UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
PORTLAND, OR 97232-1274

Refer to NMFS No:
WCRO-2019-03514

May 18, 2020

Sean E. Callahan
Federal Aviation Administration
Northwest Mountain Region, Seattle Airports District Office
2200 S. 216th Street
Des Moines, Washington 98198

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Medford Airport Capital Improvement Plan Projects, Whetstone Creek – Rogue River and Larson Creek – Bear Creek (6th field HUC Nos.: 171003080202 and 171003080110), Jackson County, Medford, Oregon

Dear Mr. Callahan:

Thank you for your letter of November 19, 2019, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Federal Aviation Administration's (FAA) proposed funding of five proposed improvement projects at the Rogue Valley International-Medford Airport. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402, 84 FR 45016). The enclosed document contains a biological opinion (opinion) prepared by NMFS pursuant to section 7(a)(2) of the ESA. In this opinion, NMFS concluded that the proposed action is not likely to jeopardize the continued existence of Southern Oregon/Northern California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*) or result in the destruction or adverse modification of their designated critical habitat.

Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA)(16 U.S.C. 1855(b)) for this action. This document also includes the results of our analysis of the action's likely effects on EFH.

As required by section 7 of the ESA, NMFS is providing an incidental take statement with the opinion. The incidental take statement describes reasonable and prudent measures NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements, that the FAA must comply with to carry out the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA's prohibition against the take of listed species.

We have also included two conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. Section 305(b) (4) (B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving this recommendation. If the response is inconsistent with the EFH conservation recommendations, the FAA must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH response and how many are adopted by the action agency. Therefore, we request that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

Please contact Michelle McMullin in the Oregon Coast Branch of the Oregon Washington Coastal Area Office, at 541-957-3378 or Michelle.McMullin@noaa.gov, if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Kim W. Kratz, Ph.D
Assistant Regional Administrator
Oregon Washington Coastal Office

bcc: OWC-PDF
OWC/Roseburg – PDF and Word (M. McMullin)
OWC/Roseburg – (T. O'Rourke)

NMFS No.: WCRO-2019-03514

PDFs sent to: Sean.Callahan@faa.gov

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the

Medford Airport Capital Improvement Plan Projects
Whetstone Creek – Rogue River and Larson Creek – Bear Creek
6th field HUC Nos.: 171003080202 and 171003080110
Jackson County, Medford, Oregon

NMFS Consultation Number: WCRO-2019-03514

Action Agency: Federal Aviation Administration

Affected Species and NMFS' Determinations:

ESA-Listed Species	**Status**	**Is Action Likely to Adversely Affect Species?**	**Is Action Likely To Jeopardize the Species?**	**Is Action Likely to Adversely Affect Critical Habitat?**	**Is Action Likely To Destroy or Adversely Modify Critical Habitat?**
Southern Oregon/Northern California Coast coho salmon (*Oncorhynchus kisutch*)	Threatened	Yes	No	Yes	No

Fishery Management Plan That Identifies EFH in the Project Area	**Does Action Have an Adverse Effect on EFH?**	**Are EFH Conservation Recommendations Provided?**
Pacific Coast Salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By:

Kim W. Kratz, Ph.D
Assistant Regional Administrator
Oregon Washington Coastal Office

Date: May 18, 2020

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1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3, below.

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR 402, as amended.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within two weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at Oregon Washington Coastal Area Office.

1.2 Consultation History

Technical assistance/pre-consultation activities began on May 29, 2019, when NMFS participated in a site visit along with the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, the U.S. Department of Agriculture, the Federal Aviation Administration (FAA), the City of Medford, the Oregon Department of State Lands, the Airport Director, and consultants and engineers for the proposed action. NMFS attended an additional meeting on July 19, 2019, to discuss the proposed design of the stormwater treatment and detention facilities.

On November 22, 2019, the FAA provided a biological assessment with appendices and requested formal consultation for funding of capital improvement projects at the Rogue Valley International – Medford Airport, implemented by the Jackson County Airport Authority. The FAA identified that the proposed action may affect, likely to adversely affect Southern Oregon/Northern California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*) and its designated critical habitat. The FAA also determined the proposed action would adversely affect EFH for Pacific Coast Salmon.

On December 23, 2019, NMFS sent the FAA a letter regarding completeness of the initiation package with a request for additional information because NMFS had questions regarding the proposed stormwater treatment and management design. The FAA provided a response on January 28, 2020. On February 6, 2020, NMFS notified the FAA that sufficient information was received. Consultation was initiated January 28, 2020.

This opinion is based on information provided in the FAA's consultation request packet and in additional information provided on January 28, 2020.

1.3 Proposed Federal Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). The EFH definition of a Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910).

The FAA proposes to fund the implementation of several improvements to the Rogue Valley International – Medford Airport (Airport) by the Jackson County Airport Authority (JCAA) over 5 years. The improvements are intended to meet FAA safety regulations and to more efficiently accommodate current and anticipated aircraft requirements. Improvements will increase the amount of impervious surfaces in 3 drainage basins at the Airport. Construction of stormwater treatment and flow management facilities are part of the proposed action.

In Basin 1, the JCAA will increase the amount of impervious surfaces by approximately 16 square feet to relocate an existing wind cone. JCAA is also relocating the existing automated surface observation system but the footprint of these two facilities and the access road will be constructed with porous pavement. Runoff from new impervious surfaces will flow onto adjacent vegetated ground for infiltration. The proposed action does not include any changes to treatment or management of runoff from existing impervious surfaces in Basin 1 (approximately 27.6 acres).

In Basin 2, the JCAA will increase the amount of impervious surfaces in sub-basin #17 by approximately 0.05 acre to relocate the existing electrical equipment building (EEB). This will allow JCAA to consolidate all airfield lighting equipment and provide capacity for future regulators and circuits. Runoff from approximately 0.03 acres of the new impervious surfaces will discharge to a vegetated filter strip for treatment and infiltration and any runoff not infiltrated will be collected in an existing catch basin in the downhill side of the filter strip. JCAA will direct runoff from the remainder of the new impervious surfaces to an existing detention pond which discharges into existing vegetated swales. Other than the filter strip, the proposed action does not include any changes to treatment or management of runoff from existing impervious surfaces in Basin 2 (approximately 41.2 acres) which include areas outside of the EEB sub-basin.

In Basin 4, the JCAA will expand the general aviation apron and add or reconstruct approximately 15.9 acres of impervious surfaces (Table 1). The purpose of the expansion is to alleviate aircraft parking congestion and accommodate future expansion. New impervious surfaces will consist of pavement for roads, parking lots, aprons, taxiways, and taxi lanes, and for new hangar buildings with tin or sheet metal roofs. JCAA will also construct a new stormwater detention facility, three new biofiltration swales, and a small vegetated swale in Basin 4. These facilities will treat and manage runoff from almost all existing impervious surfaces and from the proposed new or reconstructed impervious surfaces (approximately 15.9 acres); approximately 1.2 acres out of 138.4 acres of existing impervious acres will not be fully treated with the proposed design for Basin 4. The proposed detention facility for Basin 4 will also be sized to manage runoff from approximately 18.6 acres of future planned impervious surfaces (i.e., beyond the proposed 5-year improvements)[1] in addition to runoff from all new and existing surfaces.

Table 1. Existing and post-action impervious surfaces in Basin 4 (FAA 2019). *Future means beyond the proposed 5-year capital improvements; these acres are also included for the proposed detention of runoff.

Sub-basin	Existing Impervious Surfaces (acres)	Existing Pervious Surfaces (acres)	Total (acres)	Proposed Impervious (acres)	Future* Proposed Impervious (acres)
A	11.33	11.52	22.84	0	0
B	3.46	0.58	4.04	0	0
C	2.96	0	2.96	0	0
D	5.00	6.30	11.29	0	0
E	6.12	2.37	8.49	0	0
F	17.63	2.27	19.90	0	0
G	3.29	3.74	7.03	0.50	
H	4.38	3.60	7.98	0	0
I	2.21	8.12	10.33	7.19	0
J	18.72	11.60	30.32	7.01	0
K	4.26	3.11	7.37	0	0
L	2.21	8.12	10.33	0	0
M	1.59	1.40	3.00	0	0
N	5.34	5.82	11.16	0	0
O	2.97	2.61	5.59	0	0
P	13.87	2.74	16.60	0	0
Q	8.73	36.69	45.12	0	0
R	9.25	9.91	19.16	0	0
S	13.25	17.29	30.53	0	4.44
T	1.16	20.23	21.39	0	13.00
U	0.82	1.93	2.74	0	0.34
V	0.13	8.66	8.79	0	0
W	0.24	20.46	20.70	1.23	0.80
Total	**138.43**	**181.12**	**319.55**	**15.93**	**18.58**

Construction of the stormwater detention facility will include a small amount of in-stream work below the ordinary high water elevation in a remnant channel to Upton Creek for the outlet structure. A flow control/diversion structure will also be constructed where an existing stormwater drainage ditch discharges to the remnant channel upstream of the proposed detention facility. Construction of the stormwater detention facility would disturb approximately 0.35 acres of wetland. JCAA will also add approximately 500 square feet of artificial in-channel structure to the remnant channel.

[1] Future (i.e., beyond the proposed 5-year improvements) development is planned for sub-basin T and the JCAA will account for treatment of the entire sub-basin during future development.

JCAA's general proposal for stormwater treatment and management in Basin 4 is to use natural dispersion and then intercept the flows in the ditch parallel to Taxiway A, treat for the water quality design storm, and detain excess stormwater volume to release at controlled rates. However, water that is treated in the swales (i.e., 50% of the 2-year, 24-hour storm, also known as the water quality design storm) will bypass the detention facility and exit the Airport into Upton Creek. FAA requires stormwater detention ponds to fully drain within 48 hours of a design storm due to wildlife concerns and safety factors (FAA 2019). Detaining runoff from the water quality design storm in the detention facility would result in water remaining in the pond for more than 90 hours after the storm, which does not meet FAA safety requirements. Maintenance of the stormwater facilities will be performed by JCAA's Maintenance and Operations staff on a seasonal basis.

Natural dispersion is a method of pollution treatment flow reduction for areas adjacent to pavement. It is described in the Washington Department of Transportation Aviation Stormwater Design Manual (WSDOT 2008) and is recognized by FAA as an appropriate design standard. Paved runways and taxiways are surrounded by FAA-mandated safety areas. These are existing grassy and gradually sloped areas. Although they were not designed as filter strips, portions of runoff from impervious surfaces is dispersed or treated by sheet flow though these safety areas. Natural dispersion is the initial treatment proposed for runoff in sub-basins A-S, and in sub-basins U and V. Any flow remaining after natural dispersion in these sub-basins will be conveyed to the proposed biofiltration swales (sub-basins A-P and S) or the smaller vegetative swale (sub-basins Q, R, and U). Runoff in sub-basin V will be treated completely by natural dispersion. No new impervious surfaces are proposed in sub-basin T for the proposed capital improvements; new impervious surfaces are only planned for future development and the future development will include design of water quality treatment for the entire sub-basin. Runoff in sub-basin W will discharge directly into the detention facility without prior treatment, but the swales are designed to accept a larger amount of runoff (Table 2).

Table 2. Natural dispersion reduction calculations provided by FAA (2019) for Basin 4 and a summary of additional treatment trains. *offset by extra treatment capacity in the swales. **only future impervious surfaces proposed; no new impervious surfaces proposed for the capital improvement projects.

	Treatment via Natural Dispersion			Additional Treatment Trains and Capacities (cfs), or other Destination		
Sub-basins	Initial Flow (cfs)	Dispersion Reduction	Remaining Flow (cfs)	Biofiltration Swales	Smaller Vegetative Swale	Detention Facility
A-P, S	13.56	7%	12.58	12.81	N/A	Bypassed
Q, R, U	1.17	25%	0.88	N/A	0.91	Bypassed
V	0.08	100%	0	N/A	N/A	N/A
W	0.23	0%	0.23*	N/A	N/A	Yes
T	2.48	0%	**	N/A	N/A	Yes
Total			13.69	13.72		

The proposed biofiltration swales in Basin 4 will be divided into 3 cells of equivalent size and design with a manifold to divide and convey equal flow to each cell. Runoff will enter the swales at a controlled flow rate. Each cell will be 115 feet long and 50 feet wide with a 0.5% slope to provide a capacity of 4.27 cubic feet per second (cfs). Residence time in each cell will be 9 minutes. JCAA will construct each of the biofiltration swales with 18 inches of amended soil and vegetate them with a low-mow grass mixture and plantings recommended by Washington's aviation stormwater design manual (WSDOT 2008). Runoff will sheet flow through dense vegetation in the swale and filtrate vertically through the amended soils into a pipe network before being discharged into an existing drainage channel, bypassed around the proposed detention facility, and will exit the Airport into Upton Creek. These swales will treat runoff from sub-basins A-P and S (Table 2). Flows for storms greater than the water quality design storm will bypass the biofiltration swales and will go directly to the stormwater detention facility.

A smaller vegetative swale is also proposed to treat runoff from sub-basins Q, R, and U. This swale will be 105 feet long and 13 feet wide with a 0.5% slope. Residence time will also be 9 minutes with a capacity of 0.91 cfs. JCAA will also construct this swale with 18 inches of amended soil and vegetate them with a low-mow grass mixture and plantings recommended by Washington's aviation stormwater design manual (WSDOT 2008). Treated water will be discharged into an existing drainage channel, bypassed around the proposed detention facility, and will exit the Airport into Upton Creek

The proposed detention facility in Basin 4 is a pond with a combination of orifice and weir structures to control the release of water. A small portion of a wetland will be filled by the berm on the north side of the proposed detention facility. At full capacity, total storage will be approximately 775,000 cubic feet. Water released from the detention facility will be conveyed through the remnant channel to Upton Creek approximately 850 feet downstream. Flows released from the detention facility (i.e., post-construction flows) will be less than pre-development flows[2] for all storm events greater than the water quality design flow (up to the 10-year storm event) (Table 3). As noted above, the water quality design flow will be bypassed around the detention facility and will not be detained due to FAA safety requirements. However, the post-construction flow rate for this event represents an approximate 0.72 cfs decrease in discharge relative to existing conditions. All post-construction flows released from the detention facility will be less than existing flows (Table 3).

Table 3. Summary of Basin 4 discharge flows.

24-hour Storm	Pre-Development Flow (cfs)	Post-Construction Flow (cfs)	Existing Conditions (cfs)
50% of the 2-year	2.93	15.20	15.92
2-year	20.96	20.95	70.70
5-year	25.46	25.23	79.79
10-year	40.96	40.95	107.16

[2] NMFS defines "pre-development" site conditions for stormwater as the natural, undeveloped conditions of the project site prior to European settlement.

The following conservation measures are taken directly from FAA's biological assessment (FAA 2019).

- Work areas would be confined to the minimum area needed to complete the work.
- All disturbed areas would be restored by seeding with a native seed mix to stabilize exposed soils.
- Haul routes would use the existing road system to the extent feasible.
- Erosion and sediment control measures may include sediment fencing, inlet protection, use of designated construction entrances, and/or other measures to minimize erosion of site soils and sediment transport to downstream receiving waters.
- A pollution control plan will be developed and implemented to ensure appropriate storage, handling, and use of petroleum product and other potential pollutants on-site during construction.
- Construction vehicles and equipment would be stored, fueled, and maintained on designated areas on-site or on nearby paved areas adjacent to the site.
- Industrial stormwater discharges on Airport property will continue to be managed under the Airport's stormwater pollution control plan and the National Pollutant Discharge Elimination System (NPDES) 1200-Z permit.

We considered whether or not the proposed action would cause any other activities and determined that it would not. Airport operations and existing impervious surfaces in basins 3, 5, and 6 would continue and be present regardless of the proposed action.

FAA is the lead Federal action agency. JCAA will also need to acquire a permit from the Army Corps of Engineers (Corps; FAA 2019). However, NMFS has not received a request for consultation from the Corps for the proposed action.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provide an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "jeopardize the continued existence of" a listed species, which is "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02).

The designation of critical habitat for SONCC coho salmon uses the term essential features. The 2016 critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified essential features. In this biological opinion, we use the term PBF to mean essential feature, as appropriate for the specific critical habitat.

The 2019 regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the regulations (84 FR 44977), that definition does not change the scope of our analysis and in this opinion we use the terms "effects" and "consequences" interchangeably.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their habitat using an exposure-response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species, or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the function of the essential PBFs that help to form that conservation value.

One factor affecting the status of ESA-listed species considered in this opinion, and aquatic habitat at large, is climate change. Climate change is likely to play an increasingly important role in determining the abundance and distribution of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes will not be spatially homogeneous across the Pacific Northwest. The largest hydrologic responses are expected to occur in basins with significant snow accumulation, where warming decreases snow pack, increases winter flows, and advances the timing of spring melt (Mote *et al*. 2014, Mote *et al.* 2016). Rain-dominated watersheds and those with significant contributions from groundwater may be less sensitive to predicted changes in climate (Tague *et al.* 2013, Mote *et al.* 2014).

During the last century, average regional air temperatures in the Pacific Northwest increased by 1-1.4°F as an annual average, and up to 2°F in some seasons (based on average linear increase per decade; Kunkel *et al.* 2013, Abatzoglou *et al.* 2014). Warming is likely to continue during the next century as average temperatures are projected to increase another 3-10°F, with the largest increases predicted to occur in the summer (Mote *et al.* 2014).

Decreases in summer precipitation of as much as 30% by the end of the century are consistently predicted across climate models (Mote *et al.* 2014). Precipitation is more likely to occur during October through March, less during summer months, and more winter precipitation will be rain than snow (ISAB 2007, Mote *et al*. 2013). Earlier snowmelt will cause lower stream flows in late spring, summer, and fall, and water temperatures will be warmer (ISAB 2007, Mote *et al.* 2013). Models consistently predict increases in the frequency of severe winter precipitation events (i.e., 20-year and 50-year events), in the western United States (Dominguez *et al.* 2012). The largest increases in winter flood frequency and magnitude are predicted in mixed rain-snow watersheds (Mote *et al.* 2014).

Overall, about one-third of the current cold-water salmonid habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (Mantua *et al.* 2009). Higher temperatures will reduce the quality of available salmonid habitat for most freshwater life stages (ISAB 2007). Reduced flows will make it more difficult for migrating fish to pass physical and thermal obstructions, limiting their access to available habitat (Mantua *et al.* 2010, Isaak *et al.* 2012). Temperature increases shift timing of key life cycle events for salmonids and species forming the base of their aquatic foodwebs (Winder and Schindler 2004, Crozier *et al.* 2011, Tillmann and Siemann 2011). Higher stream temperatures will also cause decreases in dissolved oxygen and may also cause earlier onset of stratification and reduced mixing between layers in lakes and reservoirs, which can also result in reduced oxygen (Meyer *et al*. 1999, Winder and Schindler 2004, Raymondi *et al.* 2013). Higher temperatures are likely to cause several species to become more susceptible to parasites, disease, and higher predation rates (Crozier *et al.* 2008, Raymondi *et al.* 2013, Wainwright and Weitkamp 2013).

As more basins become rain-dominated and prone to more severe winter storms, higher winter stream flows may increase the risk that winter or spring floods in sensitive watersheds will damage spawning redds and wash away incubating eggs (Goode *et al.* 2013). Earlier peak stream flows will also alter migration timing for salmon smolts, and may flush some young salmon and steelhead from rivers to estuaries before they are physically mature, increasing stress and reducing smolt survival (McMahon and Hartman 1989, Lawson *et al.* 2004).

In addition to changes in freshwater conditions, predicted changes for coastal waters in the Pacific Northwest as a result of climate change include increasing surface water temperature, increasing but highly variable acidity, and increasing storm frequency and magnitude (Mote *et al*. 2014). Elevated ocean temperatures already documented for the Pacific Northwest are highly likely to continue during the next century, with sea surface temperature projected to increase by 1.0-3.7ºC by the end of the century (IPCC 2014). Habitat loss, shifts in species' ranges and abundances, and altered marine food webs could have substantial consequences to anadromous, coastal, and marine species in the Pacific Northwest (Tillmann and Siemann 2011, Reeder *et al.* 2013).

Moreover, as atmospheric carbon emissions increase, increasing levels of carbon are absorbed by the oceans, changing the pH of the water. Acidification also impacts sensitive estuary habitats, where organic matter and nutrient inputs further reduce pH and produce conditions more corrosive than those in offshore waters (Feely *et al.* 2012, Sunda and Cai 2012).

Global sea levels are expected to continue rising throughout this century, reaching likely predicted increases of 10-32 inches by 2081-2100 (IPCC 2014). These changes will likely result in increased erosion and more frequent and severe coastal flooding, and shifts in the composition of nearshore habitats (Tillmann and Siemann 2011, Reeder *et al*. 2013). Estuarine-dependent salmonids such as chum and Chinook salmon are predicted to be impacted by significant reductions in rearing habitat in some Pacific Northwest coastal areas (Glick *et al.* 2007).

Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances, and therefore these species are predicted to fare poorly in warming ocean conditions (Scheuerell and Williams 2005, Zabel *et al.* 2006). This is supported by the recent observation that anomalously warm sea surface temperatures off the coast of Washington from 2013-2016 resulted in poor coho and Chinook salmon body condition for juveniles caught in those waters (NWFSC 2015). Changes to estuarine and coastal conditions, as well as the timing of seasonal shifts in these habitats, have the potential to impact a wide range of listed aquatic species (Tillmann and Siemann 2011, Reeder *et al*. 2013).

The adaptive ability of these threatened and endangered species is depressed due to reductions in population size, habitat quantity and diversity, and loss of behavioral and genetic variation. Without these natural sources of resilience, systematic changes in local and regional climatic conditions due to anthropogenic global climate change will likely reduce long-term viability and sustainability of populations in many of these evolutionarily significant units (NWFSC 2015). New stressors generated by climate change, or existing stressors with effects that have been amplified by climate change, may also have synergistic impacts on species and ecosystems

(Doney *et al.* 2012). These conditions will possibly intensify the climate change stressors inhibiting recovery of ESA-listed species in the future.

2.2.1 Status of the Critical Habitat

Designation-wide, critical habitat for SONCC coho salmon includes all areas accessible to any life-stage up to long-standing, natural barriers and adjacent riparian zones. SONCC coho salmon critical habitat within this geographic area has been degraded from historical conditions by ongoing land management activities. Habitat impairments recognized as factors leading to decline of the species that were included in the original listing notice for SONCC coho salmon include: 1) Channel morphology changes; 2) substrate changes; 3) loss of in-stream roughness; 4) loss of estuarine habitat; 5) loss of wetlands; 6) loss/degradation of riparian areas; 7) declines in water quality; 8) altered stream flows; 9) fish passage impediments; and 10) elimination of habitat (62 FR 24049).

This section describes the status of designated critical habitat affected by the proposed action by examining the condition and trends of the essential PBFs of that habitat throughout the designated areas. These PBFs are essential to the conservation of the ESA-listed species because they support one or more of the species' life stages (e.g., sites with conditions that support spawning, rearing, migration and foraging). The PBFs of freshwater spawning and rearing sites include suitable water quality, water quantity, space, and substrate conditions as well as habitat complexity and food (Table 4). These features are essential to conservation because without them the species cannot successfully spawn, produce offspring, or mature. The PBFs of migration corridors include the items identified above as well as suitable substrate, water velocity, water temperature, and free passage (no obstructions) for adults and juveniles; these features are essential to conservation because they allow adult fish to swim upstream to reach spawning areas and they allow smolts to proceed downstream and reach the ocean.

The Rogue River drains approximately 5,160 square miles within Curry, Jackson and Josephine counties in southwest Oregon. The mainstem is about 200 miles long and traverses the coastal mountain range into the Cascades. The specific critical habitat analyzed in this opinion is the designated critical habitat for SONCC coho salmon within the Bear Creek 5th field watershed (HUC No.: 1710030801), there are 6 watersheds that comprise the mainstem Rogue River between Upton Creek and the Lower Rogue River watershed, and the Lower Rogue River 5th field watershed (HUC No.: 1710031008) (Table 5). These eight specific critical habitat units are split into 3 descriptions: (1) Bear Creek watershed; (2) the 6 watersheds that comprise the mainstem Rogue River between Bear Creek and the Lower Rogue River watershed; and (3) the Lower Rogue River watershed.

Table 4. Physical and biological features of critical habitats designated for SONCC coho salmon and corresponding species life history events.

Physical and Biological Features		Species Life History Event
Site	Site Attribute	
Spawning and juvenile rearing areas	Cover/shelter Food (juvenile rearing) Riparian vegetation Space Spawning gravel Water quality Water quantity	Adult spawning Embryo incubation Alevin growth and development Fry emergence from gravel Fry/parr/smolt growth and development
Adult and juvenile migration corridors	Cover/shelter Food (juvenile) Riparian vegetation Safe passage Space Substrate Water quality Water quantity Water temperature Water velocity	Adult sexual maturation Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Areas for growth and development to adulthood	Ocean areas – not identified	Nearshore juvenile rearing Subadult rearing Adult growth and sexual maturation Adult spawning migration

Table 5. Description of the critical habitat units included in the biological opinion. Critical habitat units are designated at the 5th field watershed level but sub-watersheds are also included for Airport Basins 1, 2, and 4. SONCC coho salmon use, and populations are also included for each of the action area components.

Action area component	Critical habitat unit or sub-watershed	SONCC coho salmon use	Population(s) of SONCC coho salmon in the action area component	Designated critical habitat for SONCC coho salmon
Airport Basins 1,2,4	*Lone Pine Creek* - Larson Creek-Bear Creek 6th field HUC 171003080110	Juvenile over-winter refugia; potential for spawning, rearing, and migration	Upper Rogue River	Yes
	Upton Creek – Whetstone Creek Rogue River 6th field HUC 171003080202	Juvenile over-winter refugia; potential for spawning, rearing, and migration	Upper Rogue River	Yes
Extent of action area based on downstream dispersion effects from the Airport	*Mainstem Bear Creek at confluence with Lone Pine Creek and downstream* - Bear Creek 5th field HUC 1710030801	Adult spawning; juvenile rearing; adult and juvenile migration	Upper Rogue River	Yes
	*Mainstem Rogue River at confluence with Upton Creek and downstream to the Lower Rogue River**	Juvenile rearing; adult and juvenile migration	Upper Rogue River; Middle Rogue and Applegate Rivers†	Yes
	Mainstem Lower Rogue River - Lower Rogue River 5th field HUC 1710031008	Juvenile rearing; adult and juvenile migration; physiological transition between marine and freshwater environments	Upper Rogue River; Middle Rogue and Applegate Rivers; Illinois River; Lower Rogue River	Yes

*Includes the following 5th field watersheds (6 total): Gold Hill – Rogue River 5th field HUC 1710030802, Grants Pass – Rogue River 5th field HUC 1710030804, Hellgate Canyon – Rogue River 5th field HUC 1710031001, Horseshoe Bend – Rogue River 5th field HUC 1710031004, Stair Creek – Rogue River 5th field HUC 1710031005, and Shasta Costa Creek – Rogue River 5th field HUC 1710031006

†Presence of individuals within the Middle Rogue and Applegate Rivers population would first occur in the Grants Pass – Rogue River 5th field HUC and continue to occur downstream to the Pacific Ocean.

Bear Creek Watershed

SONCC coho salmon use the Bear Creek 5th field watershed for spawning, migration, and juvenile rearing. There are approximately 290 miles of natural streams in the Bear Creek watershed and greater than 250 miles of irrigation canals (main canals only; ODEQ 2007a). The Rogue Basin Coordinating Council (2006) considers water temperature, water chemistry, sediment, water quantity, wood, stream complexity, and channel modification to need a significant amount of restoration activities to improve watershed conditions in the mainstem Bear Creek. These impacts have occurred from agriculture, forestry, grazing, irrigation impoundments and withdrawals, residential development, road building, and urbanization. Bear Creek has approved total maximum daily loads for dissolved oxygen and pH (ODEQ 2007b) and water temperature (ODEQ 2007a). The following PBFs in the Bear Creek watershed are likely degraded and are likely limiting the conservation role of this critical habitat unit: (1) Riparian vegetation; (2) substrate/spawning gravel; (3) water quality; (4) water quantity; (5) water temperature; and (6) cover/shelter.

The Southwest Oregon salmon restoration initiative, as part of the Coastal Salmon Recovery Initiative, described "coho salmon core" areas and "high value" areas (RVCOG 1997). Core areas contain high quality habitat capable of sustaining coho salmon spawning and rearing year around. High value areas are stream sections that appear suitable for coho salmon spawning and rearing, whether or not fish are present. Approximately 47% of the Upper Rogue River (URR) population's high value coho salmon areas are located in the Bear Creek watershed. The Bear Creek high value habitat comprises approximately 26% of all the high value areas identified in the Rogue River basin. This information leads us to conclude that although the critical habitat within the Bear Creek watershed is degraded, it also has high conservation value and the area is an important spawning and rearing habitat and a critical migration corridor.

Mainstem Rogue River watersheds
The proposed action will also affect 6 units of critical habitat along the mainstem Rogue River between Bear Creek watershed and the Lower Rogue River watershed (Table 5). Adult and juvenile SONCC coho salmon use the mainstem Rogue River as a migration corridor and juveniles also use it for rearing. The Rogue Basin Coordinating Council (2006) considers water temperature, wood, stream complexity, barriers, and channel modification to need a significant amount of restoration activities to improve watershed conditions in the mainstem Rogue River from Curry County to Evans Creek. Between locations of the now defunct Gold Ray Dam and Lost Creek Dam, the Rogue Basin Coordinating Council (2006) state that sediment, wood, and gravel are the lowest ranking factors and that these need moderate to significant levels of restoration activities for improvement. Therefore, the following PBFs are likely degraded in these watersheds: (1) Cover/shelter; (2) water quality; (3) riparian vegetation; (4) substrate/spawning gravel; (5) water temperature; and (6) safe passage.

Lower Rogue River watershed
SONCC coho salmon use the Lower Rogue River for adult and juvenile migration, juvenile rearing, and physiological transition between marine and freshwater environments. The PBFs are the same as those listed above for the mainstem Rogue River watersheds. The Rogue Basin Coordinating Council (2006) considers water temperature, wood, and stream complexity to need a significant amount of restoration activities to improve watershed conditions in the Lower Rogue River watershed and they also listed channel modification as the lowest ranking factor for the estuary. Therefore, the following PBFs are likely degraded in the Lower Rogue River watershed: (1) Cover/shelter; (2) water quality; (3) riparian vegetation; and (4) water temperature.

2.2.2 Status of the Species

Table 6, below, provides a summary of listing and recovery plan information, status summaries, and limiting factors for SONCC coho salmon. More information can be found in the recovery plan and status review for SONCC coho salmon (NMFS 2014a, NMFS 2016). These documents are available at the NMFS West Coast Region website.

Table 6. Summarized listing, recovery plan, status review, and limiting factor information for SONCC coho salmon evolutionarily significant unit (ESU).

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Southern Oregon/ Northern California Coast coho salmon	Threatened 6/28/05	NMFS 2014a	NMFS 2016	This ESU comprises 31 independent, 9 dependent, and 5 ephemeral populations all grouped into 7 diversity strata. Of the 31 independent populations, 24 are at high risk of extinction and 6 are at moderate risk of extinction. The extinction risk of an ESU depends upon the extinction risk of its constituent independent populations; because the population abundance of most independent populations are below their depensation threshold, the SONCC coho salmon ESU is at high risk of extinction and is not viable. Although recent changes in trend/viability of the ESU are considered to be mixed, there has not been a recent change in extinction risk (NMFS 2016).	• Lack of floodplain and channel structure • Impaired water quality • Altered hydrologic function • Impaired estuary/mainstem function • Degraded riparian forest conditions • Altered sediment supply • Increased disease/predation/competition • Barriers to migration • Fishery-related effects • Hatchery-related effects

Rogue River Populations
Williams *et al.* (2006) delineated 4 populations in the Rogue River Basin: (1) Upper Rogue River; (2) Middle and Applegate Rivers; (3) Illinois River; and (4) Lower Rogue River (Table 7). SONCC coho salmon in all four populations use portions of the action area for juvenile rearing; adult and juvenile migration; and physiological transition between marine and freshwater environments (Table 5). Individuals of the Upper Rogue River population also use portions of the action area for adult spawning, juvenile rearing, and juvenile overwinter refugia. The greatest factor limiting recovery of SONCC coho salmon Rogue River populations is the lack of suitable rearing habitat for juveniles (NMFS 2014a).

Table 7. Viability information for the Rogue River populations of SONCC coho salmon (NMFS 2014a).

Population	Extinction Risk	Spawner Level	IP-km[3]	Key Limiting Stresses	Key Limiting Threats
Upper Rogue	Moderate	Likely above depensation threshold	689	• Altered Hydrologic Function • Impaired Water Quality	• Agricultural Practices • Urban/Residential/ Industrial Development
Middle Rogue/Applegate	High	Likely above depensation threshold	603	• Lack of Floodplain and Channel Structure • Altered Hydrologic Function	• Dams/Diversions • Urban/Residential/ Industrial Development
Illinois	High	Likely above depensation threshold	590	• Altered Hydrologic Function • Degraded Riparian Forest Conditions	• Roads • Dams/Diversions
Lower Rogue	High	Likely below depensation threshold	81	• Lack of Floodplain and Channel Structure • Impaired Water Quality	• Roads • Urban/Residential/ Industrial Development

Upper Rogue River Population. The URR population includes individuals in Evans Creek and upstream. Productivity, abundance, and limiting factor information for the population are displayed in Table 7. The URR population is designated as a core, functionally independent population within the Interior Rogue stratum (NMFS 2014a). Most high density rearing occurs in the upper watersheds, often immediately below public land that supplies cool water. There are 11 5th field watersheds within the geographic boundaries of the URR population.

Middle Rogue and Applegate Rivers population. The Middle Rogue and Applegate Rivers (MRAR) population includes individuals from the confluence of Evans Creek downstream to the confluence of the Illinois River. Productivity, abundance, and limiting factor information for the population are displayed in Table 7. The MRAR population is designated as a non-core 1, functionally independent population within the Interior Rogue stratum (NMFS 2014a). MRAR

[3] Intrinsic potential (IP) is a measure of habitat size and a proxy of abundance within the population (Williams *et al.* 2008). Intrinsic potential per kilometer is the intrinsic potential of a stream and is a modeled index of a potential habitat suitability based on the underlying geomorphology and hydrology of the watershed for rearing juvenile SONCC coho salmon. The output of this model is in terms of IP per kilometer and written as IP-km.

reaches currently used by SONCC coho salmon represent only a fraction of the high intrinsic potential habitat.

Illinois River population. The Illinois River population includes individuals in the Illinois River and tributaries. Productivity, abundance, and limiting factor information for the population are displayed in Table 7. The Illinois River population is designated as a core, functionally independent population within the Interior Rogue stratum (NMFS 2014a).

Lower Rogue River population. The Lower Rogue River (LRR) population includes individuals from the Pacific Ocean upstream to the confluence of the Illinois River. Productivity, abundance, and limiting factor information for the population are displayed in Table 7. The LRR population is designated as a non-core. Potentially independent population within the Northern Coastal stratum (NMFS 2014a).

2.3 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

The Rogue Valley International-Medford Airport is located at 1000 Terminal Loop Parkway in Medford, Oregon. The centroid of the Airport is approximated at 42.376375 North, -122.874477 West and the property is 900 acres. The action area for the Airport Capital Improvement Plan Projects is defined as Basins 1, 2, and 4 of the Airport (approximately 757 total acres), plus areas downstream of the Airport where stormwater runoff from the impervious areas will discharge to the Pacific Ocean. This includes Upton Creek, Lone Pine Creek, the mainstem of Bear Creek from the confluence of Lone Pine Creek to the Rogue River, and the mainstem of the Rogue River from the Upton Creek confluence to the Pacific Ocean (Figure 1; Table 5). This is because stormwater runoff from Basins 1 and 4 will discharge into Upton Creek and stormwater runoff from Basin 2 will discharge into Lone Pine Creek. That discharge will then continue downstream in both streams until it reaches the Pacific Ocean. The extent of the action area was determined based on the extent of effects from the dispersion of contaminants associated with stormwater discharge.

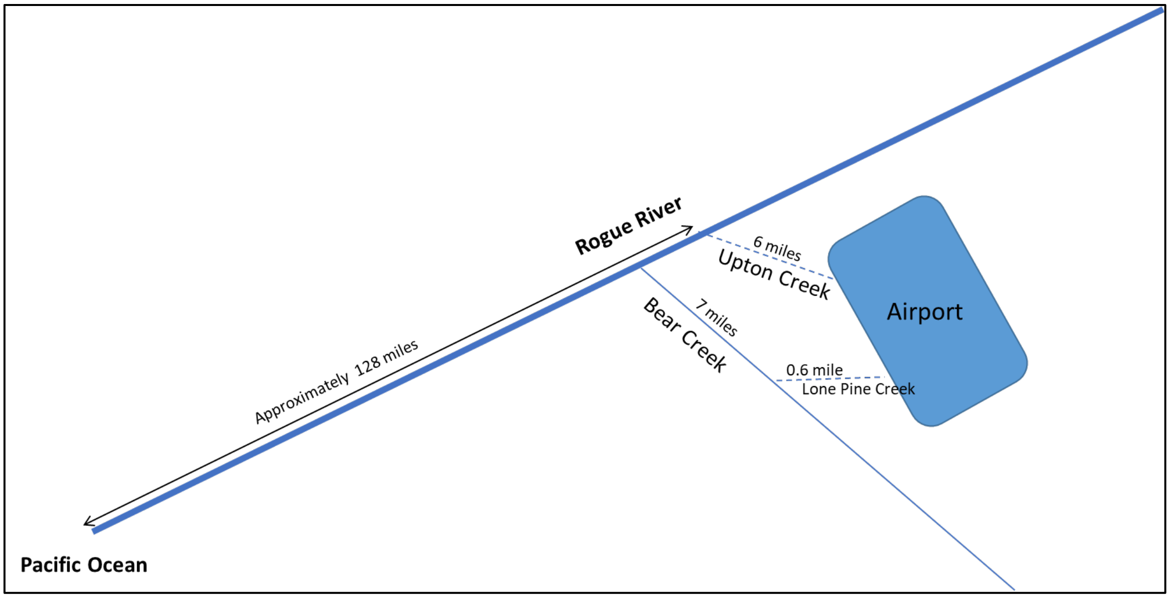

Figure 1. Line sketch of the linear stream distances in the action area. Not geographically or spatially accurate.

Both Bear Creek and Upton Creek are tributaries to the Rogue River. Bear Creek enters the Rogue River at approximately River Mile (RM) 126.8 and Upton Creek enters the Rogue River within 1 mile upstream of Bear Creek. Therefore, the entire extent of the Rogue River in the action area to the Pacific Ocean is approximately 128 miles (Figure 1). Bear Creek is a 34 mile tributary to the Rogue River, but just the lower 7 miles are part of the action area. There are approximately 6 miles of Upton Creek between where stormwater is discharged from the Airport and the Rogue River. There is approximately 0.6 miles of Lone Pine Creek between where stormwater is discharged from the Airport and Bear Creek.

2.4 Environmental Baseline

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

SONCC coho salmon use of the action area varies by location and life history (Table 5). From head of tide (at approximate RM 5) to the Pacific Ocean, SONCC coho salmon use the mainstem Rogue River for physiological transition between marine and freshwater environments. In the mainstem Rogue River, adult SONCC coho salmon migrate from the ocean to freshwater spawning grounds from mid-August through January (ODFW 2003a and b). In Bear Creek, adult spawning occurs from November through January (ODFW 2003c). Juvenile SONCC coho salmon in the mainstem Rogue River migrate to the ocean from April through July (ODFW 2003a and b, Pellissier 2007). Downstream juvenile migration from Bear Creek, Lone Pine Creek, and Upton Creek into the Rogue River and to the Pacific Ocean begins in mid-February. Juvenile rearing in the mainstem and in tributaries in the action area occurs year-round.

Key limiting stresses for the Rogue River populations were listed in Section 2.2.2 above. They included altered hydrologic function, degraded riparian forest conditions, impaired water quality, and lack of floodplain and channel structure. The greatest factor limiting recovery of SONCC coho salmon in the Rogue River populations is the lack of suitable rearing habitat for juveniles. All of these population-level limiting factors apply to the Upton Creek portion of the action area, the Bear Creek portion of the action area, including Lone Pine Creek, and the mainstem Rogue River. Furthermore, the discussion in Section 2.2.1 describing the reduced condition of PBFs due to past and present impacts of human activities also applies to the environmental baseline in the action area. Climate change effects in the action area are as described for the aquatic environment in Section 2.2.1 above.

Airport

The Rogue Valley International – Medford Airport, a 900-acre commercial service airport, is the third largest in Oregon. Upton Creek (in Basins 1 and 4) flows in a northerly direction through the eastern and northern portions and discharges to the Rogue River approximately 6 miles northwest of the Airport. Upton Creek has been channelized through the Airport and much of the creek on Airport property was rerouted into a new channel in 2000 as part of a runway expansion project. Most of the former channel was filled, but a segment of the former channel remains on the northwest portion of the Airport in Basin 4 and conveys intermittent storm/surface water flows northerly to the main Upton Creek channel north of the Airport. Lone Pine Creek (in Basin 2) transects the southern portion of the Airport, as a concrete-lined channel, and discharges into Bear Creek, approximately 0.6 mile west of the Airport (Figure 1). Multiple riparian planting projects completed over the last five years have begun to reestablish vegetation along the creek on the westernmost portion of the Airport and off-site to the west (FAA 2019). There are approximately 27.6 acres of existing impervious surfaces in Basin 1, approximately 41.2 acres in Basin 2, and approximately 138.4 acres in Basin 4.

Runoff from these existing impervious surfaces in Basin 1 and 4 do not currently receive an adequate level of treatment for pollutants and do not receive discharge rate control (FAA 2019). Areas adjacent to paved runways and taxiways are surrounded by FAA-mandated safety areas. These are existing grassy and gradually sloped areas. Although they were not designed as filter strips, portions of runoff from impervious surfaces is dispersed or treated by sheet flow though these safety areas. It is highly likely that stormwater runoff from the existing impervious surfaces in Basin 1 and 4 are contributing to water quality impairments and hydrological changes in Upton Creek and downstream. However, stormwater discharges on Airport property are managed under the Airport's NPDES 1200-Z permit with the Oregon Department of Environmental Quality and JCAA uses a number of best management practices to minimize pollutants entering stormwater (FAA 2019). These include the use of catch basins, implementing a spill prevention plan, directing maintenance floor drains to the sanitary sewer system, and performing regular stormwater system maintenance (FAA 2019).

In Basin 2 sub-basin #17 (i.e., the EEB sub-basin), an existing detention pond releases stormwater at controlled rates into vegetated swales with a residence time greater than 17 minutes prior to discharge into Lone Pine Creek. Discharge rates from the existing pond maintains pre-development flow rates for events ranging from the 2-year, 24-hour storm through the 10-year, 24-storm. The discharge flow from the existing pond for the water quality design storm (i.e., 50% of the 2-year, 24-hour event) is 0.67 cfs and is greater than the pre-development flow. The detention pond discharges into vegetated swales before entering Lone Pine Creek. Because no additional information was provided regarding the remainder of Basin 2, NMFS also assumes that the other existing impervious surfaces in Basin 2 do not currently receive an adequate level of treatment for pollutants and do not receive discharge rate control, similar to Basin 1 and 4. Therefore, it is also highly likely that stormwater runoff from the existing impervious surfaces in Basin 2, other than in the EEB sub-basin, are also contributing to water quality impairments and hydrological changes in Lone Pine Creek and downstream.

Bear Creek

Bear Creek is a highly urbanized watershed. Anthropogenic disturbance has modified the action area, and the PBFs within it, from historical conditions. Several factors have altered water chemistry in the action area, including upstream urban and rural uses of pesticides, herbicides, and fertilizers. The lack of riparian trees has led to low levels of wood debris and poor stream habitat complexity. Floodplain connectivity and off-stream wetlands have been modified extensively by development in the valley, confining the stream channel, which reduced energy dissipation and increased stress and erosion of stream banks. Channel modifications due to roads, such as Interstate 5, are prevalent. Bear Creek within the action area in summer has low water quantity due to irrigation and municipal water withdrawals and high water temperatures. In a study during the summer of 1990 and 1991, maximum water temperatures in lower Bear Creek exceeded 75^{o}F (Dambacher *et al.* 1992). The extent of impervious surfaces in the watershed is elevated due to the high density development of Medford, Central Point, and other municipalities. Impervious surfaces concentrate storm runoff and increase peak flows, which increases erosion and lowers the quality of habitat for SONCC coho salmon.

The Bear Creek Valley receives an average rainfall of 18.37 inches per year. On average, the area receives measurable rainfall 102 times per year and an excess of 1.0-inch of rain in a 24-hour period 1.8 times per year (RVSS 2020). The area also receives 0.5 to 1.0 inch of rain in a 24-hour period approximately 9 times per year (WRCC 2012). Table 8 lists monthly surface water statistics for Bear Creek and the Rogue River.

Table 8. U.S. Geological Society mean monthly surface water statistics for Bear Creek at Medford and the Rogue River at Raygold from 1978 to 2020. Only data from 1978 to present are used to eliminate influence from the construction of William Jess Dam. All values in cubic feet per second.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bear Creek	210	207	192	197	139	75	35	36	37	35	61	154
Rogue River	4,290	4,150	3,930	3,960	3,730	2,830	1,820	1,600	1,440	1,410	2,260	3,730
Percent	4.9	5.0	4.9	5.0	3.7	2.7	1.9	2.3	2.6	2.5	2.7	4.1

Presently, abundance of SONCC coho salmon is significantly depressed in the Bear Creek watershed. Smolt trapping surveys have demonstrated few SONCC coho salmon are surviving in the watershed. Over a period of 6 years, the Oregon Department of Fish and Wildlife (ODFW) smolt-trapping program captured 329 SONCC coho salmon smolts; two years resulted in none captured (Table 9; Vogt 2001, Vogt 2002, Vogt 2003, Vogt 2004, Doino 2006).[4] The ODFW discontinued the program after 2006, however we do not expect that smolt abundance has meaningfully changed. Adult spawning counts have not occurred regularly in Bear Creek, but they have demonstrated low numbers of SONCC coho salmon spawning in the watershed.[5] The Bear Creek watershed assessment reported that production of SONCC coho salmon smolts is approximately 3.7 SONCC coho salmon smolts per mile of habitat in the Bear Creek mainstem (RVCOG 2001a). Unfortunately, recent estimates for the number of SONCC coho salmon returning to the URR population are not available due to a lack of surveys. The last available surveys that did occur resulted in an estimated number of wild spawners for the URR population was estimated of approximately 319 to 2,929 (Table 10). We do not expect that spawner abundance has meaningfully changed since the last surveys.

Table 9. Number of SONCC coho salmon smolts captured by ODFW during trapping operations on Bear Creek, 2001-2006.[4]

Year	Bear Creek Mouth	Upper Bear Creek
2001	27	n/a
2002	68	n/a
2003	14	n/a
2004	0	n/a
2005	0	n/a
2006	8	212

[4] E-mail from Jay Doino, ODFW, to Chuck Wheeler, NMFS (July 28, 2009) (discussing smolt trapping in Bear Creek).

[5] ODFW random coho coastal spawning fish survey annual summaries.

Table 10. Upper Rogue River sub-basin coho spawning surveys for 2002-2012[6] and estimated number of wild spawners.

Year	Number of surveys	Number of surveyed miles	Wild estimated spawners	95% Confidence Interval
2002	18	17.3	2929	1911
2003	22	21.4	1350	434
2004	18	18.5	2580	1388
2005			No surveys	
2006	14	13.1	319	179
2007	7	6.9	No data	N/A
2008	5	5.3	No data	N/A
2009			No surveys	
2010			No surveys	
2011			No surveys	
2012			No surveys	
2013			No surveys	
2014			No surveys	

Lone Pine Creek

Lone Pine Creek is an 8.8 square-mile sub-basin to Bear Creek. Approximately 70% of the Lone Pine Creek watershed is classified as urban land use with 2 miles of streams, 5 miles of canals, and 92 miles of roads (RVCOG 2001b). It is extensively modified by residential and commercial development, and as a result, the stream channel is confined. Specific modifications include placement of stream reaches into underground pipes or concrete channels, stream channelization, and removal of woody vegetation (Wetland Consulting 2002). Lone Pine Creek is also influenced by irrigation and stormwater management. There are no natural barriers on Lone Pine Creek,[7] however, approximately 0.06 mile upstream from the confluence with Bear Creek a box culvert potentially blocks upstream movement of juvenile salmonids at low water levels. Fish distribution in Lone Pine Creek has not been extensively studied. However, ODFW considers Lone Pine Creek to contain 1.4 miles of summer steelhead and trout use and 0.6 miles of fall Chinook salmon use (as documented by a visual sighting of one adult in 2000).[7] While SONCC coho salmon distribution in Lone Pine Creek is not known, some individuals are likely to be present, albeit in low numbers.

High erosion and turbidity results from storms and pollution is contributed by urban runoff. Average streamflows in Lone Pine Creek range from 2-10 cfs in the summer to greater than 10 cfs in the winter (RVCOG 2001b). In comparison, average monthly streamflows in Bear Creek range from 35-139 cfs in summer and up to 210 cfs in winter (Table 8). Water quality is impaired for summer stream temperatures, dissolved oxygen, and pH (ODEQ 2012).

[6] Data from ODFW available online at: http://oregonstate.edu/dept/ODFW/spawn/pdf%20files/coho/2002-12FinalSONCCEstimates.pdf (Last Accessed May 2020).
[7] Telephone conversation with Brent Crowe, Oregon Department of Fish and Wildlife (September 23, 2005) (confirming absence of natural barriers on Lone Pine Creek and describing fish distribution).

Upton Creek

Upton Creek has 12.5 miles of stream, 3.8 miles of canals, and 41.9 miles of roads (RVCOG 2001c). Its sub-basin has an area of approximately 10 square miles draining a mix of agricultural, residential, and commercial/industrial lands (FAA 2019). Riparian areas have been extensively modified by human activity associated with development, including placement of long stream segments in pipes, stream channelization and relocation, and removal of woody vegetation (Wetland Consulting 2002). Fish habitat is considered to be marginal to poor (RVCOG 2001c). Upton Creek has not been identified as a critical fish-bearing stream (RVCOG 2001c) although salmonids are likely to use the lower reaches as refuge during high water events in the Rogue River and overwinter rearing habitat. Although there are multiple road crossing, no specific fish passage barriers are documented. Upton Creek is not specifically identified as water quality limited by the Oregon Department of Environmental Quality (ODEQ 2012), but conditions are known to exceed 303(d) criteria (RVCOG 2001c). Due to irrigation return flows, Upton Creek has perennial flows (Wetland Consulting 2002). The total contributing drainage basin for the main channel of Upton Creek on the Airport is approximately 6 square miles, with a predicted 2-year peak flow of approximately 155 cfs (FAA 2019). The 2-year peak flow of the Rogue River at the confluence of Upton Creek is approximately 19,800 cfs (FAA 2019). Therefore, the 2-year peak flows of Upton Creek on the Airport are approximately less than 1% of the Rogue River's 2-year peak flows.

We are not aware of any surveys for coho salmon in Upton Creek but habitat conditions in Upton Creek and Bear Creek are likely to be similar due to their proximity and exposure to similar environmental threats and stresses. As demonstrated in Table 9, coho salmon abundance in Bear Creek is reduced. Therefore, coho salmon abundance in Upton Creek is likely to be even further reduced because Upton Creek is significantly smaller than Bear Creek and is unlikely to support a large number of coho salmon. Additionally, due to the variable impacts of high road densities, stream crossings, and piping of stream channels, we do not expect that coho salmon distribution extends very far upstream and will just be present in the lower reaches downstream of the Airport.

Many formal consultations have been completed in the action area. Effects from the various formal consultations are a mix of beneficial and negative effects. Some of the effects were one-time effects with a short-duration. Other effects have a long-term presence in the action area. Restoration actions have also been completed, such as removal of major dams within the Rogue Basin. Overall, consultation aims to minimize the adverse effects of the projects, such that while there have been a lot of actions; they are conducted in such a way as to avoid severe, long-term negative effects to SONCC coho salmon and designated critical habitat.

Juvenile and adult SONCC coho salmon in the action area, and particularly in Bear Creek, Upton Creek, and Lone Pine Creek, are exposed to modified environmental baseline conditions. Under these environmental baseline conditions (i.e., exposure to environmental stressors including degraded water quality, increased water temperatures, decreased water quantities, degraded substrate and spawning gravels, fragmented and degraded riparian areas, a lack of natural cover and shelter, a lack of floodplain connectivity, degraded passage, and poor aquatic habitat complexity), the baseline condition of an individual fish in the action area is likely to be stressed, but with the ability to compensate. Individuals are likely to be less efficient metabolically and physiologically compared to individuals in areas without numerous stressors.

2.5 Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered 50 CFR 402.17(a) and (b).

2.5.1 Effects on Designated Critical Habitat

The proposed action will occur in the 6th field subwatersheds (HUC Nos.: 171003080202 and 171003080110) of Whetstone Creek – Rogue River (for Upton Creek) and Larson Creek – Bear Creek (for Lone Pine Creek) with the effects of the proposed action reaching the Pacific Ocean. Upton Creek is located within the Gold Hill-Rogue River 5th field watershed (HUC No.: 1710030802) and Lone Pine Creek is located within the Bear Creek 5th field watershed (HUC No.: 1710030801). Refer to Table 5 for all affected fifth-field watersheds. In this analysis we refer to the 5th field watersheds as critical habitat units because critical habitat units are designated at the 5th field watershed level.

All of these watersheds contain critical habitat for SONCC coho salmon. The conservation role of critical habitat in the action area is to provide habitat that supports successful juvenile and adult migration, juvenile rearing, and spawning. The PBFs present in the action area are: (1) Cover/shelter, (2) food, (3) riparian vegetation, (4) space, (5) substrate/spawning gravel, (6) water quality, (7) water quantity, (8) safe passage, (9) water temperature, and (10) water velocity (Table 4). Spawning areas are just in Upton Creek, Lone Pine Creek, and Bear Creek; the entire action area is used for rearing and migration.

Potential habitat effects in the action area from funding the proposed action are reasonably certain to include: (1) temporary and localized reductions in water quality from construction; (2) permanent, localized reductions in substrate/spawning gravel, cover/shelter, and food; (3) pollutants in stormwater runoff with episodic and permanent effects on water quality; and (4) minor changes in water quantity and water velocity. These effects are described in greater detail below. The proposed action will not change the quality and function of riparian vegetation, space, safe passage or water temperature.

Water Quality, Substrate/Spawning Gravel, Cover/Shelter, and Food - Construction

In-stream construction is only proposed below the ordinary high water elevation in a remnant channel to Upton Creek in Basin 4. No other construction will occur in streams. The proposed action includes in-water work in the remnant channel of Upton Creek for construction of approximately 500 square feet total of artificial in-channel structure distributed at 2 locations: (1)

at the detention pond outlet structure and (2) upstream of the proposed detention pond for a flow control/diversion structure where an existing stormwater drainage ditch discharges to the remnant channel. In-water work area isolation measures were not described as part of the proposed action. However, as described in Section 2.4, the remnant channel primarily conveys intermittent storm/surface water flows and the in-stream construction will occur approximately 850 feet upstream of Upton Creek. Although in-stream construction will result in temporary and localized increases in suspended sediment and turbidity in the remnant channel it is unlikely that these effects will travel further then the remnant channel in detectable amounts. This because of the small amount of proposed work and the intermittent nature of stream flows in the remnant channel. Therefore, temporary, measurable decreases on the water quality PBF from in-stream construction will be limited to the remnant channel in Upton Creek.

In-stream fill is a permanent effect that will preclude future development of natural habitat that provides cover/shelter, prevent recolonization of the substrate by aquatic invertebrates, and leave substrate unavailable for spawning. Therefore, the proposed action will have a small and localized negative effect on the substrate/spawning gravel, cover/shelter, and food PBFs.

Water Quality, Water Quantity, and Water Velocity – Stormwater

Stormwater runoff from impervious surfaces delivers a wide variety of pollutants to aquatic ecosystems, such as metals (e.g. copper and zinc), petroleum-related compounds (polycyclic aromatic hydrocarbons - PAHs), and sediment washed off the roads, parking lots, driveways, etc. (Driscoll *et al.* 1990, Buckler and Granato 1999, Colman *et al.* 2001, Kayhanian *et al.* 2003, Van Metre *et al.* 2006, Peter *et al.* 2018). Aquatic contaminants often travel long distances in solution or attached to suspended sediments, or gather in sediments until they are mobilized and transported by the next high flow (Anderson *et al.* 1996, Alpers *et al.* 2000a, 2000b).

The JCAA will increase the amount of impervious surfaces in Basins 1, 2, and 4. The amount of new impervious surfaces proposed for Basins 1 and 2 is small. Runoff from these new impervious surfaces will flow onto adjacent vegetated ground for infiltration, be discharged into a new filter strip or be discharged into an existing detention pond. The addition of new proposed impervious surfaces in Basins 1 and 2 will only result in a minor volume of runoff. However, stormwater treatment facilities are not 100% effective in removing pollutants from runoff due to practical engineering constraints on contaminant removal technology. Therefore, pollutants from new impervious surfaces will be discharged into streams and will have incremental impacts on the water quality PBF.

The JCAA will add or reconstruct approximately 15.9 acres of impervious surfaces (Table 1) in Basin 4 as part of the proposed action. The JCAA has also proposed to construct, operate, inspect, and maintain stormwater facilities that will treat pollutants in the runoff from almost all existing impervious surfaces and from the newly proposed impervious surfaces in Basin 4 (i.e., approximately 157 acres). The JCAA does not currently treat the entire volume of runoff for the water quality design storm (i.e., 50% of the 2-year, 24-hour event) from existing impervious surfaces nor are runoff rates detained to meet pre-development conditions. Consequently, the quality of stormwater runoff generated in Basin 4 will be improved and overall water quality in the receiving waters downstream will be improved. However, stormwater treatment facilities, including those proposed for this action, are not 100% effective in removing pollutants due to practical engineering constraints on contaminant removal technology. Therefore, while the proposed action will result in an improvement in stormwater quality discharged from Basin 4, compared with the existing conditions, contaminants harmful to listed species will be discharged and will continue to have a meaningful impairment of the water quality PBF. Additionally, runoff from the water quality design storm will not be detained. The JCAA's proposed treatment and flow control details are analyzed below.

JCAA's general proposal for stormwater treatment in Basin 4 is to use natural dispersion, intercept the remaining flows in the ditch parallel to Taxiway A, and treat for the water quality design storm. JCAA estimated that natural dispersion, as calculated according to WSDOT (2008), accounts for 7%, 25%, or 100% in reduction of flow needing treatment for the various sub-basins in Basin 4 (Table 2). The remaining runoff in sub-basins A-P and S will be conveyed to the proposed biofiltration swale and the remaining runoff in sub-basins Q, R, and U will be conveyed to the proposed smaller vegetative swale. These facilities will treat stormwater generated from the impervious surfaces in sub-basins A-S and U that will be modified as part of the proposed action. These sub-basins comprise the majority of impervious surfaces in Basin 4, see Table 2.

The remaining runoff in sub-basins W and T will not be conveyed to the proposed swales but the proposed swales are designed to accept a larger amount of runoff to account for the remaining runoff (Table 2). Runoff from all impervious surfaces in sub-basin W (1.23 acres proposed; 0.24 acres existing) will discharge directly into the detention facility without prior treatment due to site constraints at the Airport. No new impervious surfaces are proposed in sub-basin T.

The proposed swales are vegetated facilities. Swales are a form of bioretention. They primarily target sediments and dissolved and particulate metals, although secondary pollutant targets include nutrients, oil, grease, and PAHs (ODOT 2011). Vegetated swales (bioswales) have been shown to reduce total and dissolved copper and zinc concentrations in stormwater (ODEQ 2003, Clary *et al*. 2011). ODEQ (2003) describes bioswale pollutant reduction efficiencies for copper (46%), total and dissolved zinc (63% and 30%), oil/grease (75%), and total suspended solids, including sediment (83%-92%). These reduction efficiencies are obtainable for swales that are at least 200 feet in length with a maximum runoff velocity of 1.5 feet per second, a water depth of one to four inches, a grass height of at least 6 inches, and a minimum contact (residence) time of 2.5 minutes (ODEQ 2003). Bioretention is an effective way to remove total suspended solids and metals in stormwater runoff (Clary *et al.* 2017).

Although the design characteristics for the proposed swales in Basin 4 (see Section 1.3) vary from those stated for the above pollutant reduction efficiencies, the residence time in the proposed swales (i.e., 9 minutes) is greater than 2.5 minutes. This suggests that pollution reduction efficiencies may be equivalent to those stated above. Due to a lack of applicable information, we are unable to precisely identify whether the reduction in pollutants will be greater or less than that stated by ODEQ (2003). However, the proposed stormwater facilities in Basin 4 target the appropriate pollutants and will function with the appropriate pollutant removal mechanisms. Thus, we are reasonably confident that removal efficiencies are likely to be similar to those described by ODEQ (2003). Additionally, the proposed swales also meet the water quality treatment criteria established by NMFS under the programmatic biological opinion with the Corps for stormwater, transportation and utilities (SLOPES V STU; NMFS 2014b). Treatment protocols in the SLOPES V STU opinion are based on a design storm (50% of the 2-year, 24-hour storm) that generally results in more than 95% of the runoff from all impervious surfaces being infiltrated at or near the point at which rainfall occurs.

Stormwater runoff only occurs when there is rainfall and the greatest increase of some pollutants in a receiving waterbody is when a first-flush storm mobilizes a collection of pollutants accumulated during dry periods between rainfall events (Kayhanian *et al.* 2003, Lee *et al.* 2004, Soller *et al.* 2005, Kayhanian *et al.* 2008, Nason *et al.* 2011). In Oregon's climate, the most significant of these rain events is the first fall rain; lesser events may occur 2-5 times annually per autumn, winter, or spring, given the seasonality of precipitation patterns in Oregon. The exact concentrations of the various contaminants that would remain in the stormwater discharge are unknown and are likely to be highly variable depending on the timing and intensity of individual storm events There is a lot of uncertainty regarding the duration of elevated stormwater pollutant concentrations during first-flush events, largely due to the inherent unpredictability and natural variability in rainfall events. In general, the elevated concentrations of stormwater pollutants associated with first-flush events occurs within the first few minutes and up to the first hour after detection of observable runoff (Tiefenthaler and Schiff 2003, Stenstrom and Kayhanian 2005). Therefore, adverse effects on water quality from stormwater will occur at their greatest intensity in the fall after the first significant precipitation and will also occur at lower intensity episodically throughout the remainder of the wet season. This effect will be on-going, as the impervious surfaces will be a long-term or permanent feature on the landscape. The highest concentrations of stormwater pollutants will occur where discharge from the Airport enters Lone Pine and Upton Creeks and will continue to have a meaningful impairment of the water quality PBF.

Temporal and spatial redistribution of pollutants in stormwater runoff occurs through complex fate and transport mechanisms. Therefore, upon entry to Bear Creek from Lone Pine Creek and upon entry from Upton Creek to the much larger Rogue River, the stormwater pollutant concentrations will continue to spatially distribute and disperse and will likely be indistinguishable from background levels. At any given time, the contribution of pollutants from the Airport in Bear Creek or in the Rogue River will not be measurable above background levels due to their larger volumes. However, water quality in the streams is impaired, and every point and non-point discharge of pollutants contributes to this problem at some level. Additionally, there are many uncertainties about fate and transport of contaminants found in stormwater run-off. Overall, discharged stormwater pollutants will also be distributed in minor concentrations downstream to the Pacific Ocean with immeasurable effects on the water quality PBF in Bear Creek and in the Rogue River.

As noted above, the amount of new impervious surfaces proposed for Basins 1 and 2 is small. Runoff from these new impervious surfaces will flow onto adjacent vegetated ground for infiltration, be discharged into a new filter strip or be discharged into an existing detention pond. The addition of a small amount of new impervious surfaces in Basins 1 and 2 is unlikely to result in a meaningful increase in peak flows or water velocities.

JCAA's proposal for stormwater detention in Basin 4 is a pond with a combination of orifice and weir structures to control the release of water. Water released from the detention facility will be conveyed through the remnant channel to Upton Creek approximately 850 feet downstream. Flows released from the detention facility (i.e., post-construction flows) will be less than pre-development flows and will also be far less than existing flows for all storm events greater than the water quality design flow (up to the 10-year storm event) (Table 3). Due to FAA safety requirements, the water quality design flow will be bypassed around the detention facility and will not be detained and will be larger than the pre-development flow rate.[2] However, the post-construction flow rate for this event represents an approximate 0.72 cfs decrease in discharge relative to existing conditions. Therefore, there will be decreases in water quantity and water velocity during the storm events, but they are unlikely to meaningfully affect the water quantity or water velocity PBFs because the reductions will primarily occur during the rainy season.

Summary of Effects on Critical Habitat

The proposed action will result in temporary and localized reductions on the water quality PBF from construction and localized but permanent reductions on the substrate/spawning gravel, cover/shelter, and food PBFs. These effects will only occur in the remnant channel of Upton Creek, which is just a small portion of the Gold Hill-Rogue River designated critical habitat unit.

Pollutants in stormwater runoff from new impervious surfaces will continue to have permanent negative and adverse effects on the water quality PBF in small portions of the Gold Hill-Rogue River and Bear Creek critical habitat units due to episodic discharges. This is because stormwater treatment facilities, including those proposed for this action, are not 100% effective in removing pollutants. The effects of the proposed action will be similar to the effects caused by historical and existing discharges of pollutants, although to a lesser degree, and will add to those effects.

Because pollutants will continue to spatially distribute and disperse through complex fate and transport mechanisms downstream, the water quality PBF in the 6 remaining mainstem Rogue River critical habitats units is unlikely to be substantially altered by the proposed action. Furthermore, the proposed action will only have small changes in the amount of water discharged from the Airport which are unlikely to have meaningful effects on the quality and function of the water quantity and water velocity PBFs in the action area. However, these effects are also considered and addressed in the remainder of this analysis and in the Integration and Synthesis portion of the biological opinion. The amount of available riparian vegetation, space, safe passage will not change and there will be no changes in water temperature.

In Section 2.2.1, we determined that the condition of the water quality, water temperature, cover/shelter, and riparian vegetation PBFs were limiting the conservation role of all the critical habitat units in the action area. Slight differences in the critical habitat units create variations such that each specific critical habitat unit has small inconsistencies in conditions and PBFs that limit the individual conservation roles; substrate/spawning gravel, water quantity, and safe passage are additional PBFs that are impaired in multiple units. The proposed action will meaningfully decrease the function and value of the water quality PBF in the Gold Hill-Rogue River and Bear Creek critical habitat units. Additionally the proposed action will negatively affect the cover/shelter, food, and substrate/spawning gravel PBFs in the Gold Hill-Rogue River component of the action area. The effects will occur in Upton Creek, which is just a small portion of the Gold Hill-Rogue River designated critical habitat unit, and in Lone Pine Creek which is just a small portion of the Bear Creek designated critical habitat unit. Because of the small component of critical habitat adversely affected within the overall critical habitat units, these effects are unlikely to adversely affect SONCC coho salmon critical habitat at the 5th field watershed level or its conservation role. Although the current condition of critical habitat is not fully functional for the conservation of the species the proposed action will not preclude or significantly delay the natural trajectory of PBF development for critical habitat in the overall Gold Hill-Rogue River unit or Bear Creek unit. None of the effects of the proposed action will render the habitat unusable or incapable of supporting spawning, rearing, or migration and the critical habitat units will continue to provide functional support for SONCC coho salmon.

2.5.2 Effects on Species

In-stream Construction

The location of proposed in-stream construction is located approximately 850 feet upstream of Upton Creek and approximately 6 miles upstream of the Rogue River. If present in Upton Creek, SONCC coho salmon are likely limited to the lower reaches due to the variable impacts of high road densities, stream crossings, and piping of stream channels. As a result, it is extremely unlikely that coho salmon will be exposed to in-stream construction activities or their temporary effects on water quality in the remnant channel of Upton Creek. The permanent fill of 500 square feet of the remnant channel will not sufficiently reduce natural cover or prey in sufficient amounts to meaningfully decrease normal behavior of feeding, growth, or survival for juveniles or sufficiently reduce available spawning habitat to decrease reproduction or fitness of spawning adults. Sub-lethal effects, other injuries, or death of SONCC coho salmon individuals will not occur as a result of the proposed in-stream construction.

Stormwater Pollutants

As previously discussed in Section 2.5.1, water quality effects are reasonably certain with stormwater runoff, as stormwater runoff discharged from new impervious surfaces on the Airport will deliver a variety of pollutants to the aquatic ecosystem episodically for the foreseeable future, despite proposed treatment. Stormwater pollutants are a source of potent adverse effects to SONCC coho salmon, even at ambient levels (Loge *et al.* 2006, Spromberg and Meador 2006, Hecht *et al.* 2007, Johnson *et al*. 2007, Sandahl *et al.* 2007). These pollutants can accumulate in the prey and tissues of juvenile salmon where, depending on the level of exposure, they cause a variety of lethal and sublethal effects on salmon. These adverse effects include disrupted behavior, reduced olfactory function, immune suppression, reduced growth, disrupted smoltification, hormone disruption, disrupted reproduction, cellular damage, and physical and developmental abnormalities (Fresh *et al.* 2005, Hecht *et al.* 2007, LCREP 2007). Pre-spawn mortality of adult coho salmon is a common phenomenon in streams impacted by urban stormwater runoff (McCarthy *et al.* 2008, Feist *et al.* 2011, Scholz *et al.* 2011, McIntyre *et al*. 2015, Spromberg *et al.* 2016, Peter *et al.* 2018). Aquatic contaminants often travel long distances in solution or attached to suspended sediments, or gather in sediments until they are mobilized and transported by the next high flow (Anderson *et al.* 1996, Alpers *et al.* 2000a, 2000b).

Most published literature addresses acute toxicity of single pollutants, although pollutants from stormwater exist in mixtures and interact with each other (e.g., Niyogi *et al.* 2004, Feist *et al.* 2011). Rand and Petrocelli (1985) state that in "assessing chemically induced effects (responses), it is important to consider that organisms may be exposed not to a single chemical but rather to a myriad or mixture of different substances at the same or nearly at the same time." Environmental conditions (i.e., non-chemical conditions) can also influence the toxicity of pollutants and coho salmon vulnerability by altering susceptibility to pollutants (Brooks *et al.* 2012, Laetz *et al.* 2014). Exposure to two or more pollutants simultaneously may produce a response that is simply additive of the individual responses or one that is greater (synergistic) or less (antagonistic) than expected from the addition of their individual responses (Denton *et al.* 2002, Laetz *et al.* 2013). For example, mixtures of zinc and copper have greater than additive toxicity to a wide variety of aquatic organisms including freshwater fish (Eisler 1993). Although the large number of pollutants and much larger number of toxicological interactions in stormwater make specific mechanisms of toxicological effects on SONCC coho salmon difficult to predict, there is ample evidence that the mixture of toxins in stormwater can degrade habitat enough to substantially reduce its ability to support salmon spawning, feeding, and growth to maturity.

For example, Baldwin *et al.* (2003) exposed juvenile SONCC coho salmon to various concentrations of copper to evaluate sublethal effects on sensory physiology, specifically olfaction. These researchers demonstrated that short pulses of dissolved copper at concentrations as low as 2 micrograms per liter (µg/L) over experimental background concentrations of 3 µg/L reduced olfactory sensory responsiveness within 20 minutes such that the response evoked by odorants was reduced by approximately 10%. At 10 µg/L over background, responsiveness was reduced by 67% within 30 minutes. They calculated neurotoxic thresholds sufficient to cause olfactory inhibition at 2.3-3.0 µg/L over background. They also referenced three studies that reported copper exposures over four hours caused cell death of olfactory receptor neurons within rainbow trout, Atlantic salmon, and Chinook salmon. The concentrations tested are lower than common concentrations in stormwater outfalls, and thus indicate toxicity even after stormwater has been moderately diluted. The measured exposure times are likewise shorter than typical stormwater outfall discharge times. Inhibiting olfaction is detrimental to salmon because olfaction plays a significant role in the recognition and avoidance of predators and migration back to natal streams to spawn (Baldwin *et al.* 2003). Additional research indicates that the effect of 2 µg/L concentrations over experimental background concentrations of 3 µg/L reduces the survival of individuals (Hecht *et al.* 2007). Juvenile wild coho salmon exposed to low levels of dissolved copper did not display an alarm response (i.e., sharp reduction of swimming activity) in the presence of a predator or in response to other olfactory signals as compared to unexposed wild juveniles (McIntyre *et al.* 2012). Predators were also more successful in capturing copper-exposed juvenile coho salmon (McIntyre *et al.* 2012).

Also, fish embryos and larvae exposed to PAHs are likely to experience adverse changes in heart physiology and morphology, including pericardial edema and heart failure, leading to mortality, even with only temporary exposure to low concentrations (Hicken *et al.* 2011, Incardona *et al.* 2012, Brette *et al.* 2014, Incardona *et al.* 2014). Although exposed embryos and larvae may grow to look like normal fish on the outside, internally there are subtle changes in heart shape and also a significant reduction in swimming performance reducing individual survival due to long-term physiological impairment (Hicken *et al.* 2011). Swimming performance is an individual fitness indicator for migratory salmonids, including coho salmon. Reduced larval feeding associated with pericardial edema can lead to death during the transition period to juvenile stages (Hicken *et al.* 2011). Other individuals may experience a disturbance in heartbeat rhythm (Brette *et al.* 2014). Cardiotoxic PAHs are present in urban stormwater; their sources include vehicle exhaust, fuel spills, oil and grease, treated wood, and coal dust (N. Scholz, pers comm., Northwest Fisheries Science Center, Ecotoxicology Program Manager, February 2, 2014). PAHs will bind with organic materials and move downstream with high flow events. A similar pattern of dispersion as described above for all stormwater will likely be observed as the PAHs become more spatially distributed as they travel downstream. The highest concentrations of PAHs will be at the discharge point. In addition, during transport, PAHs are continually being re-partitioned between organic materials and water. Therefore, PAHs bind with organic materials, remaining there until high water events mobilize and re-suspend PAHs in the water column for downstream transport.

The small amount of proposed new impervious surfaces in Basins 1 and 2 will result in a minor volume of increased runoff. In Basin 4, JCAA proposes to treat stormwater runoff from all new proposed impervious surfaces in the basin and from a large amount of existing impervious surfaces (i.e., approximately 137.2 acres) that were previously not treated. Consequently, the quality of stormwater discharged from Basin 4 will be improved and overall water quality in the receiving waters downstream will be improved. However, stormwater treatment facilities, including those proposed for this action, are not 100% effective in removing pollutants. This results in exposure of SONCC coho salmon to pollutants present in the stormwater discharged from all Basins, and synergistic effects as these pollutants interact with other compounds already present in the receiving water bodies. Some of those pollutants will be absorbed or ingested by SONCC coho salmon in quantities sufficient to cause injury or death by modifying their behavior, disrupting endocrine functions, or causing immunotoxic disease effects.

While exposure to stormwater discharge from the proposed project cannot be associated with specific adverse responses in specific individuals downstream, pollutants in stormwater discharge have been shown to injure or kill individual fish either by themselves or through additive, interactive, and synergistic interactions with other pollutants (Spromberg and Meador 2006, Baldwin *et al.* 2009, Laetz *et al.* 2009, Feist *et al.* 2011, Hicken *et al.* 2011, Spromberg and Scholz 2011). Adverse effects to SONCC coho salmon from stormwater pollutants are reasonably certain to include mortality, injury, and a variety of sublethal and behavioral effects that will reduce growth, fitness, and survival. Sublethal effects (such as olfactory effects) are those that are not directly or immediately lethal, but are detrimental and have some probability of leading to eventual death via behavioral or physiological disruption. These adverse effects will only occur in Upton Creek and in Lone Pine Creek due to the immediate proximity of the discharge from the Airport's new impervious surfaces. Therefore, adverse effects will be limited to the URR SONCC coho salmon population. Some effects from stormwater contaminants will occur in the Rogue River and in Bear Creek, but due to downstream dispersal, these effects will be limited to minor effects that would not cause any impact to individual growth or survival. The proposed action will not adversely affect the Middle Rogue and Applegate Rivers, the Illinois

River, or the Lower Rogue River populations of SONCC coho salmon that rear in the action area or migrate through it because adverse effects will not occur in the Rogue River.

Quantifying the number of individual SONCC coho salmon in Upton Creek and Lone Pine Creek that will experience adverse effects due to decreased water quality caused by stormwater pollutants is impractical because the relationship between habitat conditions and the distribution and abundance of individuals in the action area is inexact and show wide, random variations due to biological and environmental processes operating at much larger demographic and regional scales. Additionally pollutant exposure is episodic and there is a thorough lack of survey and monitoring information of adult and juvenile SONCC coho salmon in Upton Creek and in Lone Pine Creek (see Section 2.4). Although generalized standard density estimates are available, these are for juveniles and are based on summer rearing habitat; these are not applicable in this scenario because the adverse effects from the stormwater pollutants will occur at their greatest intensity in the fall during the first significant precipitation event and will continue at lower intensity throughout the remainder of the wet season, when both adults and juveniles will be exposed. Finally, concentrations of stormwater pollutants will vary seasonally (i.e., streams in this region have their greatest water volumes during the wet season which will serve to decrease stormwater pollutant concentrations) and will vary longitudinally through the stream system (i.e., stormwater pollutant concentrations from the proposed project will be greatest at the discharge points and will decrease as they flow downstream), partially because of changes in overall river volume.

Although calculating the exact number of fish exposed to stormwater pollutants is impracticable, the amount of individual SONCC coho salmon injured or killed annually from increases in contaminant concentrations will be likely small in general and also when compared to the population as a whole. This is primarily because the number of SONCC coho salmon in the Upton Creek and in Lone Pine Creek is likely low and because these 2 streams represent an extremely small portion of SONCC coho salmon URR population.

2.6 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02 and 402.17(a)). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the environmental baseline (Section 2.4).

The SONCC coho salmon recovery plan (NMFS 2014a) identified urban/residential/industrial development as a key limiting threat. However, we were unable to identify any future non-

Federal actions reasonably certain to occur that would affect the action area. Other ongoing, non-Federal activities within and upstream of the action area (as described in Section 2.3) likely will continue to follow recent patterns and carry their effects forward. In particular, urbanization on non-Federal lands will continue at levels similar to the recent past. Between 2010 and 2019, the population of Jackson County increased by 8.7% from 203,206 in 2010 to 220,944 in 2019.[8] Bear Creek has three large urbanized cities: Medford, Central Point, and Ashland; it is likely that the majority of the short-term population increases will occur in these more populated centers.

Although no future private activities were identified in the consultation initiation request, many state and private land management activities that have degraded the baseline (urbanization, agricultural practices, roads, introduction of pollutants [PAHs, heavy metals, sediment, herbicides, and fertilizers], and water withdrawals) are likely to continue into the future and cause some adverse effects on SONCC coho salmon. However, regulations governing these actions have become more protective of SONCC coho salmon and their habitat over time. Effects of these non-federal activities are described in Section 2.4 and are not expected to change appreciably. We expect cumulative effects in the action area to have a slight negative impact on population abundance and productivity in the future. Likewise, we expect the quality and function of critical habitat PBFs to decline slightly in the future as a result of cumulative effects.

2.7 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

The description of the proposed action's effects includes any influence of current environmental conditions and their associated variability. While climate change is expected to continue over the relatively short duration of the action's direct and indirect effects, we cannot distinguish changes in temperature, precipitation, or other factors attributable to climate change from annual and decadal climate variability over this time period (Cox and Stephenson 2007, Deser *et al.* 2012, McClure *et al.* 2013). For these reasons, climate change is not expected to amplify the effects of the proposed action in ways not already described in Section 2.5.

2.7.1 Critical Habitat

The condition of critical habitat at the designation scale varies, but in most areas, at least one essential feature is degraded. In Section 2.2.1, we determined that the condition of the water quality, water temperature, cover/shelter, and riparian vegetation PBFs were limiting the

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[8] U.S. Census Bureau, State and County Quickfacts, Jackson County. Any county available: https://www.census.gov/quickfacts/fact/table/US/PST045219. (Last Accessed May 2020).

conservation role of all the critical habitat units in the action area. The PBFs in the Gold Hill-Rogue River and Bear Creek critical habitat units that are likely to be of a reduced quality are water quality, water temperature, water quantity, cover/shelter, riparian vegetation, substrate/spawning gravel, and safe passage. However, the conservation value of critical habitat in the Bear Creek watershed is high, and the overall action area is an important spawning and rearing habitat and a critical migration corridor. The baseline condition of critical habitat function and value in the watersheds (Section 2.2.1) and in the action area (Section 2.4) is moderately to severely degraded, primarily due to residential development, road building, and urbanization, agriculture, forestry, grazing, irrigation impoundments and withdrawals.

The proposed action will affect 6 PBFs (Section 2.5) and 4 of these will be adversely affected. However, all adverse effects will be localized and will only occur within the Gold Hill-Rogue River and Bear Creek designated critical habitat units. Therefore, the 6 downstream, mainstem critical habitat units will not be adversely affected (i.e., Grants Pass – Rogue River, Hellgate Canyon – Rogue River, Horseshoe Bend – Rogue River, Stair Creek – Rogue River, and Shasta Costa).

The proposed action will have small changes in the amount of water discharged from the Airport which are unlikely to have meaningful effects on the quality and function of the water quantity and water velocity PBFs in the action area. Adverse effects on substrate/spawning gravel, cover/shelter, and food will be permanent effects but will only occur for approximately 500 square feet in the remnant channel of Upton Creek on the Airport, which is in the Gold Hill-Rogue River component of the action area. The only long-term adverse effect on the water quality PBF will be from stormwater pollutants. The largest effects will be where discharge from the Airport enters Lone Pine and Upton creeks, but downstream the pollutants will be distributed and dispersed in the larger water volumes of Bear Creek and the Rogue River. Because the adversely affected area is only a small component within the two critical habitat units, the effects of the proposed action are unlikely to have an adverse effect on the function of these SONCC coho salmon critical habitat PBFs at the 5th field watershed level or their conservation value. There will not be any changes to the riparian vegetation, space, safe passage, or water temperature PBFs. We did not identify any cumulative effects for the action area that were not previously described in the environmental baseline (Section 2.4).

Overall, the effects of the proposed action, when added to the environmental baseline, cumulative effects, and status of critical habitat, will not appreciably reduce the condition and function of critical habitat PBFs in the affected critical habitat units. There will be some localized degradation of critical habitat quality and function, but only a small component of critical habitat will be adversely affected. Hence, the proposed action, when added to the environmental baseline, cumulative effects, and status of critical habitat, will not reduce the conservation value of designated critical habitat. The affected critical habitat units will retain their ability to serve their intended conservation role for SONCC coho salmon. Therefore, the value of the range-wide designation of critical habitat will not be appreciably diminished and will retain its current ability to play its intended conservation role for SONCC coho salmon, which is to help support viable populations of this evolutionarily significant unit (ESU).

2.7.2 Species

Of the 31 independent populations of SONCC coho salmon, 24 are at high risk of extinction and 6 are at moderate risk of extinction. Because the population abundance of most independent populations are below their depensation threshold, the SONCC coho salmon ESU is at high risk of extinction and is not viable (Section 2.2). Coho salmon abundance in the action area is likely to be limited due to the variable impacts of high road densities, stream crossings, piping of stream channels, elevated water temperatures, and lack of in-stream habitat complexity (Section 2.4).

Adverse effects on SONCC coho salmon will be limited to individuals in the URR population. Minor effects will occur on individuals of other populations in the mainstem Rogue River, but these effects will be too small to impact individual growth or survival. The adverse effects of the proposed action will only occur within a small portion of two of eleven 5th field watersheds occupied by the URR population. Coho salmon abundance in these areas is likely to be low due to the small stream sizes and due to decreased flows, lack of in-stream habitat complexity, and reduced floodplain connectivity (Section 2.4). The effects on the URR population of SONCC coho salmon would be the integrated responses of individuals to the predicted environmental changes. Instantaneous measures of population characteristics, such as population size, growth rate, spatial structure, and diversity, are the sums of individual characteristics within a particular area, while measures of population change, such as a population growth rate, are measured as the productivity of individuals over the entire life cycle (McElhany *et al.* 2000). A persistent change in the environmental conditions affecting a population, for better or worse, can lead to changes in each of these population characteristics.

The proposed action is reasonably certain to cause injury or death of a small number of adult and juvenile SONCC coho salmon by modifying their behavior, reducing growth, disrupting reproduction or causing immunotoxic disease effects as a result of episodic discharges of pollutants in stormwater runoff from new impervious surfaces. These effects will occur in areas used as spawning, rearing, and migration habitat. Only a small number of individuals per year will experience these lethal or sublethal effects and is too few to meaningfully change important population characteristics of the URR population. Cumulative effects, as described in Section 2.6, are not likely to change appreciably, and will have a slight negative effect on population abundance and productivity.

Effects from the proposed action are related to a key limiting threat for the URR population of SONCC coho salmon: urban/residential/industrial development (Section 2.2). They are also related to a key limiting stress for the population: impaired water quality. The greatest factor limiting recovery of SONCC coho salmon in the Rogue River populations is the lack of suitable rearing habitat for juveniles. In the Environmental Baseline (Section 2.4), we determined that altered hydrologic function, degraded riparian forest conditions, and lack of floodplain and channel structure are also factors limiting productivity in the action area, however these factors will not be affected by the proposed action. Overall, the proposed action will affect one limiting factor in Upton and Lone Pine creeks. Adverse effects at the population scale are unlikely to be meaningful because they will only affect individuals within Upton and Lone Pine creeks which comprise a very small area and have limited numbers of individuals. Therefore, the resulting incremental change will not meaningfully increase the limiting threats or stresses of the populations.

The URR population is designated as a core independent population in the SONCC coho salmon recovery plan (NMFS 2014a). The URR population is a historically functionally independent population. The population is at moderate risk of extinction (NMFS 2014a) and the environmental baseline in the action area is moderately to severely degraded, as explained in section 2.4. The importance of the URR population of SONCC coho salmon is such that if it were to go extinct then recovery of the SONCC coho salmon species would not be possible. To assist in species survival and recovery, core independent populations must have all criteria in the "low risk" threshold. The reduction in abundance to the URR population from the proposed action is small and will not result in a measurable decrease in population-scale abundance and productivity, nor will it change the extinction risk of this population. We did not identify any cumulative effects for the action area that were not previously described in the Environmental Baseline (Section 2.3). However, we noted that human population growth within the action area may lead to a slight increase in the intensity of cumulative effects. Cumulative effects are likely to cause a slight reduction in coho salmon population viability over time. As a result, NMFS is reasonably certain that the effects of the proposed action, when added to the status of the URR population, the environmental baseline, and cumulative effects, will not appreciably reduce the likelihood of both the survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution. The effects of the proposed action are such that the survival of the SONCC coho salmon species will not change and its recovery will not be impeded.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of SONCC coho salmon or destroy or adversely modify its designated critical habitat.

2.9 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1 Amount or Extent of Take

Incidental take is reasonably certain to occur because some SONCC coho salmon individuals in the action area will be harmed from habitat modification caused by episodic discharges of stormwater runoff from new impervious surfaces when individuals are present on an annual basis. Incidental take caused by the adverse effects of the proposed action will occur within Upton and Lone Pine Creeks. Adverse effects of the proposed action will include reduced water quality due to increased impervious surfaces and stormwater inputs of PAHs, metals, and sediment. This habitat modification will significantly impair essential breeding, spawning, rearing, migrating, feeding, or sheltering behavioral patterns such that fish will be injured or killed from the increases in pollution and will experience a reduction in fitness, growth or survival.

Accurately quantifying the number of fish harmed by these pathways is not possible because injury and death of individuals in the action area is a function of habitat quality, competition, predation, and the interaction of processes that influence genetic, population, and environmental characteristics. These biotic and environmental processes are highly variable and interact in ways that may be random or directional, and may operate across broad temporal and spatial scales. The precise distribution and abundance of fish within the action area, at the time of the action are not a simple function of the quantity, quality, or availability of predictable habitat resources within that area. Rather, the distribution and abundance of fish also show wide, random variations due to biological and environmental processes operating at much larger demographic and regional scales. Furthermore, there are no methods available to monitor this death and injury because it will occur throughout the year and after the proposed action has been completed. Therefore, it is not practical or realistic to attempt to identify and monitor the number of fish taken by the pathways described.

In cases such as this, where quantifying a number of fish is not possible, we use take surrogates or take indicators that rationally reflect the incidental take caused by the proposed action. Here, the best available indicators for the extent of take are the following combination of stormwater facility inspection, maintenance, and recording actions, because those variables will determine whether the proposed stormwater treatment system continues to reduce the concentration of pollutants in stormwater runoff as designed, and thus reflect the amount of incidental take analyzed in the opinion. This indicator is appropriate for the proposed action because it has a rational connection to the release of stormwater pollutants that cause take of listed species.

1. Each part of the proposed stormwater system in Basin 4, including the areas used for natural dispersion, the three new biofiltration swales, the small vegetated swale, all flow control/diversion structures and manifolds, the stormwater detention facility, and orifice and weir structures at the discharge point must be inspected and maintained at least quarterly for the first three years, at least twice a year thereafter, and at least three times per water year (for the first three years) within 48-hours following a storm event with more than 0.5 inches of rain over a 24-hour period.[9]

[9] Although a major storm event is frequently defined as a storm event with greater than or equal to 1.0 inch of rain during a 24-hour period, in the Medford area an excess of this amount only occurs 1.8 times per year (RVSS 2020); this would not provide sufficient opportunities to determine proper functioning condition of the swales. Inspecting

a. All stormwater must drain out of the biofiltration swales and the smaller vegetated swale within 24-hours after rainfall ends, and out of the detention pond within 48-hours after rainfall ends.
b. All structural components, including inlets and outlets, must freely convey stormwater.
c. Desirable vegetation in the biofiltration swales and the smaller vegetated swale must cover at least 90% of the facility within 3 years – excluding dead or stressed vegetation, dry grass or other plants, and weeds.

If the stormwater system is not inspected and maintained (as described in #1); if water ponds in the swales for longer than 24 hours, or detention pond for longer than 48 hours, after rainfall ends (#1a), structural components are blocked (#1b), or if desirable vegetation does not cover 90% of the filter swales (#1c) and corrective action is not taken with respect to #1a-c within seven days of a required inspection, the extent of take surrogate for stormwater will be exceeded.

2.9.2 Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.9.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02). The following measures are necessary or appropriate to minimize the extent of incidental take of listed species from the proposed action:

1. The FAA will minimize take of SONCC coho salmon from exposure to stormwater pollutants associated with new impervious surfaces by ensuring that stormwater runoff produced by impervious surfaces of the Rogue Valley International – Medford Airport that are modified through the proposed action are treated with stormwater facilities that are designed, constructed, operated, and maintained using the best available information on low impact development and best management practices for stormwater treatment and discharge; and
2. The FAA will minimize take by ensuring completion of a monitoring and reporting program to confirm that the take exemption of the proposed action is not exceeded, and that the terms and conditions in this incidental take statement are effective in minimizing incidental take.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the FAA or JCAA must comply with them in order to implement the RPMs (50 CFR 402.14). The FAA or JCAA has a

within 48 hours following a storm event with more than 0.5 inch of rain over a 24-hour period is consistent with the typical recommendation, but provides a more precise indicator of proper system function.

continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following terms and conditions implement reasonable and prudent measure #1 (stormwater pollutants associated with new impervious surfaces):
    a. The project developer will be responsible for insuring installation, function and maintenance of the proposed stormwater facilities during construction.
    b. JCAA will prepare and implement an operations and maintenance plan for the porous pavement proposed for Basin 1.
    c. Following construction, JCAA or any successor in interest to the project developer will assume responsibility for maintenance of all of the system components per the manufacturer's recommendations and as described in the *CIP Projects Stormwater Management Plan for Jackson County, Rogue Valley International-Medford Airport* prepared by Precision Approach Engineering, Inc. (2019) and submitted by the FAA.
    d. JCAA will carry out the stormwater operation and maintenance plan as described by Precision Approach Engineering, Inc. (2019), including all provisions pertaining to: identification of responsible parties, inspection and maintenance schedule, and inspection and maintenance procedures. JCAA will also keep and preserve a log of all maintenance activities.
    e. JCAA will ensure that vegetation in the biofiltration swales and the smaller vegetated swale (in Basin 4) covers at least 90% of the facility within 3 years, excluding dead or stressed vegetation, dry grass or other plants, and weeds.

2. The following terms and conditions implement reasonable and prudent measure #2 (monitoring and reporting):
    a. The FAA shall submit the following reports to NMFS:
        i. A project completion report within 60-days of completing construction, including:
            1. Project name;
            2. FAA contact person;
            3. Construction completion date;
            4. An explanation of the Basin 4 stormwater system as built or installed by the construction contractor, including any on-site changes from the proposed action (FAA 2019, Precision Approach Engineering, Inc. 2019).
        ii. An operations and maintenance plan for the porous pavement proposed for Basin 1.
        iii. Three annual reports on Basin 4 stormwater facility operation and maintenance for three full years following construction, including the following information:
            1. Stormwater facility monitoring logs with:
                a. The name of the contractor (if applicable) for all inspections;

b. the date of each regular inspection, and any additional inspection made within 48-hours of storm events with greater than or equal to 0.5 inches of rain during a 24-hour period (at least three per water year);
c. a description of any structural repairs, pond maintenance, or facility cleanout, e.g., sediment and oil removal and disposal, vegetation management, erosion control, structural repairs or seals, ponding water, pests, trash or debris removal;
d. An estimate of the percent cover of healthy vegetation in the biofiltration swales and the smaller vegetated swale, including a description of any corrective action needed to ensure 90% coverage within three years.

iv. Each of the above reports and/or plans must be submitted to NMFS at the following address, or by email to Michelle.McMullin@noaa.gov, no later than September 30:

National Marine Fisheries Service
Attn: WCRO-2019-03514
2900 N.W. Stewart Parkway
Roseburg, Oregon 97471

2.10 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). The following conservation recommendations are discretionary measures that we believe are consistent with this obligation and therefore should be carried out by the Federal action agency:

1. The FAA should request that JCAA perform in-stream construction work during times of no or low flow to eliminate turbidity and/or suspended sediment in the water column.
2. The FAA should encourage JCAA to examine the current treatment of existing impervious surfaces at the Airport and to improve treatment and flow control where deficient.
3. The FAA should consider initiating and completing consultation with NMFS on a programmatic biological opinion that addresses FAA airport improvement projects where they coincide with listed-fish under NMFS' jurisdiction. The primary benefits of programmatic consultation are more consistent use of conservation measures, the ability to address the effects of multiple activities at larger scales, efficient workload management, improved internal communication, better public relations, and a sharper vision of interagency consultation overall.

Please notify NMFS if the FAA carries out any of these recommendations so that we will be kept informed of actions that are intended to improve the conservation of listed species or their designated critical habitats.

2.11 Reinitiation of Consultation

This concludes formal consultation for the Medford Airport Capital Improvement Plan Projects.

As 50 CFR 402.16 states, reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the FAA and descriptions of EFH for Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the Pacific Fishery Management Council (PFMC) and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

The proposed action and the action area for this consultation are described above in Sections 1.3 and 2.3. The action area is also designated by the PFMC (2014) as EFH for Pacific salmon and includes spawning habitat. Spawning habitat and complex channel and floodplain habitat are identified by the PFMC as a habitat area of particular concerns (HAPC). The action area is also in an area where environmental effects of the proposed project would likely adversely affect EFH and HAPC for Pacific salmon. While the HAPC designation does not add any specific regulatory process, it does highlight certain habitat types that are of high ecological importance (PFMC 2014).

3.2 Adverse Effects on Essential Fish Habitat

The effects of the action, as proposed, on EFH are similar to those described above in the ESA portion of this document (Section 2.5). The habitat requirements (i.e., EFH) for the MSA-managed species in the action area are similar to those of the ESA-listed species. Based on information provided by the action agency and the analysis of effects presented in the ESA portion of this document, we conclude that the proposed action will have the following adverse effects on EFH designated for Pacific Coast salmon, including the spawning habitat HAPC.

Freshwater EFH quantity and quality, including salmon spawning habitat HAPC, will be temporarily reduced by (1) temporary and localized reductions in water quality from construction; (2) permanent, localized reductions in substrate/spawning gravel, cover/shelter, and food; (3) pollutants in stormwater runoff with episodic and permanent effects on water quality; and (4) minor changes in water quantity and water velocity.

3.3 Essential Fish Habitat Conservation Recommendations

We believe that the following EFH conservation recommendation would address the adverse effects described above. We recommend this measure, which is identical to the ESA terms and conditions described in Section 2.9 of the accompanying opinion, as actions that can be taken by the action agency to conserve EFH.

1. The FAA should request that JCAA perform in-stream construction work during times of no or low flow to further minimize or eliminate turbidity and/or suspended sediment in the water column.
2. Although NMFS identified adverse effects on EFH from the small, permanent reduction in substrate/spawning gravel, cover/shelter, and food, there are no practical conservation measures the action agency can implement to further minimize those effects. Therefore, NMFS has no EFH conservation recommendations at this time to address these adverse effects.
3. The FAA should implement Term and Condition #1 (Section 2.9.4) to minimize the delivery of stormwater pollutants to streams containing spawning, rearing, and migration EFH.
4. Although NMFS identified adverse effects on EFH from minor changes in stream flows, quantity, or velocity, there are no practical conservation measures the action agency can implement to further minimize those effects. Therefore, NMFS has no EFH conservation recommendations at this time to address these adverse effects.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the FAA must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

The FAA must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the FAA, the JCAA. An individual copy of this opinion was provided to the FAA. The document will be available within two weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adheres to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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