the MMPA. The purpose of the proposed action is to support the states' efforts to improve adult salmonid survival by reducing pinniped predation at Bonneville Dam, consistent with the MMPA and in consideration of the Task Force recommendations. The need for the proposed action is that NMFS must respond to the states' section 120 application, as prescribed in the MMPA, to address the seasonally recurring problem of pinniped predation, which contributes to the decline or impedes recovery of listed salmon and steelhead passing through Bonneville Dam. Other types of actions aimed at salmonid recovery, such as habitat improvements or modifications to the hydropower facilities at Bonneville Dam, are beyond the scope of the direct effects analyses but are addressed as cumulative effects.

2 ALTERNATIVES

2.1 Introduction

The purpose of this Supplemental EA is to analyze the impacts of the proposed action to issue the current LOA proposed by the states in their January 27, 2016 application to extend the 2012 LOA, without modifications. As such, we are only considering whether to either approve or deny the states' request for an extension. Therefore, this Supplemental EA only considered Alternative 1, the No-action Alternative (deny), and Alternative 2, the Proposed Action (approve), as described in the 2008 Final EA and subsequently modified, and as revised in the states' August 18, 2011 application and the 2012 SIR.

2.1.1 Action Area

The Proposed Action would be implemented at Bonneville Dam (Figure 1-1) as described in Subsection 2.1.1, Action Area, of the 2008 Final EA, and as subsequently modified in the 2012 SIR based on the states' August 18, 2011, application. The description of the action area is hereby incorporated by reference (NMFS 2008).

2.1.2 Decision Criteria

In this supplemental EA, NMFS relied on the requirements in Section 120(d) of the MMPA in considering whether the states' application should be approved or denied. These criteria include an evaluation of:

- (a) Population trends, feeding habits, the location of the pinniped interaction, how and when the interaction occurs, and how many individual pinnipeds are involved;
- (b) Past efforts to nonlethally deter such pinnipeds, and whether the applicant has demonstrated that no feasible and prudent alternatives exist and that the applicant has taken all reasonable nonlethal steps without success;
- (c) The extent to which such pinnipeds are causing undue injury or impact to, or imbalance with, other species in the ecosystem, including fish populations; and
- (d) The extent to which such pinnipeds are exhibiting behavior that presents an ongoing threat to public safety.

NMFS also relied on the requirement in Section 120(b)(1) of the MMPA in considering whether the states' application should be approved or denied, which include:

A State may apply to the Secretary to authorize the intentional lethal taking of individually identifiable pinnipeds which are having a significant negative impact on the decline or recovery of salmonid fishery stocks which—

- (a) Have been listed as threatened species or endangered species under the Endangered Species Act of 1973 (16 U. S.C. 1531 et seq.);
- (b) The Secretary finds are approaching threatened species or endangered species status (as those terms are defined in that Act); or
- (c) Migrate through the Ballard Locks at Seattle, Washington.

2.2 Alternatives

NMFS originally evaluated nine alternatives and analyzed four in the 2008 Final EA for their ability to improve adult salmonid survival by reducing pinniped predation at Bonneville Dam through lethal and non-lethal means (refer to NMFS 2008) NMFS used the criteria listed in Subsection 2.1.2, Decision Criteria, of the 2008 Final EA in their selection of alternatives. This Supplemental Environmental Assessment analyzes two alternatives: No Action and a Proposed Action modified from the original Proposed Action in the 2008 Final EA. These alternatives are described below.

2.2.1 Alternative 1 (No Action)

Under the No-action Alternative, NMFS would not approve the states' section 120 application. If NMFS denies the states' application, the states may, under Section 109(h) of the MMPA, continue to use non-lethal deterrence measures to reduce the presence of predatory pinnipeds a Bonneville Dam. Additionally, the Corps is likely to maintain the use of sea lion exclusion devices at Bonneville Dam to prevent pinnipeds from entering the fish ladders to prey on salmonids and pass upriver.

2.2.2 Alternative 2, Modified Task Force Recommendation—Lethal Removal of Individually Identifiable Predatory California Sea Lions after Active Non-lethal Deterrence (Proposed Action/Preferred Alternative)

Alternative 2 is NMFS' Proposed Action and is approval of an extension of NMFS' 2012 LOA under MMPA section 120 to continue to conduct a sea lion lethal removal program as described in Subsection 1.1.1, Proposed Action. Under this alternative, non-lethal deterrence activities conducted in 2006 and 2007 and described under Subsection 2.2.2, Alternative 2: Non-lethal Deterrence Only, of the 2008 Final EA would continue, and safety and training requirements for vessel use and deterrence measures (including firearms use) would also remain as described under Subsection 2.2.2, Alternative 2: Non-lethal Deterrence Only, of the 2008 Final EA. NMFS would also approve the states' request for lethal removal authority under the following conditions:

- 1) Individually identifiable predatory California sea lions that may be lethally removed.
 - a) Animals would be considered individually identifiable if they display natural or applied features that allow them to be individually distinguished from other California sea lions.

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- b) Animals would be considered predatory if they (1) have been observed eating salmonids in the “observation area” below Bonneville Dam between January 1 and May 31 of any year, (2) have been observed in the observation area below Bonneville Dam on a total of any 5 days (consecutive days, days within a single season, or days over multiple years) between January 1 and May 31 of any year, and (3) are sighted in the “observation area” below Bonneville Dam after they have been subjected to active non-lethal deterrence.
 - 2) The number of animals that could be removed (i.e., transferred into captivity or killed) would be limited to 1 percent of PBR. Subsection 3.4.2.1, California Sea Lion Population Levels, of the 2008 Final EA explains how PBR is calculated.
 - 3) The states would be authorized to remove predatory California sea lions under the following conditions:
 - a) The states would retain the standing Institutional Animal Care and Use Committee (IACUC) that has been approved by NMFS, composed of qualified veterinarians and biologists to advise the states on protocols for capturing, holding, and euthanizing predatory sea lions.
 - b) The capture and transfer processes would be the same as described in Subsection 2.2.2, Alternative 2: Non-lethal Deterrence Only, of the 2008 Final EA.
 - c) Predatory sea lions that are captured at any trap must be held in a temporary holding facility approved by the IACUC for at least 48 hours prior to being euthanized.
 - d) If no pre-approved research, zoo, or aquarium facility is willing to accept an animal within 48 hours of its capture, the states may euthanize it.
 - e) The method of euthanizing captured predatory sea lions must be approved by the IACUC. Methods would likely include lethal injection (administered by a qualified veterinarian or other person authorized by state law) (Chapter 18.92 RCW, Chapter 686 ORS), or gunshot.
 - f) Free-ranging predatory sea lions within the boat restricted zone (BRZ) could be shot by a qualified marksman when hauled out on the concrete apron along the north side of Cascade Island, on the flow deflectors along the base of the dam’s spillway, or in the water within 50 feet of the concrete apron or the face of the dam at power houses one and two (Figure 1-1). In all cases, the marksman would shoot from land, the dam, or other shoreline structures. Potential options for lethal removal using firearms are: (1) the marksman would shoot sea lions at close range (less than 25 yards), using a shotgun loaded with a slug or 00 buckshot, when the animal is on shore; (2) the marksman would shoot sea lions from the powerhouse

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- deck or other shoreline area at ranges greater than 25 yards using a hunting rifle with a minimum caliber of .240, when the animal is on shore or in the water as described above. Ammunition would not contain lead.
- g) The states would make all reasonable efforts to retrieve carcasses of animals that have been shot. Animals killed on land could be retrieved from shore using small boats. Small boats would be used to attempt retrieval of sea lions that may enter the water after being shot on land (but they may sink and not be found immediately or ever). The states would monitor nearby downstream areas for stranded animals that have been shot.
 - h) Safety and security during lethal removal activities would be provided by the states of Oregon and Washington in coordination with the Columbia Basin Law Enforcement Council. The states would establish an Incident Command Center (ICC) during lethal removal activities. The ICC would direct safety and security and provide a media interface. The ICC would coordinate security and safety activities with the Coast Guard and other agencies as necessary.
 - i) Road closures or changes to visitation on Corps property/dam facilities would be made by the appropriate Corps personnel in consultation with the ICC. No state or Federal road closures beyond the property managed by the Corps are anticipated under this alternative.
 - j) The states would close fishing areas near the dam as needed to ensure public safety.
- 4) The states would be required to dispose of carcasses of euthanized animals in accordance with applicable laws or transferred for use in scientific research or for educational purposes.
 - 5) The states would be required to report any permanent removals of predatory sea lions (either transferred to permanent captivity or lethally) to NMFS within 3 days following removal, so that NMFS can fulfill its management requirements under the MMPA.
 - 6) The states would be required to develop and implement a monitoring plan to evaluate (1) the impacts of predation, (2) the effectiveness of non-lethal deterrence, and (3) the effectiveness of permanent removal of individually identifiable predatory sea lions as a method to reduce adult salmonid mortality. The states may use data collected by the Corps or other agencies to help fulfill the monitoring requirement and avoid duplication of effort. If resources are available, the states would monitor pinniped impacts on salmonids elsewhere in the lower Columbia River to assess the level of impact from predation relative to observed levels at Bonneville Dam and to other sources of mortality that are being managed under the various salmon recovery plans.
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Monitoring would assist NMFS and the Task Force in evaluating the effectiveness of lethal removal, as required by the MMPA.

- 7) NMFS would issue an authorization effective through June 30, 2021 and may be renewed in writing for an additional 5-year period, as appropriate.

The number of California sea lions that could be lethally removed would be limited to 1 percent of PBR (currently 92). In analyzing impacts of lethal removal on the California sea lion population, this Supplemental EA assumes the full number allowed would be removed. Thus, using the method in the 2008 EA, NMFS estimates that the estimated cost for permanently removing 92 animals is ranges between \$460,000 and \$920,000 per year.

3 AFFECTED ENVIRONMENT

3.1 Introduction and Environmental Setting

This Section describes those resources that may be affected by the Proposed Action and its alternatives as a result of the proposed changes in the states' 2011 request (Section 1.1, Background), to the extent necessary to understand potential impacts.

Please refer to Section 3.0, Affected Environment, of the 2008 Final Environmental Assessment: Reducing the Impact on At-risk Salmon and Steelhead by California Sea Lions in the Area Downstream of Bonneville Dam on the Columbia River, Oregon and Washington, for an overview of the baseline physical, biological, social, and economic conditions that occur within the action area and provides a basis for analysis of the environmental consequences of the action and no-action alternatives relative to the action alternatives (Subsection 2.0, Alternatives).

As in the 2008 Final EA and 2012 SIR, NMFS considered all resources potentially affected by the Proposed Action and identified changed circumstances or information potentially affecting those resources. Appendix A provides a comparison and summary of new information since the issuance of the 2008 EA and 2012 SIR for all resource potentially affected by the Proposed Action considered in this Supplemental EA. Detailed descriptions of these resources are included in Section 3, Affected Environment, and Section 4, Environmental Consequences, of the 2008 Final EA and are hereby incorporated by reference (NMFS 2008) and in Appendix A. In this Supplemental EA, NMFS includes updated information on the sixteen resources, with an analysis on resources with changed circumstances.

3.2 Air Quality

This resource was examined during scoping for this Supplemental EA (Appendix A). On September 15, 2011, Oregon Department of Environmental Quality (ODEQ) and the Southwest Clean Air Agency (SWCAA) presented their final air quality strategy report for the Columbia River Gorge to the Columbia River Gorge Commission. This air quality strategy report summarizes conclusions of the 2004 to 2008 air quality study and describes “a variety of current, new, and possible future emission reduction strategies that will continue to improve visibility in the Gorge” (ODEQ and SWCAA 2011). Implementation of strategies outlined in this report is expected to result in improved air quality in the Columbia River Gorge over the coming decades. A detailed description of air quality in the action area was provided in the 2008 Final EA and is hereby incorporated by reference.

Overall, current air quality is within the range of what was analyzed in the 2008 Final EA. We accessed the ODEQ website for any new information on air quality in the Columbia River Gorge, and there have been no updates on air quality in the Columbia River Gorge since the 2011 report. Therefore, the new circumstances and information regarding air quality do not indicate that the Proposed Action would result in any impacts that are significant, uncertain, or outside the range of impacts we considered in the 2008 Final EA and 2012 SIR.

3.3 Water Quality

This resource was examined during scoping for this Supplemental EA (Appendix A). The lower Columbia River, from river mile 146 (Bonneville Dam) to the mouth, continues to be 303(d) impaired (ODEQ 2010; Ecology 2008). A detailed description of water quality in the action area was provided in the 2008 Final EA and is hereby incorporated by reference.

Overall, current water quality is within the range of what was analyzed in the 2008 Final EA. We accessed the ODEQ and Ecology websites for any new information on water quality in the lower Columbia River, and there were no meaningful changes in the 303(d) listings. Therefore, the new circumstances and information regarding water quality do not indicate that the Proposed Action would result in any impacts that are significant, uncertain, or outside the range of impacts we considered in the 2008 Final EA and 2012 SIR.

3.4 Marine Mammals

This resource was examined during scoping for this Supplemental EA (Appendix A). Three stocks of marine mammals (pinnipeds) travel up the Columbia River as far as Bonneville Dam: California sea lions (*Zalophus californianus californianus*) (United States stock), Steller sea lions (*Eumetopias jubatus*) (eastern United States stock), and harbor seal (*Phoca vitulina richardsi*) (Oregon/Washington coastal stock). These stocks are known to occur and forage in the tailrace at the dam during the January through May adult run timing of ESA-listed salmon and steelhead and could be affected by the action alternatives.

Details of the life history; species status, distribution, and abundance; population levels; and factors affecting sea lion distribution at Bonneville Dam are described in detail in the 2008 Final EA and 2012 SIR and are incorporated here by reference. Changes to these circumstances are described below.

3.4.1 California Sea Lions

Changes from the 2008 Final EA and 2012 SIR for California sea lions include population, distribution, and overall predation rates on salmonids at the Bonneville Dam.

A population estimate of California sea lions has been updated since 2011 (Carretta et al. 2012), at which the population of California sea lions was estimated at 296,750 animals, with a potential biological removal of 9,200 animals. Estimates of human-caused fishery related mortality has declined (Carretta et al. 2015). The optimum sustainable population level has not been formally determined (Carretta et al. 2015), and the population is currently not listed under the ESA, and is not designated as depleted nor considered strategic under the MMPA (Carretta et al. 2015).

Their distribution in the action area has extended upstream to river mile 191 (the Dalles Dam) (Stansell et al. 2011). However, as of 2011, California sea lions are no longer dominant in abundance at the Bonneville Dam, with Steller sea lions now outnumbering California sea lions (Stansell et al. 2011; Brown et al. 2008). California sea lions still dominate salmonid predation, taking more than two thirds of the observed catch (Table 1-2).

Counts of California sea lions in the action area (Bonneville Dam) fluctuated from 54 in 2009 to 89 in 2010 to 54 in 2011. Counts of California sea lions in the action area for the years 2012 through 2015 fluctuated from 39 animals in 2012 to 195 animals in 2015. An unanticipated mortality of two California sea lions in 2015 at the traps at Bonneville Dam was reported (Corps 2016).

3.4.2 Steller Sea Lions

Changes from the 2008 Final EA and 2012 SIR for Steller sea lions include population, abundance, and overall predation rates on salmonids at the Bonneville Dam.

According to the 2013 Stock Assessment Report, the population estimate of Steller sea lions was 63,000 to 78,000. The eastern distinct population segment of Steller sea lions was delisted in December 2013 (78 Fed. Reg. 66139, November 4, 2013). However, Steller sea lions are still classified as a depleted stock under the MMPA, and therefore Section 120 of the MMPA does not apply to Steller sea lions.

Steller sea lion numbers at the Bonneville Dam tailrace have increased from no Steller sea lions in 2002 to a high of 89 in 2011, with minimum estimates of 73 in 2012, 80 in 2013, 65 in 2014, and 69 in 2015 (Corps 2016). This increase may be partially attributed to their increased tolerance to hazing as reported

in 2008 (Stansell et al. 2011; Brown et al.2008). However, actions to displace or remove Steller sea lions cannot escalate beyond non-lethal deterrence because lethal take is not authorized for this species.

Salmonid consumption by Steller sea lions has also increased to about one third of the total catch by pinnipeds. In addition, Steller sea lions consume the majority of sturgeon taken at the dam (Stansell et al. 2011; Brown et al.2008). An unanticipated mortality of one Steller sea lion in 2015 at the traps at Bonneville Dam was reported (Corps 2016).

3.4.3 Harbor Seal

This resource was examined during scoping for this Supplemental EA (Appendix A). Since the 2008 Final EA and 2012 SIR, no new stock assessment of harbor seals has been conducted (NMFS 2015a); thus, no new population or abundance estimates are available and no changes to harbor seal population, distribution, or predation on salmonids in the action area to report. A detailed description of harbor seals in the action area was provided in the 2008 Final EA and is hereby incorporated by reference.

3.5 Listed Salmonids

This resource was examined during scoping for this Supplemental EA (Appendix A). In the Columbia River basin there are currently 13 ESUs/DPSs of salmon and steelhead listed as threatened or endangered under the ESA. Of these 13 listed species, 11 have a geographic range that overlaps with the action area, and of these, 5 species also exhibit adult run timing that coincides with the period when pinnipeds are present. A complete list of these species and descriptions of their life history, distribution, and status are included in the 2008 Final EA and are incorporated here by reference. The listing status of Columbia River salmonids was reaffirmed in 5-year status reviews published December 7, 2011 (76 Fed. Reg. 76386) and on May 26, 2016 (81 Fed. Reg. 33469). Importantly, the findings in the 5-year reviews concluded that, while some of the up-river populations are stable (not declining), some populations, especially the populations of spring-run Chinook salmon affected by predatory California sea lion at Bonneville Dam, remain at high risk of extinction. However, because there are no changes to the listing status of potentially affected salmonids since the 2008 Final EA and 2012 SIR, no further discussion is provided.

3.6 Other Listed Fish Species

3.6.1 North American Green Sturgeon

This resource was examined during scoping for this Supplemental EA (Appendix A). Green sturgeon (*Acipenser medirostris*) is a federally threatened species found along the west coast of the United States,

including within the action area. Only the northern distinct population segment (nDPS) of green sturgeon overlaps with the action area and is evaluated in this EA. The nDPS of North American green sturgeon was proposed for listing in 2003 (68 Fed. Reg. 4433, January 29, 2003), but insufficient evidence existed for threatened or endangered status. However, the species was listed as an ESA species of concern (69 Fed. Reg. 19975, April 15, 2004). The nDPS is made up of populations in coastal watersheds northward of and including the Eel River in California (NMFS 2015b) (5-year Review 8/25/2015). Based on survey data from 2010-2014 and estimates of mean spawning periodicity, total number of adults in the northern DPS population is estimated at $2,334 \pm 1,221$ (Ethan Mora, pers. comm., University of California Davis, May 6, 2015, as reported in NMFS 2015b).

With respect to threats, the available information indicates that some threats, such as those posed by fisheries and impassable barriers, have been reduced. The emerging threat posed by nearshore and offshore energy development requires continued attention into the future. Because many of the threats cited in the original listing still exist, the threatened status is still applicable (NMFS 2015b).

3.6.2 Eulachon

This resource was examined during scoping for this Supplemental EA (Appendix A). NMFS issued a final rule on March 18, 2010 (52 Fed. Reg. 13012) determining that eulachon (*Thaleichthys pacificus*) spawning south of the Nass River in British Columbia to, and including, the Mad River in California meet the discreteness and significance criteria for delineation of the Southern Distinct Population segment (DPS) of this species and listing it as threatened under the ESA. The listing status of eulachon was reaffirmed in a 5-year status review issued on April 1, 2016. The Biological Review Team (BRT) concluded that, starting in 1994, eulachon have experienced an abrupt decline in abundance throughout its range, and there is no evidence that the population has returned to its former levels. The BRT concluded that the major threats to eulachon include climate change impacts on ocean conditions, bycatch in offshore shrimp trawl fisheries, climate change impacts on freshwater habitats, changes in downstream flow-timing and intensity due to dams/water diversions, and predation (Gustafson et al. 2010). These threats, together with large declines in abundance and distribution throughout their range, indicated to the BRT that eulachon were at moderate risk of extinction throughout all of its range.

3.7 Other Fish Species

3.7.1 Non-listed Spring-run Chinook Stocks

This resource was examined during scoping for this Supplemental EA (Appendix A). The Middle Columbia River Chinook ESU includes spring-run populations spawning in the Klickitat, Deschutes, John

Day, and Yakima Rivers (Myers et al. 1998). No changes to non-listed spring-run Chinook salmon population or distribution in the action area have occurred since the 2008 Final EA and 2012 SIR. A detailed description of non-listed spring-run Chinook salmon in the action area was provided in the 2008 Final EA and is hereby incorporated by reference.

3.7.2 White Sturgeon

This resource was examined during scoping for this Supplemental EA (Appendix A). No meaningful changes to white sturgeon distribution in the action area have occurred since the 2008 Final EA. However, white sturgeon numbers in the lower Columbia River have increased slightly since the 2008 Final EA when the population estimate was 80,500 fish (JCRMS 2016). The population estimate in 2015 was 143,890 fish (range 85,700 to 202,100) (JCRMS 2016). The 2016 projected population estimate is 147,100 fish (JCRMS 2016). Recreational and commercial harvest guidelines are being adjusted to assist white sturgeon recovery. A detailed description of white sturgeon in the action area was provided in 2008 Final EA and 2012 SIR, and is hereby incorporated by reference.

3.7.3 Lamprey

This resource was examined during scoping for this Supplemental EA (Appendix A). Three lamprey species are found within the Columbia and Snake River basins and occur within the action area: Pacific lamprey (*Lampetra tridentata*); western brook lamprey (*L. ayresi*); and river lamprey (*L. richardsoni*). No changes to distribution of any of these lamprey species in the action area have occurred since the 2008 Final EA. The description of lamprey in the action area provided in the 2008 Final EA and 2012 SIR is hereby incorporated by reference.

Adult Pacific lamprey counts have decreased dramatically at all Columbia River dams in recent years (Luzier et al. 2011). Counts at Bonneville Dam have varied from fewer than 20,000 in 2000 to over 100,000 in 2003 and back down to about 11,000 in 2010. Pacific lamprey populations in the Columbia River are considered at “high risk” in the mid and upper Columbia and Snake Rivers and at somewhat lower risk in the lower Columbia River. Threats to lamprey recovery include barriers to passage, water quality, and stream and floodplain degradation (Luzier et al. 2011).

3.7.4 American Shad

This resource was examined during scoping for this Supplemental EA (Appendix A). American shad (*Alosa sapidissima*) is a non-native species found in the action area.

No meaningful changes to American shad distribution in the action area have occurred since the 2008 Final EA. However, the population of American shad has fluctuated widely in recent years, with over 4 million fish returning to the Columbia River by 1990, with an average return over the past 10 years of 3 million fish (Parsley et al. 2011). Returns of American shad declined to 1 million fish in 2010 following a record return in 2005 (Parsley et al. 2011). A description of American Shad in the action area was provided in the 2008 Final EA and is hereby incorporated by reference.

Overall, current status of other fish species is within the range of what was analyzed in the 2008 Final EA and 2012 SIR. Therefore, the new circumstances and information regarding other fish species do not indicate that the Proposed Action would result in any impacts that are significant, uncertain, or outside the range of impacts we considered in the 2008 Final EA and 2012 SIR.

3.8 Fish Habitat

This resource was examined during scoping for this Supplemental EA (Appendix A). Essential fish habitat is defined for salmonids under the Magnuson-Stevens Fishery Conservation and Management Act and includes the action area. Critical habitat has been designated under the Endangered Species Act for all listed salmonids that are potentially affected by the action. The descriptions of essential fish habitat and critical habitat for these species were described in the 2008 Final EA and 2012 SIR and are hereby incorporated by reference.

Since the publication of the 2008 Final EA, critical habitat was designated for the Southern DPS of eulachon (October 20, 2011, 76 Fed. Reg. 65324). All other details related to eulachon are described in Subsection 3.6.2, Eulachon. Critical habitat was also designated for Lower Columbia River coho salmon on February 24, 2016 (81 Fed. Reg. 9252).

Overall, fish habitat is within the range of what was analyzed in the 2008 Final EA and 2012 SIR. Therefore, the new circumstances and information regarding fish habitat do not indicate that the Proposed Action would result in any impacts that are significant, uncertain, or outside the range of impacts we considered in the 2008 Final EA and 2012 SIR.

3.9 Terrestrial Wildlife and Birds

This resource was examined during scoping for this Supplemental EA (Appendix A). However, no changes to terrestrial wildlife and birds have occurred since the 2008 Final EA. A detailed description of terrestrial wildlife and birds in the action area was provided in the 2008 Final EA and is hereby incorporated by reference. Terrestrial wildlife and birds in the action area remains within the range of

what was analyzed in the 2008 Final EA. Therefore, the Proposed Action would not result in any impacts that are significant, uncertain, or outside the range of impacts we considered in the 2008 Final EA and 2012 SIR.

3.10 General Vegetation

This resource was examined during scoping for this Supplemental EA (Appendix A). No meaningful changes to general vegetation have occurred since the 2008 Final EA. A detailed description of general vegetation in the action area was provided in the 2008 Final EA and is hereby incorporated by reference. General vegetation in the action area remains within the range of what was analyzed in the 2008 Final EA. Therefore, the Proposed Action would not result in any impacts that are significant, uncertain, or outside the range of impacts we considered in the 2008 Final EA and 2012 SIR.

3.11 Social and Economic Resources

This resource was examined during scoping for this Supplemental EA (Appendix A). The Columbia River Gorge National Scenic Area, designated for special protection, spans 292,500 acres on both sides of the Columbia. There have been no changes to this designation since the 2008 Final EA, and the description provided in that document is hereby incorporated by reference.

The Bonneville Lock and Dam is an Urban Area that is exempt from Scenic Area regulations. The Corps has not removed or built any new mainstem Columbia River dams or navigation since the 2008 Final EA. However, there has been an increase in commerce value since the 2008 Final EA, with a new estimated value of \$3 billion annually vs. the previous \$1.5 to \$2 billion annual commerce value. The waterway still supports approximately 10 million tons of commercial cargo annually and provides approximately 40,000 jobs (PNWA 2011).

We looked at the Columbia Gorge National Scenic Area Management Plan for new information on social and economic resources, and no new updates to this plan have occurred since 2011. Overall, the social and economic resources are within the range of what was analyzed in the 2008 Final EA. Therefore, the new circumstances and information regarding social and economic resources do not indicate that the Proposed Action would result in any impacts that are significant, uncertain, or outside the range of impacts we considered in the 2008 Final EA and 2012 SIR.

3.12 Tourism and Recreation

This resource was examined during scoping for this Supplemental EA (Appendix A). Tourism and recreation opportunities in the action remain approximately the same (Bonneville Lock and Dam and

Lake Bonneville, Bradford Visitor Center and the Washington Shore Visitor Complex, four fishing areas maintained by the Corps in the project area, the Fort Cascades Historic Site and Trail, and other public areas) as described in the 2008 Final EA, and these descriptions are hereby incorporated by reference.

Some changes to tourism and recreation visitor numbers have occurred since the previous EA, in particular to the two visitor centers and the Bonneville Dam facilities over the greater 40-mile long reservoir (whole and locally). The two visitor centers (Bradford Visitor Center and the Washington Shore Visitor Complex) and immediate fishing areas (i.e., Tanner Creek, Robbins Island, Bradford Island, and the Washington Shore) drew 910,216 visits in fiscal year 2011, down from approximately 1 million visits as reported in 2008. The Bonneville Dam facilities drew 2.89 million recreational visits in fiscal year 2011, up slightly from nearly 2.74 million recreational visits in fiscal year 2005. Between the years 2011 and 2015 the Bonneville Dam facilities and reservoir drew an average of 2.5 million recreational visits per year on average³.

Overall, tourism and recreation resources are within the range of what was analyzed in the 2008 Final EA. Therefore, the new circumstances and information regarding tourism and recreation do not indicate that the Proposed Action would result in any impacts that are significant, uncertain, or outside the range of impacts we considered in the 2008 Final EA and 2012 SIR.

3.13 Cultural Resources

This resource was examined during scoping for this Supplemental EA (Appendix A). No meaningful changes to cultural resources have occurred since the 2008 Final EA. A detailed description of cultural resources in the action area was provided in the 2008 Final EA and is hereby incorporated by reference. Cultural resources remain within the range of what was analyzed in the 2008 Final EA. Therefore, the Proposed Action would not result in any impacts that are significant, uncertain, or outside the range of impacts we considered in the 2008 Final EA and 2012 SIR.

3.14 Noise

This resource was examined during scoping for this Supplemental EA (Appendix A). No meaningful changes to noise have occurred since the 2008 Final EA. A detailed description of noise in the action area

³ Webb, Greg (pers comm.). 2016. USACE. Bonneville Dam Park and Natural Resource Manager, Bonneville Lock and Dam (1-541-374-7996), June 9, 2016.

was provided in the 2008 Final EA and is hereby incorporated by reference. Noise in the action area remains within the range of what was analyzed in the 2008 Final EA. Therefore, the Proposed Action would not result in any impacts that are significant, uncertain, or outside the range of impacts we considered in the 2008 Final EA and 2012 SIR.

3.15 Aesthetics

This resource was examined during scoping for this Supplemental EA (Appendix A). No meaningful changes to aesthetics have occurred since the 2008 Final EA. A detailed description of aesthetics in the action area was provided in the 2008 Final EA and is hereby incorporated by reference. Aesthetic resources remain within the range of what was analyzed in the 2008 Final EA. Therefore, the Proposed Action would not result in any impacts that are significant, uncertain, or outside the range of impacts we considered in the 2008 Final EA and 2012 SIR.

3.16 Transportation

Traffic data for both Washington and Oregon were examined during scoping for this Supplemental EA (Appendix A). Since the 2008 Final EA, small changes in traffic counts were noted on both the Oregon and Washington sides of the Columbia River in the action area. In 2008, the average daily traffic volume at Washougal and Maryhill was 5,700 and 4,100, vehicles, respectively (NMFS 2008). In 2015, the average daily traffic volume at Washougal and Maryhill was 6,704 and 2,312 vehicles, respectively (WSDOT 2015). In 2008, the average daily traffic volume at Rowena and Troutdale was 19,500 and 27,800 vehicles, respectively (ODOT 2008). In 2014, the average daily traffic volume at Rowena and Troutdale was 21,200 and 21,200 vehicles, respectively (ODOT 2014).

Overall, transportation resources are within the range of what was analyzed in the 2008 Final EA. Therefore, the new circumstances and information regarding transportation do not indicate that the Proposed Action would result in any impacts that are significant, uncertain, or outside the range of impacts we considered in the 2008 Final EA and 2012 SIR.

3.17 Public Services

This resource was examined during scoping for this Supplemental EA (Appendix A). No meaningful changes to public services have occurred since the 2008 Final EA. The description of public services in the action area provided in the 2008 Final EA is hereby incorporated by reference. Public services remain within the range of what was analyzed in the 2008 Final EA. Therefore, the Proposed Action would not

result in any impacts that are significant, uncertain, or outside the range of impacts we considered in the 2008 Final EA and 2012 SIR.

3.18 Safety and Human Health

This resource was examined during scoping for this Supplemental EA (Appendix A). No meaningful changes to safety and human health have occurred since the 2008 Final EA, and the 2006 Bonneville Safety Program remains in effect⁴. The description of public safety and human health in the action area provided in the 2008 Final EA is hereby incorporated by reference. Safety and human health resources remain within the range of what was analyzed in the 2008 EA. Therefore, the Proposed Action would not result in any impacts that are significant, uncertain, or outside the range of impacts we considered in the 2008 Final EA and 2012 SIR.

⁴ Ediger, James (pers. comm.). USACE Occupational and Safety and Health Act Coordinator (1-541-374-7978), June 9, 2016.

4 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

The following analyses supplement the 16 resources identified and analyzed in the 2008 Final EA as having a potential to be impacted by the alternatives. The analyses describe expected conditions under the two alternatives when compared to the affected environment or existing conditions as described in the 2008 Final EA, and as updated in this Supplemental EA. Specifically, this section presents circumstances and information *that are new or that have been updated since the analysis conducted in the 2008 Final EA and the 2012 SIR*, where those circumstances or that information are relevant to environmental concerns and bear on our Proposed Action or its impacts. These impacts are in addition to those in the 2008 EA and 2012 SIR. Refer to Appendix A for a summary of sources consulted for each resource analyzed in the 2008 Final EA and this Supplemental EA.

4.2 Air Quality

No meaningful changes to air quality have occurred since the 2008 Final EA and 2012 SIR; environmental consequences discussed in the 2008 Final EA and 2012 SIR are hereby incorporated by reference.

4.3 Water Quality

No meaningful changes to water quality have occurred since the 2008 Final EA; environmental consequences discussed in the 2008 Final EA are hereby incorporated by reference.

4.4 Marine Mammals

4.4.1 Alternative 1 (No Action)

Under the Alternative 1, NMFS would not approve the states' section 120 application. If NMFS denies the states' application, the states may, under Section 109(h) of the MMPA, continue to use non-lethal deterrence measures to reduce the presence of predatory pinnipeds a Bonneville Dam. However, there is no evidence that the non-lethal deterrence efforts have been successful in reducing the presence of pinnipeds at Bonneville Dam or their rate of predation. Thus, future abundance of California sea lions at the dam would likely fluctuate regardless of non-lethal deterrence activities. If California sea lions were able to consume a high proportion of the Chinook salmon and steelhead runs, it is possible that over time the predation would deplete the runs to the point of functional extinction, as happened at Ballard Locks in Washington (refer to Subsection 3.4.3, Factors Affecting Distribution at Bonneville Dam, of the 2008 Final EA). As such, with respect to California sea lions at Bonneville Dam, animals would likely continue

to congregate in the action area between February and June each year to feed on returning adult spring Chinook salmon and steelhead at levels greater than those seen for the years 2008 through 2015.

Under Alternative 1 there would be no effects on the overall abundance and productivity of the California sea lion population range-wide. Male California sea lions migrate south from the Columbia River as the breeding season approaches in May and June (refer to Subsection 3.4.1, Life History, of the 2008 Final EA). Neither the migration timing nor the abundance of migratory male sea lions would be affected by the No-Action Alternative.

The numbers of Steller sea lions at Bonneville Dam would likely increase as they have done since 2002 (Table 1-3). In the absence of non-lethal deterrence activities, there would be no activities that would cause Steller sea lions to leave the area. Steller sea lions are year round residents of coastal Oregon and Washington; however, breeding individuals migrate to rookeries, beginning as early as April, as the breeding season approaches (refer to Subsection 3.4.1, Life History, of the 2008 Final EA). Neither the migration timing nor the abundance of migratory Steller sea lions would be affected by the No-Action Alternative.

The presence of harbor seals under Alternative 1 would likely remain stable or increase slightly because this has been the trend in recent years, regardless of non-lethal deterrence activities (refer to Subsection 3.4.2, Species Status, Distribution and Abundance, and Table 3.4-2 of the 2008 Final EA). Under Alternative 1 there would be no effects on the use of the river by harbor seals.

Additionally, the Corps is likely to maintain the use of sea lion exclusion devices at Bonneville Dam. Aside from these examples, the No-action Alternative represents a return to practices prior to 2005, before the Corps and the states began active non-lethal deterrence.

Therefore, under the No-action alternative marine mammals would not be significantly impacted.

4.4.2 Alternative 2—Lethal Removal of Individually Identifiable Predatory California Sea Lions after Active Non-lethal Deterrence (Proposed Action)

Under Alternative 2, NMFS would grant the states' request for lethal removal authority, with conditions, including a requirement that non-lethal deterrence activities would also be pursued, and would be similar to those described in the 2008 Final EA and 2012 SIR. The below impacts are in addition to those described in the 2008 EA and 2012 SIR.

As described in the 2008 Final EA and 2012 SIR, lethal removal would be conducted in a humane manner under the guidance of a standing ACC. The methods of killing predatory sea lions would include shooting or lethal injection. Animals could be shot only in the BRZ while hauled-out on shore or in the water in close proximity (less than 50 feet) to the concrete apron on Cascade Island or the face of the dam below the powerhouses, by a marksman who must be on shore. Because of these requirements, it is unlikely that a marksman would shoot any sea lion other than one on the list of predatory sea lions. These requirements would also minimize the potential that an animal would be wounded but not killed; sea lions hauled-out on land make a stable target, and a marksman firing from shore would be firing from a stable platform, which promotes accurate shot placement. Because of the possibility that a wounded animal might die of its wounds, NMFS would count wounded animals toward the total number of removals allowed. Sea lions in the water close to shore would be observed for as long as necessary to positively identify the animal and assess its behavior pattern for accurate shot placement. To date, the states have not exercised the option to lethally remove predatory California sea lions by shooting the animals.

Since the issuance of the 2008 LOA, all predatory sea lions, authorized for removal and killed by the states, have been by lethal injection. It is likely this is the method the states' will continue to use to remove predatory California sea lions for the period considered in the Proposed Action.

This alternative would allow up to 1 percent of the California sea lion PBR (currently 92 animals) to be removed each year. The removal of as many as 92 animals from the California sea lion population would have no effect on the overall range-wide abundance, distribution, and productivity of the California sea lion population because the number of sea lions involved is extremely small compared to the current number of animals (9,200) that can be safely removed from the population (PBR) without affecting its status with respect to optimum sustainable population (OSP) (refer to Subsection 3.4.2, Species Status, Distribution, and Abundance, of the 2008 Final EA and 2012 SIR). There is a surplus of male California sea lions in the population, meaning that not all males that participate in the breeding migration are successful at establishing and maintaining breeding territories on the rookeries and therefore spend the breeding season at nearby haul-outs or at sea (refer to Subsection 3.4.1, Life History, of the 2008 Final EA and the 2012 SIR). Individual sea lions that would be permanently removed under Alternative 2, and that may have occupied a breeding territory, would be rapidly replaced by otherwise idle males from the population. The migration timing would not be affected by this alternative. Thus, compared to the No-action Alternative, Alternative 2 would result in no change in status of the population range-wide, although it would reduce (albeit inconsequentially) the number of individual animals from the population.

Permanent captive holding of some California sea lions would also be possible under Alternative 2. Captive holding would be allowed by permitted holding facilities, in compliance with the standards established under the Animal Welfare Act. The annual limit of 1 percent of PBR that could be removed under Alternative 2 includes animals that are captured and transferred to permanent captivity; thus, the effects of this activity are similar to those described above.

The local abundance of California sea lions at the dam could be reduced by as many as 1 percent of PBR (determined for the U.S. coast-wide population, currently 92) annually, compared to the No-action Alternative. It is possible that new animals would take the place of removed animals during the year in which the removal occurs. Over time, if experienced predatory sea lions were removed, it is possible that the remaining animals would be less experienced and less effective as predators. It is also possible that the removal of experienced animals and the non-lethal deterrence of inexperienced animals would result in fewer sea lions being attracted to the action area. If this occurred, the total number of predatory sea lions in the action area would gradually decline.

Under Alternative 2, Steller sea lions and harbor seals would be subject to the same non-lethal activities considered under Alternative 2, but not to lethal removal. Compared to the No-action Alternative, Alternative 2 would result in increased displacement of foraging Steller sea lions, but no change in the range-wide abundance, distribution, or productivity of the population. The potential for the accidental lethal taking of a Steller sea lion would be negligible under this alternative because the conditions for lethal removal (marksman on shore, animals hauled out or in close proximity to shore, and sufficient time to identify the animal to be lethally removed) optimize the opportunity to positively identify the target animal.

Therefore, under Alternative 2 marine mammals would not be significantly impacted.

4.5 Listed Salmonids

4.5.1 Alternative 1 (No Action)

Under the Alternative 1, NMFS would not approve the states' section 120 application. If NMFS denies the states' application, the states may, under Section 109(h) of the MMPA, continue to use non-lethal deterrence measures to reduce the presence of predatory pinnipeds a Bonneville Dam. Thus, as there is no evidence that non-lethal deterrence activities reduce pinniped predation, there would be no effects on listed salmonids under Alternative 1. Additionally, the Corps is likely to maintain the use of sea lion

exclusion devices at Bonneville Dam. Aside from these examples, the Alternative 1 represents a return to practices prior to 2005, before the Corps and the states began active non-lethal deterrence.

There would likely be no change under Alternative 1 compared to baseline conditions. As described in Subsection 3.4, Marine Mammals, of the 2008 Final EA, non-lethal deterrence measures that have been pursued in recent years have not had a measurable effect on pinniped predation rates. Pinniped consumption of salmonids would therefore likely increase, with negative effects on productivity, abundance, and genetic and life history parameters for all affected populations.

It is likely that sea lion predation on salmonids would increase under the Alternative 1. However, it is not possible to estimate any potential change in the numbers, life history, distribution, run-timing, or level of extinction risk of listed salmonids passing Bonneville Dam from the available data. There is no information available to determine whether pinniped predation disproportionately affects hatchery- or natural-origin fish passing through the action area.

Therefore, under the Alternative 1 listed salmonids would not be significantly impacted.

4.5.2 Alternative 2—Lethal Removal of Individually Identifiable Predatory California Sea Lions after Active Non-lethal Deterrence (Proposed Action)

Under Alternative 2, non-lethal deterrence activities, that would occur as a required precursor to lethal removal, would be the same as described in Subsection 2.2.2, Alternative 2: Non-lethal Deterrence Only, of the 2008 Final EA, and is incorporated here by reference. The below impacts are in addition to those described in the 2008 EA and 2012 SIR.

Lethal activities would be carried out from shore in such a way as to avoid bullets entering the water. In the event a bullet did enter the water, it would be highly unlikely to strike a listed fish. Bullets are made of non-toxic metal and once spent the projectile would sink. For these reasons, under Alternative 2 there would be no change from the baseline conditions with respect to effects described in the 2008 EA and 2012 SIR.

Under Alternative 2, there would likely be an increase in survival (and hence an increase in the abundance and a decrease in the level of extinction risk) of listed adult salmonids under Alternative 2 compared to the No-action Alternative because of the lethal removal of some predatory California sea lions. Under this alternative, up to 92 California sea lions may be removed. The estimated total number of adult salmonids that could be consumed by California sea lions in the years 2017 to 2021 is expected to be similar to the

range of impacts in Table 1-2, based on the available data regarding stock composition, and as estimated in Table 4.5-1 of the 2008 EA⁵.

Therefore, under the Alternative 2, listed salmonids would not be significantly impacted.

4.6 Other Listed Fish Species

In our February 29, 2012, biological opinion (NMFS 2012) we determined that the proposed action was “not likely to adversely affect green sturgeon and eulachon, or their critical habitats. We reaffirmed this finding in our supplemental biological opinion (NMFS 2016a) on the states’ January 27, 2016, application. Therefore, the effects of the Proposed Action on green sturgeon and eulachon are within the range of effects previously considered.

4.6.1 Alternative 1 (No Action)

Under the Alternative 1, NMFS would not approve the states’ section 120 application. If NMFS denies the states’ application, the states may, under Section 109(h) of the MMPA, continue to use non-lethal deterrence measures to reduce the presence of predatory pinnipeds a Bonneville Dam, and the Corps is likely to maintain the use of sea lion exclusion devices at Bonneville Dam, but these activities are not linked to NMFS’ decision to approve or deny the states’ application. Thus, there would be no effects on green sturgeon and eulachon under Alternative 1.

Therefore, under the Alternative 1, other listed fish species would not be significantly impacted.

4.6.2 Alternative 2—Lethal Removal of Individually Identifiable Predatory California Sea Lions after Active Non-lethal Deterrence (Proposed Action)

Under Alternative 2, non-lethal deterrence activities would be the same as described in Subsection 2.2.2, Alternative 2: Non-lethal Deterrence Only, of the 2008 Final EA, and is incorporated here by reference. The below impacts are in addition to those described in the 2008 EA and 2012 SIR.

Under Alternative 2 there would be no change from the baseline conditions with respect to direct effects or indirect effects on green sturgeon and eulachon.

⁵ Even though the average total salmonid passage at Bonneville Dam has increased since 2008, we expect, based on the data in Table 1-2, the range of potential increases in the numbers and percentages of spring-run Chinook salmon and steelhead passing Bonneville Dam resulting from the removal of California sea lions under Alternative 2 to be comparable to the estimates in Table 4.5-1 of the 2008 EA.

4.7 Other Fish Species

4.7.1 Alternative 1 (No Action)

Under the Alternative 1, NMFS would not approve the states' section 120 application. If NMFS denies the states' application, the states may, under Section 109(h) of the MMPA, continue to use non-lethal deterrence measures to reduce the presence of predatory pinnipeds a Bonneville Dam, and the Corps is likely to maintain the use of sea lion exclusion devices at Bonneville Dam, but these activities are not linked to NMFS' decision to approve or deny the states' application. Thus, there would be no effects on other fish species (white sturgeon, lamprey, and shad) under Alternative 1.

Under the Alternative 1, NMFS would not approve the states' section 120 application. Pinniped consumption of unlisted salmonids would therefore likely increase, with negative effects on productivity, abundance, and genetic and life history parameters for all affected populations. Pinniped predation levels on unlisted salmonids would likely be similar to levels seen in the past (Table 4.5-4 in the 2008 Final EA, and Table 1-3). However, it is not possible to estimate any potential change in the numbers, life history, distribution, run-timing, or level of extinction risk of listed salmonids passing Bonneville Dam from the available data. There is no information available to determine whether pinniped predation disproportionately affects hatchery- or natural-origin fish passing through the action area.

Therefore, under the Alternative 1, other fish species would not be significantly impacted.

4.7.2 Alternative 2—Lethal Removal of Individually Identifiable Predatory California Sea Lions after Active Non-lethal Deterrence (Proposed Action)

The below impacts are in addition to those described in the 2008 EA and 2012 SIR. Under Alternative 2 there would be no effects on unlisted salmonids and other fish species (white sturgeon, lamprey, and shad) relative to the baseline conditions, due to non-lethal deterrence measures for the reasons discussed above under Alternative 2.

Under Alternative 2, there would likely be an increase in survival of non-listed adult salmonids under Alternative 2 compared to the baseline conditions because of the lethal removal of some California sea lions. Under this alternative, up to 92 California sea lions may be removed. The estimated total number of non-listed adult salmonids that could be consumed by California sea lions in the years 2017 to 2021 is

expected to be similar to the range of impacts in Table 1-2, based on the available data regarding stock composition, and as estimated in Table 4.5-1 of the 2008 EA⁶.

Lethal activities that involve removal of predatory California sea lions by a qualified marksman would be carried out from shore in such a way as to avoid bullets entering the water. In the event a bullet did enter the water, it would be highly unlikely to strike a listed fish. Bullets are made of non-toxic metal and once spent the projectile would sink. For these reasons, under Alternative 2 there would be no change from the baseline conditions with respect to effects.

In addition, the lethal removal of some California sea lions might deter other sea lions from the action area, either because exposure to the lethal activities would cause newly arriving animals to avoid the area or because the removal of experienced sea lions would make it less likely that they would learn to forage successfully. These possibilities are too uncertain, however, to support a reliable estimate of any decrease in pinniped predation (and corresponding increase in salmonid survival). Conversely, it is likely that other sea lions would eventually replace the sea lions that were lethally removed, so the increase in the number of salmonids passing Bonneville Dam would likely be less than the numbers shown in Table 1-2.

A decrease in indirect effects on white sturgeon and lamprey is expected under this alternative compared to the No-action Alternative. The reduction in predation mortality for white sturgeon would be attributable to the displacement of Steller sea lions by the non-lethal deterrence activities under this alternative. The displacement of Steller sea lions is also expected to result in an unquantifiable but minor beneficial effect on lamprey relative to the No-action Alternative (see explanation under Alternative 2, subsection 4.7.1). The lethal removal of California sea lions is also expected to result in a survival increase for lamprey because observations indicate that they represent 99 percent of the lamprey predation. The indirect effect of Alternative 2 compared to the No-action Alternative for shad remains unknown (see above discussion under the No-action Alternative).

Therefore, under Alternative 2 other fish species would not be significantly impacted.

⁶ Even though the average total salmonid passage at Bonneville Dam has increased since 2008, we expect, based on the data in Table 1-2, the range of potential increases in the numbers and percentages of spring-run Chinook salmon and steelhead passing Bonneville Dam resulting from the removal of California sea lions under Alternative 2 to be comparable to the estimates in Table 4.5-1 of the 2008 EA.

4.8 Fish Habitat

Under the Alternative 1, NMFS would not approve the states' section 120 application. If NMFS denies the states' application, the states may, under Section 109(h) of the MMPA, continue to use non-lethal deterrence measures to reduce the presence of predatory pinnipeds a Bonneville Dam, and the Corps is likely to maintain the use of sea lion exclusion devices at Bonneville Dam, but these activities are not linked to NMFS' decision to approve or deny the states' application. Thus, there would be no effects on fish habitat under Alternative 1.

Under Alternative 2, Potential impacts to fish habitat would include effects from non-lethal deterrence activities and/or lethal removal activities on the water column, substrate, and riparian zones within the action area. Impacts to the riparian zones within the action area would be the same as described in the 2008 Final EA. Water quality impacts, including effects to the water column, and on substrate would be the same as described in the 2008 Final EA. There would be no substantial effect to any water quality parameter under any action alternative because all boat-based deterrence or removal activities would be of short duration and localized within the action area. Further, substrate would not be affected because none of the activities would disturb substrate.

As described in the 2008 Final EA, there would be no effect on essential fish habitat (EFH) for coho salmon or Chinook salmon because there would be no impact on water quality or substrate necessary for coho salmon or Chinook salmon to carry out spawning, breeding, feeding, or growth to maturity. Additionally, because there would be no negative effect on riparian areas, substrate, or water quality, no negative impacts to critical habitat are anticipated (e.g., spawning sites, juvenile rearing areas and migration corridors, adult migration corridors, food resources, water quality and quantity, and riparian vegetation).

Therefore, under Alternative 2 fish habitat would not be significantly impacted.

4.9 Terrestrial Wildlife and Birds

No meaningful changes to terrestrial wildlife and birds have occurred since the 2008 Final EA; environmental consequences discussed in the 2008 Final EA and 2012 SIR are hereby incorporated by reference.

4.10 General Vegetation

No meaningful changes to general vegetation have occurred since the 2008 Final EA; environmental consequences discussed in the 2008 Final EA and 2012 SIR are hereby incorporated by reference.

4.11 Socioeconomic Resources

4.11.1 Alternative 1 (No-action Alternative)

Under this alternative, there would be no meaningful changes in socioeconomic resources since the 2008 Final EA; environmental consequences discussed in the 2008 Final EA and 2012 SIR are hereby incorporated by reference.

4.11.2 Alternative 2—Lethal Removal of Individually Identifiable Predatory California Sea Lions after Active Non-lethal Deterrence (Proposed Action)

Under Alternative 2, lethal removal activities would impact the social or economic environment in the same manner as impacts described under Alternative 3 in the 2008 Final EA (refer to Subsection 4.10.3, Alternative 3: Lethal Removal of Individually Identifiable Predatory California Sea Lions After Active Non-lethal Deterrence, of the 2008 Final EA). However, depending on the success of the lethal removal measures, it is possible that pinniped predation would decrease, and that there would be a modest improvement in salmonid survival under this alternative as compared to the No-action Alternative. This would be compatible with the goals of protecting cultural and natural resources under the Columbia River Gorge National Scenic Area Designation since salmon are considered to be cultural and natural resources.

4.12 Tourism and Recreation

4.12.1 Alternative 1 (No-action Alternative)

There would be no effect on tourism or recreation in the project area or in the vicinity of the Columbia River Gorge as a result of the No-action Alternative because only limited non-lethal deterrence activities would occur, neither of which would cause area closures or limitations on recreational activities. There would be no closures of the Bradford Visitor Center and Washington Shore Visitor Complex, the four fishing areas maintained by the Corps in the project area, the Fort Cascades Historic Site and Trail, or any other public area under this alternative.

4.12.2 Alternative 2—Lethal Removal of Individually Identifiable Predatory California Sea Lions after Active Non-lethal Deterrence (Proposed Action)

The below impacts are in addition to those described in the 2008 EA and 2012 SIR. Impacts resulting from non-lethal deterrence measures under Alternative 2 would be the same as those described under Alternative 3 in the 2008 Final EA (refer to Subsection 4.10.3, Alternative 3: Lethal Removal of Individually Identifiable Predatory California Sea Lions After Active Non-lethal Deterrence, of the 2008 Final EA).

Unlike the No-action Alternative, Alternative 2 would involve close-range shootings and the Corps would close fishing areas close to the dam for public safety (refer to Subsection 2.2.3, Alternative 3: Modified Task Force Recommendation—Lethal Removal of Individually Identifiable Predatory California Sea Lions After Active Non-lethal Deterrence of the 2008 Final EA and the 2012 SIR). Such closures are not anticipated to negatively impact recreational fishing because all other allowable fishing areas in the Columbia River would remain open. Further, such closures would be limited in duration, allowing fishers to re-enter the Corps' managed fishing areas once lethal removal measures were completed. Lethal removal activities involving firearms would only be conducted in the BRZ, which is already closed to boating.

Temporary closures of Corps roads and either the Bradford Visitor Center or Washington Shore Visitor Complex could occur under Alternative 2 compared to the No-action Alternative where no closures would occur. This may inconvenience visitors on a particular day and time, but overall, closures would be rare, localized, and temporary (hours, not days).

As under the No-action Alternative and Alternative 2, there would be no effect to tourists on the Fort Cascades Historic Site and Trail or designated hiking trails along the Washington shore because no lethal removal or non-lethal deterrence activities would occur in the vicinity of these sites.

Therefore, under Alternative 2 tourism and recreation would not be significantly impacted.

4.13 Cultural Resources

No meaningful changes to cultural resources have occurred since the 2008 Final EA; environmental consequences discussed in the 2008 Final EA are hereby incorporated by reference.

4.14 Noise

No meaningful changes to noise have occurred since the 2008 Final EA; environmental consequences discussed in the 2008 Final EA are hereby incorporated by reference.

4.15 Aesthetics

No meaningful changes to aesthetics have occurred since the 2008 Final EA; environmental consequences discussed in the 2008 Final EA are hereby incorporated by reference.

4.16 Transportation

4.16.1 Alternative 1 (No-action Alternative)

There would be no effects on transportation in the project area as a result of Alternative 1.

4.16.2 Alternative 2—Lethal Removal of Individually Identifiable Predatory California Sea Lions after Active Non-lethal Deterrence (Proposed Action)

The below impacts are in addition to those described in the 2008 EA and 2012 SIR.

Unlike Alternative 1, road or facility closures could occur under this alternative, but non-lethal deterrence activities would not impact lock operations. Past non-lethal deterrence measures have not interfered with recreational boating in the vicinity of the dam, and it is anticipated that there would be no interference with these activities from future employment of the same measures. For these reasons, there would be no effect on transportation in the project area associated with non-lethal deterrence activities.

Unlike Alternative 1, Alternative 2 may involve the shooting of free-ranging sea lions by qualified marksmen at close range. While lethal removal activities are underway, the Corps (in consultation with the ICC) would close roads and facilities close to the dam for public safety (refer to Subsection 4.15.3 Alternative 3: Lethal Removal of Individually Identifiable Predatory California Sea Lions after Active Non-lethal Deterrence, of the 2008 Final EA). Such closures may impede the movement of visitors on Corps property on a particular day and time. Overall, however, such closures would be rare, localized, and temporary (typically less than 2 hours). Travelers passing through the action area by land (on State Highway 14 in Washington, Interstate 84 in Oregon, or by railway) or by water (through the navigation locks) would not be affected because no closures of the locks or roads beyond the property managed by the Corps are anticipated under Alternative 2. NMFS anticipates, based on experience from 2007, that there may be 20 days on which animals hauled out below the dams are shot on-site each year. No long-term changes to highways, roads, bridges or navigation routes, including navigation locks, would occur. Under Alternative 2, NMFS does not expect impacts to transportation to be different than those considered in the 2008 Final EA.

Therefore, under Alternative 2 transportation would not be significantly impacted.

4.17 Public Services

No meaningful changes to public services have occurred since the 2008 Final EA; environmental consequences discussed in the 2008 Final EA are hereby incorporated by reference.

4.18 Safety and Human Health

4.18.1 Alternative 1 (No Action)

There would be no effect on public services in the project area as a result of Alternative 1.

4.18.2 Alternative 2—Lethal Removal of Individually Identifiable Predatory California Sea Lions after Active Non-lethal Deterrence (Proposed Action)

The below impacts are in addition to those described in the 2008 EA and 2012 SIR.

Impacts resulting from non-lethal deterrence measures under Alternative 2 would be the same as those described in Subsection 4.17.2 Alternative 2: Non-lethal Deterrence Only, the 2008 Final EA, and the comparison to the No-action Alternative would therefore also be the same.

Unlike the Alternative 1, Alternative 2 may involve shooting of sea lions hauled out or close to shore below Bonneville Dam with live ammunition. There is some risk of bullets ricocheting off the hard haul-out surface, but there is little likelihood that ricocheting bullets would strike anyone because the haul-outs are located in a part of the project area that is not open to the public and is within the Corps' BRZ (Figure 1-1). Similarly, there is little risk of bullets "skipping" off the surface of the water because of the sharp angular trajectory from the marksman to a target animal near the shore, considering the vantage points that would be used by the marksmen. There is little risk of a stray bullet striking anyone because the states' safety plan would specify the type of weapons and ammunition that could be used, the training required of marksmen, and the conditions under which animals could be shot, including public area closures as needed.

Therefore, under Alternative 2 safety and human health would not be significantly impacted.

5 CUMULATIVE EFFECTS

For the resources air quality, water quality, other fish species, fish habitat, terrestrial wildlife and birds, general vegetation, social and economic resources, tourism and recreation, cultural resources, noise, aesthetics, transportation, public services, and safety and human health, the effects of Alternative 1 (No-action) and the Proposed Action (Alternative 2) are the same as those analyzed in the 2008 EA and 2012 SIR. Therefore, potential effects on these resources are not discussed further in this section. This analysis examines the two resources that have the potential for cumulative effects when Alternative 1, (No-action) or the Alternative 2 (the Proposed Action) are added to other past, present, and reasonably foreseeable future actions: marine mammals and salmonids.

The effects of the alternatives considered in this EA are expected to be minor, however there are other Federal, state, and tribal actions expected to occur within the action area that will also affect these resources. These actions include Federal, state, and tribal fisheries; land management and water-use decisions, hatchery programs, and the implementation of recovery plans for ESA-listed salmon and steelhead (see subsection 5.2.2). Overall, there should be no significant adverse cumulative impacts associated with the proposed action.

5.1 Alternative 1 (No-action)

5.1.1 Marine Mammals

Under the Alternative 1, NMFS would not approve the states' section 120 application. If NMFS denies the states' application, the states may, under Section 109(h) of the MMPA, continue to use non-lethal deterrence measures to reduce the presence of predatory pinnipeds a Bonneville Dam, and the Corps is likely to maintain the use of sea lion exclusion devices at Bonneville Dam, but these activities are not linked to NMFS' decision to approve or deny the states' application. There would likely be no change under Alternative 1 compared to baseline conditions with respect to effects described in Subsection 3.4, Marine Mammals, of the 2008 Final EA and 2012 SIR.

Thus, Alternative 1 would not have significant adverse cumulative impacts on marine mammals.

5.1.2 Listed Salmonids

Under Alternative 1, pinniped consumption of salmonids is likely to increase, with negative effects on productivity, abundance, and genetic and life history parameters for all affected populations. However, it

is not possible to estimate any potential change in the numbers, life history, distribution, run-timing, or level of extinction risk of listed salmonids passing Bonneville Dam from the available data. There is no information available to determine whether pinniped predation disproportionately affects hatchery- or natural-origin fish passing through the action area.

Thus, Alternative 1 would not have significant adverse cumulative impacts on listed salmonids.

5.2 Proposed Action (Alternative 2)

5.2.1 Marine Mammals

A population estimate of California sea lions has been updated since 2011 (Carretta et al. 2012), at which the population of California sea lions was estimated at 296,750 animals, with a potential biological removal of 9,200 animals. Estimates of human-caused fishery related mortality has declined in recent years (Carretta et al. 2015). These totals are within the range (less than) of mortalities detailed in the 2008 Final EA and 2012 SIR, and are incorporated here by reference. The optimum sustainable population level has not been formally determined (Carretta et al. 2015), and the population is currently not listed under the ESA, and is not designated as depleted nor considered strategic under the MMPA (Carretta et al. 2015).

Under the Alternative 2 (Proposed Action), it is likely that many California sea lions would continue to be present in the lower Columbia River generally, and at Bonneville Dam in particular. At Bonneville Dam between 2012 and 2015, there were a minimum of 39 to 195 individual California sea lions observed (Table 1-3). There are likely many more sea lions than the average number observed per year in the area below the dam. There are no other known activities that are likely to cause the number of sea lions at Bonneville Dam or in the lower Columbia River to decrease (although a substantial decrease in the number of salmonids available as prey would likely reduce California sea lion presence in the area below the dam). Removing as many as 92 sea lions each year would reduce the numbers of sea lions present at the dam, but there would still be many sea lions in the area each year. The sea lions likely removed under the Proposed Action would represent a small fraction, less than 10 percent, throughout the lower Columbia River in a given year, which is a small fraction of the population as a whole.

Thus, Alternative 1 would not have significant adverse cumulative impacts on marine mammals.

5.2 Listed Salmonids

As reflected in Table 3.5-3 of the 2008 Final EA, all upper Columbia and Snake River spring Chinook salmon populations are at high risk, and the majority of Snake River, middle Columbia River, and lower Columbia River steelhead are at moderate risk. These risk ratings were reaffirmed in our 2016 5-year reviews (NMFS 2016).

To estimate the potential benefits of implementing the Proposed Action, we examined the data in Table 3.5-4 and Table 4.5-1 in the 2008 Final EA and determined that the range of parameters considered in the 2008 Final EA, e.g., the percent of listed to non-listed salmonids (25 to 35 percent to 75 to 65 percent for spring-run Chinook salmon, and 28 to 72 percent to 60 to 40 percent for steelhead), has not changed in a meaningful way (greater than or less than 1 standard deviation). Therefore, implementing the Proposed Action could result in an increase of listed spring Chinook salmon and listed steelhead passing Bonneville Dam comparable to the range of benefits estimated in Table 4.5-1 of the 2008 EA⁷. Actual numbers may be lower because eventually new sea lions would likely take the place of sea lions that had been removed.

These salmon and steelhead species potentially affected by the Proposed Action have been listed for several years. Many factors have led to their decline and are preventing their recovery (refer to Subsection 3.6, Other Fish Species, of the 2008 Final EA and 2012 SIR). As a result, recovery plans for these species encourage the management of all sources of mortality, including marine mammal predation. Examples include:

Basin-wide Salmon Recovery Strategy (Federal Caucus 2000). Marine mammal predation has a measurable effect on returning adult Columbia River salmonids. Predation is part of a properly functioning ecosystem; however, given the perilous state of decline being faced by many salmon and steelhead species, predation control could contribute to recovery efforts, along with other management actions. Recommend active management of predators, including sea lions, in the Columbia River as important to improve salmonid survival rates.

Columbia River Estuary Recovery Plan Module for Salmon and Steelhead (Estuary Module) (NMFS 2011). The cumulative effect of altered flows, changes in sediment transport processes and food sources,

⁷ Even though the average total salmonid passage at Bonneville Dam has increased since 2008, we expect, based on the data in Table 1-2, the range of potential increases in the numbers and percentages of spring-run Chinook salmon and steelhead passing Bonneville Dam resulting from the removal of California sea lions under Alternative 2 to be comparable to the estimates in Table 4.5-1 of the 2008 EA.

introduced species, hatcheries, upstream habitat impacts, hydroelectric impacts, and contaminants have recast estuary and plume environments such that predator/prey relationships have changed significantly. Predation by pinnipeds on adult spring Chinook salmon and winter steelhead is a significant threat to salmon and steelhead recovery. Altered predator/prey relationships between native pinnipeds and salmonids ranks as a “high” threat priority (4 on a scale of 1 to 5, where 5 is the highest priority ranking), and actions to reduce salmon and steelhead predation by pinnipeds is among a suite of actions most important for the recovery of spring Chinook salmon and winter steelhead (Management Action CRE-14).

Final Upper Columbia Recovery Plan (Upper Columbia Salmon Recovery Board, adopted October 2007). Mammals are natural salmonid predators, but the role of predation has been reshaped by changes in predator and prey populations along with major changes in the environments. This plan supports immediate adoption of more effective predator control programs, including lethal removal when necessary, of the marine and avian predators that have the most significant negative impacts on returns of Upper Columbia Basin ESA-listed salmonid fish stocks.

In addition to recovery planning, Federal agencies must consult with NMFS under section 7 of the ESA on any action that is likely to adversely affect the listed fish. Through the consultation process, Federal agencies or applicants may change their Proposed Actions to avoid harming listed fish, or NMFS may require them to conduct their proposed action in a way that reduces or mitigates harm to listed fish. From 1982 through 2001, Federal agencies spent \$3.3 billion on Columbia River salmon recovery (GAO 2002; NMFS 2008)⁸. While it is not possible to translate funds expended to numbers of fish saved, it is evident from this information that billions of dollars are committed to actions aimed at improving survival of listed Columbia Basin salmon and steelhead.

Implementation of the Proposed Action would make a measurable contribution to improving survival of returning adult salmonids. While as a single action it is not sufficient to recover these listed species, there is no single action available that would accomplish that goal. As identified in recovery planning documents, the recovery of the species requires incremental improvements in the array of factors that

⁸ The GAO has not produced a similar report on salmon and steelhead recovery and Federal expenditures for the years 2002 through 2015. However, assuming a similar level of spending as in Table 1 of the 2002 GAO report for the years 2002 through 2015 by the 11 Federal agencies would put expenditures at \$5.7 billion spent on Columbia River salmon Recovery in the Columbia River Basin for the years 2001 through 2015.

cause mortality. The Proposed Action would result in beneficial cumulative impacts by making an incremental contribution, in addition to other efforts, to decreasing all sources of mortality.

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Appendix A

Summary of 2008 Environmental Assessment, 2012 Supplemental Information Report, and Comparison of New Information from 2012 through 2016.

Appendix A – Summary of 2008 Environmental Assessment, Comparison of New Information from 2008 through 2011, and New Information for the Years 2012-2016

Resources & 2008 EA Summary	Data Sources for Updated Information	Date Reviewed	Data Review Summary	No Change/ Change with Description	Relationship to 2008 Impact Analysis	Data Review Summary and No Change/Change with Description for 2012-2016
<p>3.2 Air Air quality in and around the Columbia Gorge is generally improving.</p>	<p>Columbia River Gorge Air Study and Strategy; September 15 2011. Available at: http://www.deq.state.or.us/air/gorgeair/</p>	<p>Nov-7-2011 Nov-23-2015 Jan-25-2016</p>	<ul style="list-style-type: none"> Current haze levels in the Gorge are not getting worse Visibility levels are expected to improve over the coming decades 	No Change		<p>No Change Web site reviewed 5/20/2016</p>
<p>3.3 Water Quality ODEQ and Ecology have listed the lower Columbia River, from river mile 146 (Bonneville Dam) to the mouth, as 303(d) impaired.</p>	<p>Oregon Water Quality Assessment Database, 2010 Integrated Report. Available at: http://www.deq.state.or.us/wq/assessment/2010/search.asp Washington Water Quality Assessment, 2008. Assessment was approved by US EPA in January 2009. Available at: http://www.ecy.wa.gov/programs/wq/1014/2008/index.html</p>	<p>Nov-10-2011 Nov-23-2015 Jan-25-2016</p>	<ul style="list-style-type: none"> The lower Columbia River, from river mile 146 (Bonneville Dam) to the mouth, continues to be 303(d) impaired. 	No Change		<p>No Change Web sites and reports reviewed 5/20/2016</p>
<p>3.4 Marine Mammals: Three stocks present in action area. California sea lion U.S. stock (<i>Zalophus californianus</i>) Steller sea lion eastern DPS (<i>Eumetopias jubatus</i>) and harbor seal Oregon/Washington coastal stock (<i>Phoca stalinus</i>).</p> <p><i>California sea lion</i> - Taxonomy and physical description. Breeding range, sexual maturity, breeding territoriality, California rookeries, breeding and pupping season. Post-breeding northward migration (males). Varied diet, opportunistic, (smelt, salmonids, rockfish, lamprey, herring) in the Columbia River.</p> <p>Population estimate (Carretta et al. 2007) 238,000, carrying capacity.</p>	<p>No new information.</p>	<p>Nov-22-2011 Nov-23-2015 Jan-25-2016</p>		No Change		No Change
<p>Federal and state listing status, distribution in the project area, population abundance.</p>	<p>Carretta et al. 2011 http://www.nmfs.noaa.gov/sei/wsi/draft.htm</p>	<p>Nov-22-2011 Nov-23-2015 Jan-25-2016</p>	<p>2011 Draft Stock Assessment Report population estimate 296,750, potential biological removal 9,200, standard logistic growth curve used to depict growth in pup count. The population is not listed under the ESA, is not designated as depleted nor considered "strategic" under the MMPA.</p>	Change – Population increased	<p><i>California sea lion</i> population and FBR increase does not alter the expected impacts of the proposed action on the sea lion population (<1% of FBR) because the authorized take, while increasing to 92 animals per year, is limited to same proportion of FBR. In addition, the practical logistics of capture and removal limits removals to less than the upper limit analyzed in 2008.</p>	<p>2014 Marine Mammal Stock Assessment Report (Carretta et al. 2015) – no change in population estimate (available).</p>

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Earliest known report of animals hauled out at the dam from the 1970s. Observations at the dam increased beginning in 2000, dominant pinniped present and feeding on salmonids.	Stansell et al. 2011	Nov-22-2011 Nov-23-2015 Jan-25-2016	Distribution in the action area has extended as far upstream as river mile 191, the Dalles Dam.	Change – A small number of California sea lions at Bonneville Dam have moved above the dam foraging in the forebay and beyond.	The extended distribution of California sea lions above the dam does not alter the expected impacts of the proposed action on the sea lion population because sea lions observed upstream are a subset of animals observed below the dam and removal levels are capped at ≤1% of PBR. There are observations of animals upstream of the dam but predation events observed there are not recorded as part of the salmonid predation estimates because the observations are opportunistic. Nevertheless, predation by animals observed in the forebay should be considered as contributing to salmonid mortality at the facility. Animal C697 was known to kill salmonids above and below the dam and it can be assumed that all sea lions above the dam were at one time below the dam.																																					
Likely more sea lions present than are observed. A subset of California sea lions, seen in any one year, return in subsequent years and are joined by new arrivals.	Stansell et al. 2011	Nov-22-2011 Dec-08-2011 Nov-23-2015 Jan-25-2016	California sea lions at the dam in 2011 are no longer dominant in abundance. California sea lions still dominate salmonid predation, taking more than two thirds of the observed catch. Overall predation declined, however, in 2011 for the first time since 2005.	Change – California sea lion predation on salmonids declined in 2011.	California sea lion predation is lower but still the majority of that observed. To the extent that removals contributed to the decreased predation by California sea lions observed in 2011 (1.2% of run) it is within the scope of the impacts of the action analyzed in 2008 (0.4 – 5.0% of run). It is unknown whether predation will rebound in 2012, however, reduced predation was a desired result of the removal program.																																					
	Brown et al. 2008 Brown et al. 2009 Brown et al. 2010 Brown et al. 2011	Nov-22-2011 Nov-23-2015 Jan-25-2016	Non-lethal deterrence conducted from boats in the tailrace. California and Steller sea lions exposed to noise from pyrotechnics and vessel maneuvering. Some animals are exposed multiple times per day and/or over the course of a season. No injuries noted. In 2008, Two Steller sea lions and three unauthorized California sea lions die in the traps. Enforcement investigation finds no evidence of human involvement in closing the traps.	Change – 38 California sea lions have been removed. Non-lethal hazing has been conducted for 4 more seasons. Accidental mortality in 2008 prompts equipment and procedural modifications, re-issuance of ESA section 7 consultation.	Authorized California sea lion removals are within the limits described and analyzed in the 2008 EA. The new information does not alter the expected impacts of the proposed action on the population of California sea lions. Removals would remain capped at the same levels under the proposed action, i.e., no more than 1% PBR.	An unanticipated mortality of two California sea lions in 2015 at the traps at Bonneville Dam was reported (Corps 2016)																																				
		Nov-22-2011 Nov-23-2015 Jan-25-2016	Removals: <table border="1"> <thead> <tr> <th>Year</th> <th>Captured</th> <th>Eligible</th> <th>Transferred to Captive</th> <th>Died</th> <th>Killed</th> </tr> </thead> <tbody> <tr> <td>2008</td> <td>9</td> <td></td> <td>6</td> <td></td> <td>2</td> </tr> <tr> <td>2009</td> <td>16</td> <td></td> <td>4</td> <td></td> <td>11</td> </tr> <tr> <td>2010</td> <td>14</td> <td></td> <td>0</td> <td></td> <td>14</td> </tr> <tr> <td>2011</td> <td>5</td> <td></td> <td>0</td> <td></td> <td>1</td> </tr> <tr> <td>Total</td> <td>44</td> <td></td> <td>10</td> <td></td> <td>28</td> </tr> </tbody> </table>	Year	Captured	Eligible	Transferred to Captive	Died	Killed	2008	9		6		2	2009	16		4		11	2010	14		0		14	2011	5		0		1	Total	44		10		28			
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California sea lion population has recovered and reached maximum net productivity level in 1997 and is at optimum sustainable population (OSP). Potential biological removal (PBR) level is 3,511 and annual human caused mortality from fisheries averaged 1,476 or 17.3% of PBR.	Carretta et al. 2011 http://www.nmfs.noaa.gov/se/lions/draft.htm	Nov-22-2011 Nov-23-2015 Jan-25-2016	The new draft stock assessment report indicates that the California sea lion population is growing. The methodology for estimating the population abundance, based on pup counts, and for calculating the potential biological removal level based on N_{max} , have not changed but the new analysis incorporates a different growth curve (standard logistic growth curve) for the population than was used in the previous report (generalized logistic growth curve). The new stock assessment report also reflects a shift in policy regarding publication of "optimum sustainable population" determinations in the scientific literature. The determination of optimum sustainable population status for the California sea lion population has yet to be published in the literature and therefore the new draft stock assessment has been revised to state that optimum sustainable population level has not been formally determined. Estimates of human caused fishery related mortality has declined.	No Change No Change	The alteration of the statistical model used for depicting the growth in pup count; does not alter the expected impacts of the proposed action on the sea lion population because the population continues to be robust and growing. The estimates of fishery related and other human-caused mortality are considered to be minimum estimates but overall continue to be less than the potential biological removal level for the stock and thus within the range analyzed in 2008.	PBR is 9,200 (2012 SFR).
California sea lion counts fluctuated but increased overall from 30 in 2002 to 71 in 2007 with peak of 104 in 2003. Since 2011, CSL counts have fluctuated from 39 animals in 2012 to 195 animals in 2015 (Corps 2016).	Stancill et al. 2011, Wright and Stancill 2011	Nov-22-2011 Nov-23-2015 Jan-25-2016	Counts fluctuated from 54 in 2009 to 89 in 2010 to 54 in 2011 but average daily attendance of California sea lions fell to 7.3 in 2011, the lowest since 2003. California sea lion average daily abundance was significantly lower statistically for the three years 2009-2011 than the preceding three years 2006-2008.	Change – Total abundance present is within the range previously observed but average daily abundance is lower.	The decrease in average daily abundance of California sea lions does not alter the expected impacts of the proposed action because not all of the sea lions observed at the dam over the course of the year are there simultaneously and deterrence measures or removals are opportunistic from the subset of animals present on a given day. Some animals will be exposed multiple times per day while others may only be exposed a few times per season based upon frequency of attendance. The average daily abundance is significantly lower but the total abundance (54, 89, 54) is within the range analyzed in 2008 (30 – 106)	
Steller sea lion - Taxonomy and physical description. Breeding range, sexual maturity, Oregon rookeries, breeding territoriality, breeding and pupping season. Year around residents in Oregon and Washington, post breeding dispersal. Varied diet, opportunistic, haul-out selection.	No new information.	Nov-22-2011 Nov-23-2015 Jan-25-2016		No Change		No Change
Population estimate 47,885. ESA listed (threatened) M-DFA depleted.	Allen and Anglin 2010 http://www.nmfs.noaa.gov/se/lions/stock.htm	Nov-22-2-11 Nov-23-2015 Jan-25-2016	2010 Stock Assessment Report population estimate of Steller sea lions is 52,847. Petition to delist received and response in preparation.	Change – Population increase	Steller sea lions population increase does not alter the expected impacts of the proposed action on individual sea lions or the population. The number of individual Steller sea lions at the dam is	According to the 2013 Stock Assessment Report, the population estimate of Steller sea lions was 63,000 to 78,000. The eastern distinct population segment of Steller sea lions

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Resource & 2008 EA Summary	Data Sources for Updated Information	Date Reviewed	Data Review Summary	No Change/ Change with Description	Relationship to 2008 Impact Analysis	Data Review Summary and No Change/Change with Description for 2012-2016
<p>Federal and state listing status, distribution in the project area.</p> <p>Abundance in the project area is increasing, haul out locations, salmonid consumption by Steller sea lions is variable but far less than California sea lions. Majority of sturgeon consumed by puppets at the dam are taken by Steller sea lions.</p>	<p>No new information.</p> <p>Stansell et al 2011 Brown et al 2008</p>	<p>Nov-22-2011 Dec-9-2011 Nov-23-2015 Jan-25-2016</p>	<p>Steller sea lion numbers at the dam have increased and outnumbered California sea lions in 2011. Salmonid consumption by Steller sea lions has also increased to about one third of the total catch by puppets. Steller sea lions consume the majority of sturgeon taken at the dam. In 2008 Steller sea lions showed increased tolerance to harang and numbers in the tailrace increased. The result was an increased number of harassment takes. Unanticipated mortality of two Steller sea lions, accidental trap incident.</p>	<p>No Change</p> <p>Change – Presence at the dam, sturgeon and salmonid consumption increased. Un-anticipated mortality in accidental trap incident.</p>	<p>a small fraction of the total population. Temporary displacement of individual animals from the foraging area immediately below the dam occurs as anticipated in the 2008 analysis. Animals have grown tolerant and some portion of the individuals displaced simply move from one location in the tailrace to another to avoid harang. Many return from day to day and year to year. The number of individual Steller sea lions at the dam has increased indicating that the anticipated effects of temporary disturbance or displacement are not sufficient to exclude the animals from the area and impacts of the action were below those anticipated.</p> <p>The increase in numbers of Steller sea lions at the dam does not alter the expected impacts of the proposed action on individual sea lions or the population because the kinds of impacts (sound exposure, temporary displacement) are minor and have been shown to be inconsequential to the local abundance of individually recognized Steller sea lions and overall number present. The accidental mortality event and increased tolerance to non-lethal harang, observed in 2008, prompted re-issuance of ESA section 7 consultation, analysis and a new take estimate. The number of animals present at the dam is a small fraction of the total population range wide and there is ample foraging opportunity elsewhere in the Columbia River and rangwide to accommodate these animals. Predation by Stellers on sturgeon and salmonids grew despite harang efforts. Predation on salmonids is higher than previously observed but still less than California sea lions. Overall the impact of the action on Steller sea lions appears lower than anticipated. Actions to displace or remove Steller sea lions cannot escalate beyond non-lethal deterrence because</p>	<p>was deleted in December 2013 (78 Fed. Reg. 66139, November 4, 2013).</p> <p>Change (see above)</p> <p>Steller sea lion numbers at the Bonneville Dam tailrace have increased from no Steller sea lions in 2002 to a high of 89 in 2011, with minimum estimates of 73 in 2012, 80 in 2013, 65 in 2014, and 69 in 2015 (Corps 2016).</p> <p>An unanticipated mortality of one Steller sea lion in 2015 at the traps at Bonneville Dam was reported (Corps 2016).</p>

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Resources & 2008 EA Summary	Data Sources for Updated Information	Date Reviewed	Data Review Summary	No Change/ Change with Description	Relationship to 2008 Impact Analysis	Data Review Summary and No Change/Change with Description for 2012-2016
Harbor seal - Taxonomy, distribution, and physical description. Non-migratory movements, presence in the Columbia River estuary, breeding and pupping. Year around residents in Oregon and Washington, poor breeding dispersal. Variable and diverse diet. Population estimate (Carretta et al. 2007) 24,732 is old but considered within OSP.	Allen and Anglin 2010 http://www.nmfs.noaa.gov/w/hars/region.htm	Nov-22-2011 Nov-23-2015 Jan-25-2016		No Change	lethal take is not authorized for this species.	No Change (no new stock assessment)
Factors affecting abundance of pinnacids at Bonneville Dam – The seasonal presence of salmonids, tolerance and avoidance of exposure to non-lethal harang, presence of larger numbers of pinnacids elsewhere in the estuary, and the availability of alternative prey such as sturgeon, lamprey and shad. Fecal analysis indicates that salmonids are the preferred prey of California sea lions and sturgeon are preferred by Steller sea lions. Boat and shore based harang are used at the dam, sea lions continue to adapt to harang, harang has not produced an appreciable effect on predation rate.	No new information.	Nov-22-2011 Nov-23-2015 Jan-25-2016		Change	(See California sea lion and Steller sea lion summaries above.)	No Change
Steller sea lions reacted differently to non-lethal harang than California sea lions, observed numbers declined with harang and sturgeon predation decreased with harang.	Staniell et al. 2011 ESA Section 7 Consultation No. 2008-08780	Nov-22-2011 Nov-23-2015 Jan-25-2016	See Steller sea lion summary above.	Change – New take estimate.	Impacts to Steller sea lions, which include temporary displacement, exposure to noise and vessels, were within or below the range anticipated in the 2008 analysis. New take estimate developed in section 7 Consultation and takes have remained within range analyzed.	No Change
3.F Listed Salmonids: NMFS considers an ESU to be a DPS and thus a species under the ESA. There are 13 ESU/DPSs listed as threatened or endangered in the Columbia Basin. Eleven overlap the action area and 5 have run timing coincident with the presence of sea lions in the action area.	http://www.nwr.noaa.gov/ESA-Salmon-Litman/5-yr-review.cfm	Nov-22-2011 Nov-23-2015 Jan-25-2016	The listing status of Columbia River salmonids was reaffirmed in a 5-year status review published Aug-15-2011.	Change – Status review updates listing information, however all stocks retain status described in 2008 analysis.	The updated status information does not alter the expected impacts of the proposed action on listed Columbia Basin salmonids. The listing status and threats were reaffirmed during a five year status review that was completed in 2011. In spite of some improvements referenced in the status reviews, predation remains a secondary threat for all ESU/DPSs that migrate through the estuary therefore the impacts and benefits of the proposed	No Change The listing status of Columbia River salmonids was reaffirmed in a 5-year status review published December 7, 2011 (76 Fed. Reg. 76386) and on May 26, 2016 (81 Fed. Reg. 33469).

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The five runs coincident with sea lion presence are upper Columbia River spring Chinook, Snake River spring/summer Chinook, Snake River Basin steelhead, middle Columbia River steelhead, lower Columbia River steelhead.	No new information.	Nov-22-2011 Nov-23-2015 Jan-25-2016	The life history, species description, status, and potentially affected population information are as described in 2008.	No Change	action are within the range of impacts analyzed in 2008.	No Change
The ESA requires development and implementation of Recovery Plan. NMFS convened take reduction teams and invited public participation to develop Recovery Plan. Federal agencies must consult with NMFS to determine whether and to what degree action may affect listed species. NMFS commits on a host of actions.	No new information.	Nov-22-2011 Nov-23-2015 Jan-25-2016		No Change		Since the 2008 Final EA and the 2012 SIR, survival of listed salmonids has improved as a result of implemented and ongoing conservation measures.
Viability standards for abundance and productivity were developed by take reduction teams to assess the level of individual salmonid population's extinction risk. An "acceptable" or "low" risk level is defined as ≤ 5% probability of extinction in 100 years. A "moderate" risk is defined as 5% to 25% extinction probability in 100 years and a "high" risk is defined as >25% extinction probability in 100 years. Extinction risk was assessed for 54 populations in the Columbia and Snake River basins.	No new information.	Nov-22-2011 Nov-23-2015 Jan-25-2016		No Change		No Change
A final recovery plan is in place for upper Columbia River spring Chinook salmon. Interim recovery plans are in place for middle and lower Columbia River steelhead and recovery plans are being drafted for Snake River spring/summer Chinook and Snake River Basin steelhead.	http://www.nwr.noaa.gov/Publications/FR-Notices/2009/loader.cfm?csModule=security/getfile&pageid=44562	Nov-22-2011 Nov-23-2015 Jan-25-2016	Final recovery plan adopted for mid-Columbia River steelhead Sep-30-2009.	Change – Interim recovery plan replaced by final document.	The adoption of a Final Recovery Plan for mid-Columbia steelhead does not alter the expected impacts of the proposed action on the steelhead stock. The final plan reiterates that predation is one of many factors affecting the recovery of the DPS.	No Change
Predation listed among the high priority factors limiting recovery of ESA listed salmonids.	No new information.	Nov-22-2011 Nov-23-2015 Jan-25-2016		No Change		No Change
Survival improvements from implemented and ongoing conservation measures.	Wright and Stansell 2011; Stansell et al. 2011	Nov-22-2011 Nov-23-2015 Jan-25-2016	California sea lion presence declined and predation dropped in 2011.	Change – Presence of California sea lions was lower in 2009-2011 than	The decline in California sea lion presence does not alter the expected impacts of the proposed action on listed salmonids. It is too early to tell if	No Change

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				2006-2008. Predation on salmonids dropped in 2011	reductions in California sea lions will have a lasting beneficial effect on salmonid survival because overall California sea lion abundance is still within the range analyzed in 2008. It is unclear if the drop in predation in 2011 is related to removals, lower California sea lion presence, inter-species competition with Steller sea lions, or other environmental factors.	
Other Listed Fish Species		Nov-23-2015 Jan-25-2016				Green sturgeon. Not evaluated in the 2008 Final EA. Based on survey data from 2010-2014 and estimates of mean spawning periodicity, total number of adults in the northern DPS population is estimated at 2,334 ± 1,221 (pers. comm. with Ethan Moxa, UC Davis, May 6, 2015 as reported in NDMFS 2015 [3-year Review]). Eulachon. NDMFS issued a final rule on March 18, 2010 (52 Fed. Reg. 13012) determining that eulachon (<i>Thaleichthys pacificus</i>) spawning south of the Naso River in British Columbia to, and including, the Mad River in California meet the discreteness and significance criteria for delineation of the Southern Distinct Population Segment (DPS) of this species and listing it as threatened for under the Endangered Species Act (ESA) protection. The listing status of eulachon was reaffirmed in a 5-year status review issued on April 1, 2016. Source: Gustafson et al. 2010
3.6 Other Fish Species <u>Non-listed Spring-run Chinook Stocks</u>	No new information.	Nov-22-2011 Nov-23-2015 Jan-25-2016		No Change		No Change
<u>White Sturgeon</u> - Present in the Columbia River year around from the mouth upstream to the Kootenai River. Two groups present in the action area. Population healthy and supporting largest sport and	ODFW 2011	Nov-22-2011 Nov-23-2015 Jan-25-2016	Population estimate in 2011 89,000 sub-adults, 11,000 adults. Harvest guideline reduced.	Change – Population declining	White sturgeon are declining and adjustments are being made to recreational and commercial harvest guidelines to assist recovery. Some possible beneficial effects from disturbance and displacement of	Change White sturgeon numbers in the lower Columbia River have increased slightly since the 2008 Final EA when the population estimate was 80,500 fish (NCRMS 2016). The population

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commercial fisheries (42,000 fish annually) in the Columbia Basin. Population of 36 to 60 inch (sub-adult) fish estimated at 297,450 fish and 60 to 72 inch "large broodstock" fish at 7,743. Population considered at low risk.					predatory Steller sea lions were anticipated incidental to the California sea lion removal action, however, the benefits did not materialize. There is no evidence of direct impacts on sturgeon from the removal action and the decline in sturgeon population does not alter the expected impact of the proposed action on the sturgeon resource.	estimate in 2015 was 143,890 fish (range 85,700 to 202,100), (JCRMS 2016). The 2016 projected population estimate is 147,100 fish (JCRMS 2016)
Lamprey - Pacific lamprey populations can be highly variable but adult lamprey counts have decreased dramatically at all Columbia River dams in recent years.	Luzier et al. 2011	Nov-22-2011 Nov-23-2015 Jan-25-2016	Lamprey - Pacific lamprey populations in the Columbia River are considered at "high risk" in the mid & upper Columbia and Snake River; and at somewhat lower risk in the lower Columbia River. Threats to lamprey recovery include barriers to passage, water quality, stream and floodplain degradation. Counts at Bonneville Dam have varied from fewer than 20,000 in 2000 to over 100,000 in 2003 and back down to about 11,000 in 2010.	Change - Recent population assessment and conservation initiatives are being developed.	The current status of lamprey does not alter the expected impacts of the proposed action on the lamprey resource. Safety measures in place for listed salmonids will also protect other non-listed species in the tailrace including lamprey.	No Change Lamprey counts at Bonneville Dam ranged from 29,224 in 2012 to 38,716 in 2015. Source: Fish Passage Center
Shad - American shad, returning to the Columbia River, totaled over 4 million fish by 1990 and the average return over the past 10 years has been 3 million fish.	Parley et al. 2011	Nov-22-2011 Nov-23-2015 Jan-25-2016	Returns declined to 1 million in 2010 following record return in 2005.	Change - population fluctuates widely	The current status of the shad population does not change the expected impacts of the proposed action on the shad resource. Safety measures in place for listed salmonids will also protect other non-listed species in the tailrace including shad.	No Change 2015 shad counts at Bonneville Dam were 712,091 and the 10-year average as of 6/12/2016 was 987,511. Source: Fish Passage Center
3.7 Fish Habitat						
Essential Fish habitat is defined for salmonids under the Magnuson-Stevens Fishery Conservation and Management Act and includes the action area. Freshwater habitat at Bonneville Dam has been highly altered and degraded.	No new information.	Nov-22-2011 Nov-23-2015 Jan-25-2016		No Change		No Change
Critical habitat has been designated under the Endangered Species Act for all listed salmonids that are potentially affected by the action.	No new information.	Nov-22-2011 Nov-23-2015 Jan-25-2016		No Change		Change Critical habitat was designated for Lower Columbia River coho salmon on February 24, 2016 (81 Fed. Reg. 9252)
New Information - Critical habitat has been designated for eulachon.	http://www.nwr.noaa.gov/Other-Marine-Species/Eulachon.cfm	Nov-22-2011 Nov-23-2015 Jan-25-2016	Final Critical Habitat Federal Register Notice Oct-20-2011	Change - new critical habitat	Critical habitat designation does not change the expected impact of the proposed action on eulachon habitat. Eulachon habitat overlaps designated critical habitat for listed salmonids and effects of the action will fall within the range of effects from the action on salmonid habitat as expressed in the 2008 analysis.	

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<p>3.8 Terrestrial Wildlife and Birds</p> <p>Various Federal, state, and local regulations address wildlife protection, including protection of threatened, endangered, and sensitive fish and wildlife in the project area. Operations at Bonneville Dam are designed to comply with these laws and regulations.</p>	<p>No new information.</p> <p>Federal Federal Endangered Species Act Marine Mammal Protection Act Migratory Bird Treaty Act and Executive Order 13186 The Bald and Golden Eagle Protection Act Fish and Wildlife Coordination Act Animal Damage Control Act</p> <p>State Washington State list of endangered, threatened, and sensitive species Oregon State Endangered Species Act</p> <p>Local County sensitive Areas Ordinances and Comprehensive Plans</p>	<p>Nov-7-2011 Nov-23-2015 Jan-25-2016</p>		No Change		No Change WDFW and ODFW species of concern/threatened and endangered species web pages reviewed 5/20/2016.
<p>3.9 General Vegetation</p> <p>The shoreline in the project area is degraded by developed and filled lands resulting from dam and facility construction, river fluctuations that inundate the shoreline, and ongoing maintenance activities. The original shoreline around Bonneville Dam exists only as part of the Fort Cascade National Historic Site and Trail.</p>	No new information.	<p>Nov-7-2011 Nov-23-2015 Jan-25-2016</p>		No Change		No Change tpa.gov, Environment, Fish & Wildlife web pages reviewed 5/20/2016.
<p>3.10 Social and Economic Resources</p> <p>The Columbia River Gorge National Scenic Area designated for special protection spans 292,500 acres on both sides of the Columbia. The Bonneville Lock and Dam is an Urban Area exempt from Scenic Area regulations.</p> <p>The Corps maintains a system of navigation locks, including the Bonneville Lock and Dam, along the Columbia-Snake Inland Waterway to Lewiston, Idaho supporting:</p> <ul style="list-style-type: none"> 10 million tons commercial cargo annually An estimated \$1.5 to \$2 billion annually 	<p>No new information.</p> <p>PNWA (Pacific Northwest Waterways Association). 2011. Columbia Snake River System Facts. Webpage accessed November 8, 2011. Available at: http://www.pnwa.net/new/Articles/CSRSFasrSheet.pdf</p>	<p>Nov-8-2011 Nov-23-2015 Jan-25-2016</p> <p>Nov-8-2011 Nov-23-2015 Jan-25-2016</p>	<ul style="list-style-type: none"> 10 million tons commercial cargo annually An estimated \$3 billion annually 40,000 jobs in the region 	<p>No Change</p> <p>Change – an estimated \$3 billion annually vs \$1.5-2 billion annually</p>	<p>No new maintain Columbia River dam or navigation locks have been built or removed since 2008. While the commerce value has increased recently the current value falls within the scope of impacts assessed in the 2008 analysis and the proposed action continues to have little impact on this resource. New data does not represent significant new circumstances or</p>	<p>No Change from 2011 evaluation.</p> <p>No new updates to the Columbia Gorge National Scenic Area Management Plan since 2011.</p>

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<ul style="list-style-type: none"> More than 40,000 jobs in the region 					information per CEQ's regulations at 40 C.F.R. 1502.09(e)(1)(ii).	
<p>3.11 Tourism and Recreation</p> <p>Tourism and recreational areas around the Bonneville Lock and Dam and Lake Bonneville include the Bradford Visitor Center and the Washington Shore Visitor Complex, four fishing areas maintained by the Corps in the project area, the Fort Cascades Historic Site and Trail, and any other public area within the project area.</p> <p>The two visitor centers and immediate fishing areas draw approximately 1 million visits annually.</p> <p>The Bonneville Dam facilities and reservoir drew nearly 2.74 million recreational visits in fiscal year 2005.</p>	Norris, Robin (pers. comm.). 2011. USACE. Bradford Island Visitor Center, Bonneville Lock and Dam (1-541-374-4563), November 8, 2011.	Nov-8-2011 Nov-23-2015 Jan-25-2016	<ul style="list-style-type: none"> The two visitor centers and immediate fishing areas (i.e., Tanner Creek, Robbins Island, Bradford Island, and the Washington Shore) drew 910,216 visits in FY 2011. The Bonneville Dam facilities over the greater 40-mile long reservoir (whole and locally) drew 2,894,744 recreational visits in fiscal year 2011. 	Change – slightly fewer visitors to the two visitor centers and immediate fishing areas, and slightly more recreational visitors to the Bonneville Dam facilities over the greater 40-mile long reservoir (whole and locally) in fiscal year 2011.	Visitation opportunities remain about the same now as they did in 2008. The number of visitors using the area falls within the scope of impacts assessed in the 2008 analysis. New data does not represent significant new circumstances or information per CEQ's regulations at 40 C.F.R. 1502.09(e)(1)(ii).	<p>No Change</p> <p>Between the years 2011 and 2015 the Bonneville Dam facilities and reservoir drew an average of 2.5 million recreational visits per year on average. This is within the range discussed in the 2008 Final EA.</p> <p>Source: Webb, Gwag (pers. comm. with R. Anderson). 2016. USACE. Bonneville Dam Park and Natural Resource Manager, Bonneville Lock and Dam (1-541-374-7996), June 9, 2016.</p>
<p>3.12 Cultural Resources</p> <p>Historic Designations: The Bonneville Project, which is within the action area, includes two primary historic designations: (1) Bonneville Lock and Dam, and (2) Fort Cascades National Historic Site.</p> <p>Tribal Interests: Native Americans have a vested cultural, religious, and economic interest in lands around the Bonneville Project. Public Law 100-581 directs the Secretary of the Army to identify, develop and improve Treaty fishing access sites known as "in-lieu" sites for transfer to the Department of the Interior. The Corps has continued to build sites along the Columbia River for use by treaty tribes, including designation of an in-lieu site approximately one mile upstream of Bonneville Dam on the Washington shore.</p>	No new information.	Nov-9-2011 Nov-23-2015 Jan-25-2016		No Change		No Change (no new information since the 2008 Final EA)
	No new information.	Nov-9-2011 Nov-23-2015 Jan-25-2016		No Change		No Change (no new information since the 2008 Final EA)
<p>3.13 Noise</p> <p>Noise levels at the Bonneville Project fluctuate with transportation-related noise as the primary input to ambient levels. With major roadways and</p>	No new information.	Nov-9-2011 Nov-23-2015 Jan-25-2016		No Change		No Change (no new information since the 2008 Final EA)

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<p>railways on both the Oregon and Washington sides of the project, highway traffic and railcars are constant inputs. In addition, there is transportation-related noise from the Columbia River due to traffic moving through the navigation lock – towboat and vessel horns and alarms as they navigate waters also used by recreational boaters.</p>						
<p>3.14 Aesthetics</p> <p>The Columbia River Gorge with its diverse array of landscapes including rain forests, rolling farmlands, and semi-arid grasslands is a National Scenic Area. The Bonneville Project is located in this setting between Cascades Locks, Oregon and North Bonneville, Washington. Additional components of the river’s aesthetic environment include fishing activities, river traffic, and lock operations.</p>	No new information.	Nov-9-2011 Nov-23-2015 Jan-25-2016		No Change		No Change (no new information since the 2008 Final EA)
<p>3.16 Transportation</p> <p>The Columbia River system is the Northwest’s inland river highway representing the only route from the Pacific Coast to the Columbia-Snake River Basin interior region.</p> <p>Running parallel to the Columbia River on the Oregon side is a major roadway, Interstate 54, and railway – the Oregon Union Pacific Railroad.</p> <p>Running parallel to the Columbia River on the Washington side is a major roadway, State Highway 14, and railway – Washington Burlington Northern Santa Fe Railroad Company</p> <p>For Oregon, See Table 3-15-1 Average hourly traffic volume (number of vehicles/hour) during daylight hours on I-54 through the Columbia Gorge, January to May 2006 (ODOT’s 2008).</p>	<p>No new information.</p> <p>No new information.</p> <p>No new information.</p> <p>ODOT’s traffic data website http://www.oregon.gov/ODOT/ID/TRATA/trm/trt.shtml (accessed November 14, 2011)</p>	<p>Nov-14-2011 Nov-23-2015 Jan-25-2016</p> <p>Nov-14-2011 Nov-23-2015 Jan-25-2016</p> <p>Nov-14-2011 Nov-23-2015 Jan-25-2016</p> <p>Nov-14-2011 Nov-23-2015 Jan-25-2016</p>	<p>ODOT’s traffic data website http://www.oregon.gov/ODOT/ID/TRATA/trm/trt.shtml (accessed November 14, 2011) focuses on daily, rather than hourly averages, and does not differentiate between eastbound and westbound traffic.</p> <p>For the Rowena Station (#33-001), the average daily traffic in 2010 was 20,760 vehicles, which is very close to the corresponding value in 2006 (20,518 vehicles – a difference of</p>	<p>No Change</p> <p>No Change</p> <p>No Change</p> <p>Change – but no substantial change in traffic volumes between 2006 and 2010.</p>	<p>Falls within the scope of impacts assessed in the 2008 analysis. New data does not represent significant new circumstances or information per CEQ’s regulations at 40 C.F.R. 1502.09(c)(1)(ii).</p>	<p>No Change</p> <p>No Change</p> <p>No Change</p> <p>No Change (falls within the range originally analyzed)</p> <p>In 2014, the average daily traffic volume at Rowena and Troutdale was 21,200 and 21,200, vehicles, respectively (ODOT 2014).</p>

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For Washington, See Table 3-15-2 Average hourly traffic volume (number of vehicles/hour) during daylight hours on SR-14 through the Columbia Gorge, January to May 2006 (ODSPS 2008).	WSDOT's annual traffic report for 2010 available at http://www.wsdot.wa.gov/masodata/travel/pdf/Annual_Traffic_Report_2010.pdf (accessed Nov 14, 2011).	Nov-14-2011 Nov-23-2015 Jan-25-2016	<p>about 1%). The average daily traffic (ADT) volume at that station from 2001 to 2010 ranged between 19,084 (2001) and 20,867 (2007), a range of about 1,800 vehicles (about 9% of the 2011 total). Compared to that overall range of variability, the difference between 2006 and 2010 (242 vehicles) is minor.</p> <p>The data from the Troutdale Station (#26-001) tell a similar story: the ADT ranged from 27,392 (2001) to 29,637 (2010), a range of 2,245 vehicles (about 8% of the 2010 total). The difference between 2010 and 2006 was 677 vehicles, or about 2% of the 2006 total.</p> <p>WSDOT's annual traffic report for 2010 available at http://www.wsdot.wa.gov/masodata/travel/pdf/Annual_Traffic_Report_2010.pdf accessed November 14, 2011, turned up the following numbers for the traffic counters at Washougal and Maryhill:</p> <table border="1"> <thead> <tr> <th colspan="4">Average daily traffic volume</th> </tr> <tr> <th>Site</th> <th>2006</th> <th>2008</th> <th>2010</th> </tr> </thead> <tbody> <tr> <td>Washougal</td> <td>6200*</td> <td>6100*</td> <td>5700</td> </tr> <tr> <td>Maryhill</td> <td>2000*</td> <td>2100*</td> <td>4100*</td> </tr> </tbody> </table> <p>Asterisks indicate actual counts; other values are estimated through some arcane process understood only by the traffic data analysts at WSDOT.</p> <p>Similar to the numbers from the Oregon side of the Columbia River, these data do not show much change from 2006 to 2010. Traffic data analysts cannot offer any kind of explanation for the spike at Maryhill in 2008. The range of variability at Washougal between 2006 and 2010 was 500 vehicles per day, which is about 8% of the 2006 total. The 2010 average (6000) was about 3.2% less than the 2006 total. If one ignores the aberrant spike in 2008, the range of variability at Maryhill during the same period was 100 vehicles per day, or 2% of the 2006 total. The 2010 total was no different. If one includes the 2008 value, the range of variability bumps up to about 100%.</p>	Average daily traffic volume				Site	2006	2008	2010	Washougal	6200*	6100*	5700	Maryhill	2000*	2100*	4100*	Change – but no substantial change in traffic volumes between 2006 and 2010.	Falls within the scope of impacts assessed in the 2008 analysis. New data does not represent significant new circumstances or information per CEQ's regulations or information per 40 C.F.R. 1502.09(c)(1)(ii).	In 2015, the average daily traffic volume at Washougal and Maryhill was 6,704 and 2,312, vehicles, respectively (WSDOT 2015).
Average daily traffic volume																						
Site	2006	2008	2010																			
Washougal	6200*	6100*	5700																			
Maryhill	2000*	2100*	4100*																			
3.16 Public Services:																						
Law Enforcement: The Corps has access to multiple law enforcement services in both Oregon and Washington.	No new information.	Nov-14-2011 Nov-23-2015 Jan-25-2016		No Change		No Change																
In Oregon, the Oregon State Police enforce game and fish regulations, and the Corps contracts with them for law enforcement of the fishing areas (primarily) and other public areas.	No new information.	Nov-14-2001 Nov-23-2015 Jan-25-2016		No Change		No Change																
In Washington, the Corps' primary law enforcement contract is with the	No new information.	Nov-14-2011 Nov-23-2015		No Change		No Change																

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<p>Skamania County Sheriff's office located in Stevenson, Washington. The WDFW enforces fish and game regulations and officers regularly review in the Washington Shore area.</p> <p>Fire: The Bonneville Project, which is in the action area, is served by three fire departments in neighboring towns -- North Bonneville (Washington, downstream) is the closest and has a small volunteer fire crew. Cascade Locks (Oregon, upstream) also has a volunteer fire crew. Stevenson (Washington, upstream) has the largest fire crew with professional firefighting capacity. The Corps maintain a fire truck on site for immediate response at the Bonneville Project.</p>	No new information.	<p>Jan-25-2016</p> <p>Nov-14-2011 Nov-23-2015 Jan-25-2016</p>		No Change		No Change
<p>3.17 Safety and Human Health</p> <p>The Bonneville Project is a secure and gated facility, open to the public 362 days a year.</p> <p>The Corps has an established Bonneville Safety Program, revised in 2006, which outlines the general structure of the safety and occupation health program that supports the provision of safe and healthful workplaces, procedures and equipment applicable to project staff, official visitors, contractors, and members of the public engaged in recreational activities at the Bonneville Project</p>	<p>No new information.</p> <p>Mentler, Rick (pers.com). 2011. USACE Safety Coordinator (1-541-374-4571). December 5, 2011.</p>	<p>Nov-14-2011 Nov-23-2015 Jan-25-2016</p> <p>Dec-5-2011 Nov-23-2015 Jan-25-2016</p>		No Change		<p>No Change</p> <p>Source: Ediger, James (pers. comm. with R. Anderson). USACE Occupational and Safety and Health Act Coordinator (1-541-374-7978), June 9, 2016.</p>

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