



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

Refer to NMFS No: WCR-2017-8438

April 20, 2018

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Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Revised Blue Mountains Forest Plan in Northeast Oregon on the Malheur, Umatilla, and Wallowa-Whitman National Forests

Dear Mr. Beverlin, Mr. Watrud, and Mr. Montoya:

Thank you for your letter of November 13, 2017, 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 Revised Blue Mountains Forest Plan in Northeast Oregon on the Malheur, Umatilla, and Wallowa-Whitman National Forests (Forests). We also received supplemental material by email on January 18 and February 2, 2018, and your letter of March 19, 2018, with an attached revised final biological assessment. 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.

In this biological opinion (Opinion), NMFS concludes that the action, as proposed, is not likely to jeopardize the continued existence of Snake River Basin steelhead (*Oncorhynchus mykiss*), Middle Columbia River steelhead (*O. mykiss*), or Snake River spring/summer Chinook salmon (*O. tshawytscha*), nor will the action destroy or adversely modify designated critical habitat for these species. Finally, NMFS concurs with the Forests that the action, as proposed, is not likely to adversely affect Snake River fall Chinook salmon (*O. tshawytscha*), Snake River sockeye salmon (*O. nerka*), or critical habitat for either species. Rationale for our conclusions is provided in the attached Opinion.





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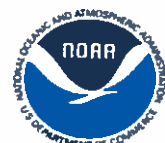
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**Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens
Fishery Conservation and Management Act Essential Fish Habitat Response**

Revised Blue Mountains Forest Plan in Northeast Oregon on the Malheur, Umatilla, and
Wallowa-Whitman National Forests

NMFS Consultation Number: *WCR-2017-8438*

Action Agencies: Malheur, Umatilla, and Wallowa-Whitman National Forests


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?
Snake River Basin steelhead (<i>Oncorhynchus mykiss</i>)	Threatened	Yes	No	Yes	No
Middle Columbia River steelhead (<i>O. mykiss</i>)	Threatened	Yes	No	Yes	No
Snake River spring/summer Chinook salmon (<i>O. tshawytscha</i>)	Threatened	Yes	No	Yes	No
Snake River fall Chinook salmon (<i>O. tshawytscha</i>)	Threatened	No	N/A	No	N/A
Snake River sockeye salmon (<i>O. nerka</i>)	Endangered	No	N/A	No	N/A

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:


 for Barry A. Thom
 Regional Administrator

Date: April 20, 2018

TABLE OF CONTENTS

1. INTRODUCTION	1
1.1 BACKGROUND	1
1.2 CONSULTATION HISTORY	1
1.2.1 Blue Mountains National Forests Land Management Plans	1
1.2.2 Hells Canyon National Recreation Area Comprehensive Management Plan	4
1.2.3 Coordination with Tribes	5
1.3 PROPOSED FEDERAL ACTION	5
1.3.1 Overview of Revised Forest Plan	5
1.3.2 Riparian Management Areas	9
1.3.3 Management Direction	10
1.3.4 Watershed Analysis	18
1.3.5 Key Watersheds	19
1.3.6 Monitoring and Adaptive Management	20
1.3.7 Consideration of Climate Change	22
1.4 HELLS CANYON NATIONAL RECREATION AREA	23
2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT	23
2.1 ANALYTICAL APPROACH	24
2.2 RANGEWIDE STATUS OF THE SPECIES AND CRITICAL HABITAT	26
2.2.1 Status of the Species	26
2.2.2 Status of Critical Habitat	28
2.2.3 Climate Change Implications for ESA-listed Species and their Critical Habitat	30
2.3 ACTION AREA	31
2.4 ENVIRONMENTAL BASELINE	32
2.5 EFFECTS OF THE ACTION	36
2.5.1 Riparian Management Areas	39
2.5.2 Designation and Protection of Population Strongholds	40
2.5.3 Multiscale Analysis	42
2.5.4 Watershed Restoration Priorities and Guidance	43
2.5.5 Management Direction (Desired Conditions, Standards, and Guidelines)	44
2.5.6 Monitoring and Adaptive Management	47
2.5.7 Consideration of Climate Change	48
2.5.8 Summary of Effects to Species	49
2.5.9 Effects to Critical Habitat	50
2.5.10 Effects to Species and Critical Habitat from the Hells Canyon National Recreation Area	53
2.6 CUMULATIVE EFFECTS	54
2.7 INTEGRATION AND SYNTHESIS	54
2.8 CONCLUSION	56
2.9 CONSERVATION RECOMMENDATIONS	56
2.10 REINITIATION OF CONSULTATION	57
2.11 “NOT LIKELY TO ADVERSELY AFFECT” DETERMINATIONS	57

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE	58
3.1 ESSENTIAL FISH HABITAT AFFECTED BY THE PROJECT	59
3.2 ADVERSE EFFECTS ON ESSENTIAL FISH HABITAT	59
3.3 ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS	59
3.4 SUPPLEMENTAL CONSULTATION	59
4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW ...	59
4.1 UTILITY	60
4.2 INTEGRITY	60
4.3 OBJECTIVITY	60
5. REFERENCES	61
APPENDIX A	A-1

TABLE OF TABLES

Table 1. Past NMFS biological opinions and letters of concurrence on Forest Plans for the Wallowa-Whitman, Malheur, and Umatilla National Forests.	3
Table 2. Categories of activities addressed by the Blue Mountain Forest Plan.	6
Table 3. Riparian management area widths.	9
Table 4. Examples of desired conditions related to the protection and conservation of listed salmon and steelhead and their habitat.	11
Table 5. Examples of Plan objectives for listed species and their critical habitats.	13
Table 6. Examples and excerpts of standards and guidelines supporting the conservation and recovery of listed salmon and steelhead. For the full list of standards and guidelines and complete language, see the BA.	14
Table 7. Federal Register notices for rules that list species, designate critical habitat, or apply protective regulations to evolutionarily significant units/distinct population segments considered in this consultation.	26
Table 8. Listing classification and date, status summary (including recovery plan reference and most recent status review), and limiting factors for species considered in this Opinion. 27	27
Table 9. Types of sites, physical and biological features, and the species life stage each PBF supports.	29
Table 10. Critical habitat, designation date, Federal Register citation, and status summary for critical habitat considered in this Opinion.	29
Table 11. Summary of baseline stream and riparian baseline conditions across subbasins in which anadromous fish occur on the Blue Mountain Forests. FA = functioning appropriately; FR = functioning at risk (gray); and FUR = functioning at an unacceptable risk (dark gray).	34
Table 12. Summary of PIBO data on stream habitat conditions presented in the BA for each Forest.	35
Table 13. Summary of potential adverse effects from future site-specific actions, by activity category.	38

Table 14.	Comparison of Critical Habitat Physical and Biological Features for Steelhead to Blue Mountains Watershed Condition Indicators. The “X”s indicate which PBFs correspond with each Water Quality Indicator.	51
Table 15.	Comparison of Critical Habitat Physical and Biological Features for Chinook Salmon to Blue Mountains Watershed Condition Indicators. The “X”s indicate which PBFs correspond with each Water Quality Indicator.	52
Table 16.	Federal Register notices for final rules that list threatened and endangered species, designated critical habitat, or apply protective regulations to listed species.	57

TABLE OF FIGURES

Figure 1.	Vicinity map of the Blue Mountains national forests. Hatch marks show the HCNRA, administered by the Wallowa-Whitman National Forest. For the HCNRA, the Wallowa-Whitman National Forest is carrying forward the 2003 Comprehensive Management Plan without modification as part of the proposed Rived Forest Plan....	8
Figure 2.	The action area, showing subbasins in which ESA-listed salmon and steelhead overlap with one of the Blue Mountains Forests.	32

ACRONYMS

ARCS	Aquatic and Riparian Conservation Strategy
BA	Biological Assessment
BLM	Bureau of Land Management
BMP	Best Management Practices
CMP	Comprehensive Management Plan
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CTWSR	Confederated Tribes of the Warm Springs Reservation
DPS	Distinct Population Segment
DQA	Data Quality Act
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Units
FA	Functioning Appropriately
Forests	Malheur, Umatilla, and Wallowa-Whitman National Forests
FR	Functioning at Risk
FUR	Functioning at Unacceptable Risk
HAPC	Habitat Areas of Particular Concern
HCNRA	Hells Canyon National Recreation Area
HUC	Hydrologic Unit Code
ITS	Incidental Take Statement
LRMP	Land and Resource Management Plans
MPG	Major Population Group
MSA	Magnuson-Stevens Fishery Conservation and Management Act

NMFS	National Marine Fisheries Service
NPT	Nez Perce Tribe
<i>O.</i>	<i>Oncorhynchus</i>
Opinion	Biological Opinion
Plan	Blue Mountains Forest Plan
PBF	Physical and Biological Feature
PCE	Primary Constituent Element
PFMC	Pacific Fishery Management Council
PIBO	PACFISH/INFISH Biological Opinion Monitoring Program
RMA	Riparian Management Areas
RMO	Riparian Management Objectives
RMP	Reasonable and Prudent Alternatives
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WCF	Watershed Condition Framework
WCI	Watershed Condition Indicators
WWNF	Wallowa-Whitman National Forest

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) portion of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.), and implementing regulations at 50 CFR 402. 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 through NMFS' Public Consultation Tracking System. A complete record of this consultation is on file at the NMFS Boise, Idaho, office.

1.2 Consultation History

1.2.1 Blue Mountains National Forests Land Management Plans

The Malheur, Umatilla, and Wallowa-Whitman National Forests (Forests) have combined efforts to revise their 1990 land and resource management plans. The proposed revised plans are combined in a single document, *Blue Mountains National Forests Land Management Plans*, referred to in this Opinion as the Plan or the Revised Forest Plan. (The Forests will split the combined plans into three separate plans before publication.) Discussions between NMFS, the U.S. Fish and Wildlife Service (USFWS), and the U.S. Forest Services' (USFS) Level 1 and Level 2 Teams have been ongoing since early 2006 regarding the Plan revision consultation. Table 3 of the Forests' biological assessment (BA) for the Plan revision lists the most recent and substantial Level 1 Team consultation discussions, many of which focused on the contents of the Forests' Aquatic and Riparian Conservation Strategy (ARCS). Subsequent to the meetings documented in Table 3 of the BA, the following communications between the Forests and NMFS occurred:

- The Forests submitted the "Final Biological Assessment for the Revised Blue Mountains National Forest Plan" to NMFS on August 30, 2017.
- On October 16, 2017, staff from the Forests, USFWS, NMFS, cooperating counties (Wallowa, Union, Grant, Harney, Wheeler, Morrow, and Columbia), and Congressional offices (Representatives Walden and McMorris Rodgers, and Senators Wyden and Markley) met to discuss the counties' concerns about the Plan's grazing guideline GM-

3G. On October 31, 2017, a subset of these entities again met and identified modifications to GM-3G for the Forests to consider.

- On November 13, 2017, the Forests submitted to NMFS an addendum to the BA, amending and incorporating by reference the Final BA for the Revised Blue Mountains National Forest Plans, dated August 30, 2017. The primary changes to the BA provided by the addendum were revisions to the Plan’s grazing guideline GM-3G.
- On January 18, 2018, the Forest submitted supplemental information to the NMFS by email: spreadsheets entitled *List of Recovery or Conservation Strategies for Snake River spring/summer Chinook salmon and Snake River Basin Steelhead Addressed by the Blue Mountains Forest Plan Revision* and *List of Recovery or Conservation Strategies for Middle Columbia River Steelhead Addressed by the Blue Mountains Forest Plan Revision*.
- On March 8, NMFS shared a draft of the Proposed Action from this Opinion with the Forests. The Forests shared minor corrections to the Proposed Action with NMFS by email on March 19, 2018, concerning the Plan’s monitoring program, and we made these corrections to our document.
- On March 19, 2018, the Forests submitted a revised final BA to NMFS. The revised final BA incorporates the revisions from the November 13, 2017, addendum; makes numerous minor corrections; and changes the Forests’ ESA determination for Snake River fall Chinook salmon from “no effect” to “not likely to adversely affect.” This Opinion is based on the revised final BA submitted by the Forests to NMFS on March 19, 2018.

Forest Plans—also called Land and Resource Management Plans (LRMPs)—describe the social, economic, and ecological goals of National Forests and provide a framework for future management decisions. The National Forest Management Act of 1976 requires each National Forest to prepare a Plan and revise it every 15 years to address new economic and social conditions, new resource conditions, and new scientific information. The current Forest Plans for each of the Blue Mountains National Forests are from 1990, and were amended in 1995 by PACFISH and INFISH (USFS 1995a; USFS 1995b). PACFISH consists of interim strategies for managing anadromous fish-producing watersheds in Eastern Oregon and Washington, Idaho, and portions of California (INFISH is a similar strategy for bull trout and other in-land fisheries). NMFS issued biological opinions on the implementation of PACFISH and effects to listed salmon and steelhead in 1995 and 1998 (NMFS 1995a; NMFS 1995b; NMFS 1998), shown in Table 1.

The USFS and Bureau of Land Management (BLM) developed PACFISH because they recognized that federal land management in the Pacific Northwest had allowed activities to occur which had led to degraded fish habitat on federally-managed lands, contributing to the decline of anadromous fish species. PACFISH was intended to be an interim strategy, expected to be in effect for approximately 18 months while long-term ecosystem-scale strategies were developed. The intent of PACFISH was to protect existing quality anadromous fish habitat and to stop habitat degradation on federal land, thus allowing restoration of aquatic and riparian ecosystems

to occur at natural rates. The USFS and BLM intended PACFISH to curb habitat degradation in the short term until a long-term, ecosystem based restoration strategy could be developed to protect and restore anadromous fish-producing waters on federal lands in the Columbia River Basin.

Table 1. Past NMFS biological opinions and letters of concurrence on Forest Plans for the Wallowa-Whitman, Malheur, and Umatilla National Forests.

Administrative Unit	Amendment/ Consultation	Consultation Date	NMFS Species Addressed
Wallowa-Whitman, Malheur, and Umatilla National Forests	Biological Opinion on Implementation of PACFISH (“1995 PACFISH Opinion”)	1/23/95 10/08/96	Snake River Spring/Summer Chinook Salmon, Snake River Fall Chinook Salmon, Snake River Sockeye Salmon
Wallowa-Whitman and Umatilla National Forests	Land and Resource Management Plans Amendment (“Salmon Biological Opinion”)	3/1/95	Snake River Spring/Summer Chinook Salmon, Snake River Fall Chinook Salmon
Wallowa-Whitman and Umatilla National Forests	Land and Resource Management Plans Amendment Steelhead Biological Opinion (“1998 LRMP Opinion”)	6/22/98	Snake River Basin Steelhead, Snake River Spring/Summer Chinook Salmon, Snake River Fall Chinook Salmon
Wallowa-Whitman National Forest	Hells Canyon National Recreation Area Comprehensive Management Plan letter of concurrence	4/16/2003	Snake River Spring/Summer Chinook Salmon, Snake River Fall Chinook Salmon, Snake River Sockeye Salmon, Snake River Basin Steelhead

The Forests developed the revised Plan in the context of the history and direction from ESA consultations on PACFISH and PACFISH-amended LRMPs. The 1995 PACFISH Opinion provided guidance for addressing the long-term needs of Snake River salmon on federal lands. PACFISH and the 1995 PACFISH Opinion included a series of goals, objectives, and guidelines for the Forests to apply until the Forests updated their Plans. The 1995 PACFISH Opinion emphasized the need for the Forests to develop management strategies that fostered the maintenance and creation of well-distributed, high quality salmon habitat over time.

The listing of Snake River Basin steelhead as threatened under the ESA in 1997 required the USFS to reinstate ESA consultation on the PACFISH-amended LRMPs in the Snake Basin to address potential effects to steelhead (NMFS 1998). Our 1998 LRMP Opinion noted that a major weakness in PACFISH-amended LRMPs was the lack of a comprehensive, aquatic restoration strategy for watersheds with ESA-listed fish species. The Forests’ planning of actions up to that point had lacked a comprehensive and coordinated approach to analyze and restore watersheds to improve survival and enable recovery of the listed anadromous species.

The PACFISH, the PACFISH-amended LRMPs, and the associated consultation(s) played an important role in the decades-long effort to revise the Blue Mountains Plans. The Revised Plans

do not repeat verbatim direction in PACFISH or the LRMP Opinions. Instead, the Level 1 Team worked to ensure that the Revised Plans included a long-term aquatic conservation strategy sufficient to replace the previous interim strategies, and to ensure that management actions on Federal land carried out within the framework of the Revised Plans would meet or exceed the intent of this previous direction to minimize adverse effects to listed species.

In 2002, regional executives from the USFS, NMFS, and USFWS agreed that Revised Forest Plans for the Forests would include a long-term aquatic conservation strategy that would replace the PACFISH interim strategies and associated consultations (USFS et al. 2002). The proposed long-term strategy that the Forests subsequently developed is called the *Blue Mountains Aquatic and Riparian Conservation Strategy* (Blues ARCS, or ARCS) and is a key element of the Revised Plan and included as Appendix A of the BA. The Blues ARCS builds off of the strategies in PACFISH and also includes an active watershed restoration component. Appendix B of the BA provides a comprehensive crosswalk between the components and direction of PACFISH versus those of the proposed Blues ARCS (e.g., comparison of standard widths for riparian habitat conservation areas bordering fish-bearing streams under PACFISH versus under the Blues ARCS), and NMFS agrees that it demonstrates that the ARCS is at least as protective as PACFISH.

In developing the Blues ARCS, the Forests followed the *Updated Interior Columbia Basin Strategy: A Strategy for Applying the Knowledge Gained by the Interior Columbia Basin Ecosystem Management Project to the Revision of Land Use Plans and Project Implementation* (“Interior Columbia Basin Strategy,” developed 2003, revised 2014) (BLM et al. 2014). This interagency memorandum applies to USFS Regions 1, 4, and 6. The memorandum identifies fundamental elements for revised Forest Plans to include when replacing PACFISH and INFISH. These elements are intended to promote and achieve conservation of aquatic and riparian resources. The elements include: (1) Designation and conservation of riparian areas to maintain and improve riparian function; (2) designation and protection of population strongholds for listed species; (3) multiscale analysis (i.e., watershed analysis at different spatial scales); (4) restoration priorities and guidance; (5) management direction (e.g., desired conditions and standards and guidelines); (6) monitoring and adaptive management; and (7) consideration of climate change.

1.2.2 Hells Canyon National Recreation Area Comprehensive Management Plan

One exception to the new direction of the Revised Blue Mountains Forest Plan is the Hells Canyon National Recreation Area (HCNRA), 662,000 acres on the Snake River managed by the Wallowa-Whitman National Forest (WWNF). A comprehensive management plan (CMP) for the area was approved in 1982 and incorporated into the Wallowa-Whitman National Forest Plan in 1990. The USFS revised the CMP in 2003, and this revision was again incorporated into the 1990 Forest Plan for the WWNF. NMFS concurred with the WWNF in 2003 that the CMP was not likely to adversely affect Snake River Basin steelhead (*Oncorhynchus mykiss*), Snake River fall Chinook salmon (*O. tshawytscha*), Snake River spring/summer Chinook salmon (*O. tshawytscha*), Snake River sockeye salmon (*O. nerka*), or their designated critical habitats (NMFS No. NWR-2003-00273). At that time, NMFS had not yet designated critical habitat for Snake River Basin steelhead, which occurred in 2005. The WWNF is carrying forward the

2003 CMP without modification as part of the proposed Revised Forest Plan. Although the CMP remains unchanged since 2003, the WWNF is including it in the proposed action for the Revised Forest Plan in order to reinitiate consultation on the CMP and analyze the effects of the CMP on critical habitat for Snake River Basin steelhead. In the BA, in addition to analyzing the effects of the CMP on Snake River Basin steelhead critical habitat, the Forests have also updated their analyze of the effects of the CMP on Snake River spring/summer Chinook and their critical habitat and on the Snake River Basin steelhead DPS.

Direction from PACFISH will remain in place for the HCNRA and the proposed Blues ARCS will not apply to this area. Like the Revised Plan, the CMP provides a framework for the development of future actions that will be authorized, funded, or carried out at a later time and for which any take of a listed species would not occur unless and until those future actions are authorized, funded, or carried out and subject to further section 7 consultation.

1.2.3 Coordination with Tribes

Because this action has the potential to affect tribal trust resources, NMFS provided copies of the draft proposed action from NMFS' draft Opinion to the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), the Nez Perce Tribe (NPT), and the Confederated Tribes of the Warm Springs Reservation (CTWSR) on March 8, 2018. The NPT was the only tribe to respond, responding in this way:

- NMFS received a letter from the NPT on March 19, 2018, requesting a government-to-government consultation prior to the finalization of this Opinion. In their letter, the NPT makes several suggestions to modify the proposed Revised Plan. NMFS developed ESA Conservation Recommendations (Section 2.9) to address some of the NPT's concerns with the Proposed Plan.
- NMFS met with the NPT Executive Committee on April 10, 2018. The NPT Executive Committee voiced several concerns with the Proposed Plan.

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). “Interrelated actions” are those that are part of a larger action and depend on the larger action for their justification. “Interdependent actions” are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

1.3.1 Overview of Revised Forest Plan

Land management plans for National Forests provide a framework and sideboards to guide decisions for all natural resource management activities on a national forest or grassland, per the requirements of the National Forest Management Act Planning Rule. The Revised Plan is intended to guide project development on the Forests for the next 15 years. The Revised Blue Mountains Plan would apply to roughly 5.4 million acres of federal land spread across the

Forests in Northeast Oregon and Southwest Washington (Figure 1). For these three forests, with the exception of the HCNRA administered by the WWNF, the revised Plan will replace all current Forest Plan direction for federally listed species and their designated critical habitat on the Forests. Activities expected to occur on the Forests and that fall under their purview of the Plan include: timber harvest, livestock grazing, recreation, mining, transportation, wildland fire management, special uses, and watershed restoration. Table 2 summarizes each major category of activity.

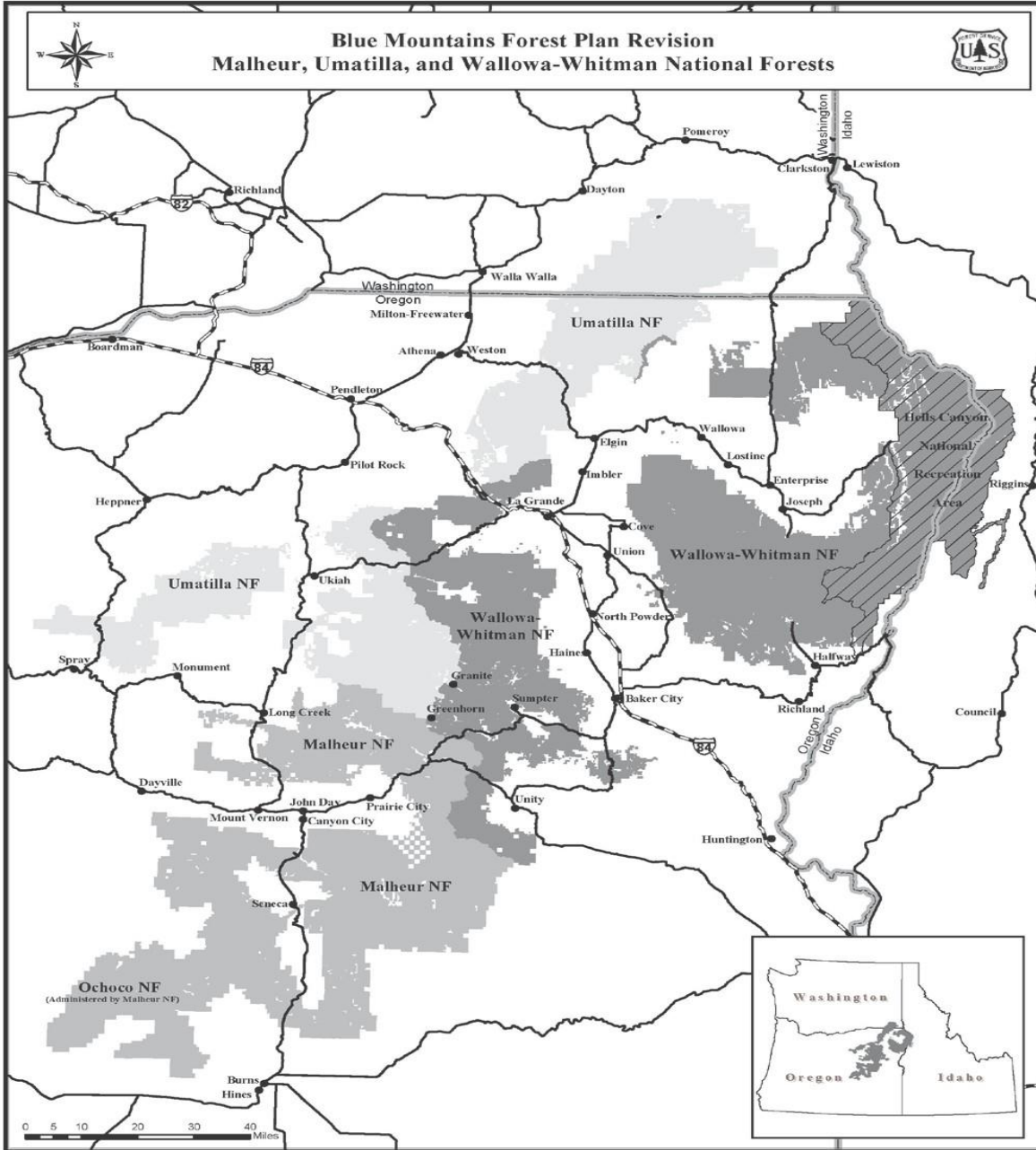
Table 2. Categories of activities addressed by the Blue Mountain Forest Plan.

Activity Category	Summary
Vegetation Management (Timber Harvest, Silvicultural Management, and Fuel and Wildland Fire Activities)	<ul style="list-style-type: none"> • 2.7 million acres within the Forests are suitable for timber harvest • Timber harvest activities include a range of harvesting methods, temporary road construction and use, road reconstruction, and prescribed fire. • Wildland fire management includes constructing fire lines, fuel reduction (thinning), application of water, and aerial application of chemical retardants.
Livestock Grazing	<ul style="list-style-type: none"> • Permittees graze livestock on up to 3.7 million acres of grazing land on the Forests (including the HCNRA).
Recreation	<ul style="list-style-type: none"> • The Forests provide and manage a variety of recreational opportunities: campsites, vistas, parking areas, dispersed camping, boating, mushroom and berry picking, hunting, and fishing.
Mining	<ul style="list-style-type: none"> • Gold, silver, and other valuable minerals are available for prospecting in accordance with mining laws. • Mining activities on the Forests include suction dredging, placer mining, and small-scale hard rock mines. • In 2016 there were 1,260 active mining claims on the three National Forests. • Relatively minor production of rock materials (e.g., crushed basalt, riprap) occurs intermittently on the Forests.
Roads and Trails	<ul style="list-style-type: none"> • The Forests maintain a system of roads, trails, and areas for non-motorized and motor vehicle use available for public use. • To manage these roads, the Forests conduct road and trail construction, reconstruction, maintenance, decommissioning activities, and treatment of invasive plants.
Special Uses	<ul style="list-style-type: none"> • Special Uses include: road use permits, right-of-ways or easements, use of federally-owned structures, operation of resorts on Federal land, recreational residences, water transmission lines, diversion dams, water withdrawals for irrigation, diversion structures, telephone lines, and some powerline special use permits. • The Forests receive requests for special use permits, leases, or easements for these
Watershed Restoration	<ul style="list-style-type: none"> • The Forests conduct watershed, stream, and riparian restoration projects in many watersheds across the three Forests. Restoration actions include passage barrier removals, addition of large wood to streams, and stream channel reconstruction.

The Revised Plan includes goals, desired conditions, objectives, management areas and suitable uses, standards and guidelines, and monitoring and evaluation as Plan components. Watershed Analysis is included as other Plan content. Full details of the revised Plan are provided in Appendix K at the BA (the Revised Forest Plan) and Appendix A of the BA (*Blue Mountains Aquatic and Riparian Conservation Strategy* [or “Blues ARCS”]). The Blues ARCS also serves as Appendix A of the Revised Forest Plan. Together, these two appendices to the BA constitute the full management direction of the Revised Forest Plan, which provides for multiple uses, as mandated by the Multiple Use-Sustained Yield Act and the National Forest Management Act.

The elements of the Plan which are aimed at protecting and conserving riparian and aquatic areas are collected in the Blues ARCS. Per the Interior Columbia Basin Strategy (BLM et al. 2014), this long-term strategy has several key components: riparian management areas, identification of key watersheds, watershed analysis, watershed protection and restoration, management direction for activities that can impact riparian and aquatic areas, monitoring and adaptive management, and consideration of climate change. In this section we summarize the components of the Plan, focusing on the elements of the Blues ARCS. We focus our description of the Proposed Action on the ARCS because the ARCS includes the elements of the Plan that determine the level and type of impacts that future site-specific projects developed under the Plan could have on listed fish and their habitat. The BA, including the Blue Mountains ARCS in Appendix A, provides more detail on all components of the Plan (which is Appendix K of the BA) and is incorporated here by reference. The following section will briefly summarize key components of the Plan and the ARCS, include examples where appropriate, and reference the pertinent sections of the BA for further details.

Figure 1. Vicinity map of the Blue Mountains national forests. Hatch marks show the HCNRA, administered by the Wallowa-Whitman National Forest. For the HCNRA, the Wallowa-Whitman National Forest is carrying forward the 2003 Comprehensive Management Plan without modification as part of the proposed Revised Forest Plan.



1.3.2 Riparian Management Areas

Management areas—such as Wilderness, Wild and Scenic Rivers, or General Forest—are spatially distinct areas within the Forests with unique direction and desired conditions under the Plan. For ESA-listed salmon and steelhead, the most important management area designation is Riparian Management Areas (RMAs). The Blues ARCS approach to riparian area management involves designation of relatively large default RMAs to protect and restore water quality, habitat for a wide range of aquatic and terrestrial species, and critical ecological processes. Watershed analysis can be used to adjust the default RMA widths in particular watersheds. The RMAs are not no-touch buffers. Instead, management activities designed to benefit aquatic and riparian-dependent resources and move the landscape towards desired conditions are allowed within RMAs. The RMAs extend over roughly 1.3 million acres of the three Forests (Table 6 of the BA), a substantial portion of the 5.4 million acres administered by the Forests.

The RMAs will generally have minimum widths but are designed to extend to the outer edge of riparian vegetation, or to the outer extent of the 100-year floodplain, whichever is greater. Table 3 shows the minimum widths.

Table 3. Riparian management area widths.

Category	Minimum Riparian Management Area Width
Fish-bearing streams	300-foot slope distance on either side of stream or to outer edge of 100-year floodplain, whichever is greatest
Permanently-flowing non-fish-bearing streams	150-foot slope distance on either side of stream or to outer edge of 100-year floodplain, whichever is greatest
Constructed ponds, reservoirs and wetlands greater than 1 acre	150-foot slope distance from the outer edge of wetland or from the maximum pool elevation, whichever is greatest
Lakes and natural ponds	300-foot slope distance
Seasonally-flowing, intermittent* and ephemeral streams, wetlands smaller than 1 acre, and unstable areas	<p>At a minimum, the RMAs will include:</p> <ul style="list-style-type: none"> ▪ The extent of unstable and potentially unstable areas (including earthflows). ▪ The stream channel and extend to the top of the inner gorge, or in incised streams, to the edge of the former floodplain. ▪ The stream channel or wetland and the area from the edges of the stream channel or wetland to the outer edges of the riparian vegetation, extending from the edges of the stream channel to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest. A site-potential tree height is the average maximum height of the tallest dominant trees for a given site class.

**Intermittent streams* are defined as any non-permanent flowing drainage feature having a definable channel and evidence of annual scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two physical criteria. Including intermittent streams, springs, and wetlands within RMAs are important for full implementation of the ARCS. Fish-bearing intermittent streams are distinguished from non-fish-bearing intermittent streams by the presence of any species of fish for any duration. Many intermittent streams may be used as spawning and rearing streams, refuge areas during flood events in larger rivers and streams, or travel routes for fish emigrating from lakes. In these instances, the guidelines for fish-bearing streams would apply to those sections of the intermittent stream used by the fish.

1.3.3 Management Direction

Management direction under the Plan consists of goals, desired conditions, objectives, and standards and guidelines.

1.3.3.1 Goals

Goal statements set forth a broad framework and theme for the Revised Forest Plan and form the basis for desired conditions. The Plan's three goals are to promote ecological integrity, promote social well-being, and promote economic well-being. For each of the Plan's three goals, there are many desired condition statements which more specifically describe what conditions are needed for attaining the goal. The goal that is relevant to Plan's potential effects to listed species is "Goal 1: Promote Ecological Integrity." Ecological integrity is the quality or condition of an ecosystem when its dominant ecological characteristics (for example, composition, structure, function, connectivity, and species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence. The Revised Plan aims to integrate the three goals and their respective desired conditions to enable sustainable management of the Forests. However, it may not be possible for an individual project developed under the Plan to make progress towards all of the Plan's desired conditions, as described below.

1.3.3.2 Desired Conditions

Desired conditions describe the social, economic, and ecological attributes toward which management of the land and resources of the Blue Mountains National Forests are to be directed. Desired conditions may not be achieved during the life of the Plan. However, future projects and activities must be consistent with the desired conditions of the Revised Forest Plan. Therefore, a project or activity, when assessed at the appropriate spatial scale described in the Revised Forest Plan (e.g., subwatershed scale), must be designed to meet one or more of the following conditions:

- Maintain or make progress toward one or more of the desired conditions of the Revised Forest Plan without adversely affecting progress toward, or maintenance of, other desired conditions; or,
- Be neutral with regard to progress toward the Revised Forest Plan desired conditions; or,
- Maintain or make progress toward one or more of the desired conditions over the long term, even if the project or activity would adversely affect progress toward or maintenance of one or more desired conditions in the short term; or,
- Maintain or make progress toward one or more of the desired conditions over the long term, even if the project or activity would adversely affect progress toward other desired conditions in a negligible way over the long term.

Documentation for individual projects for approval will explain how a project is consistent with desired conditions and will describe any short-term or negligible long-term adverse effects the project may have concerning the maintenance or attainment of any desired condition. Table 4 provides examples of desired conditions related to listed salmon and steelhead and their habitat. The BA provides a complete list of desired conditions. Appendix A of this Opinion provides a list of all the desired conditions, standards, and guidelines identified in the ARCS as addressing stream and riparian protection.

Table 4. Examples of desired conditions related to the protection and conservation of listed salmon and steelhead and their habitat.

Desired Condition Name and Number	Desired Condition Description
Aquatic Function DC-1 (AQ-1)	Aquatic habitats contribute to ecological conditions capable of supporting self-sustaining populations of native species and diverse plant, invertebrate, and vertebrate aquatic and riparian-dependent species. Aquatic habitats are key for the recovery of threatened and endangered fish species and provide important habitat components for all native aquatic species.
Aquatic Function DC-7 (AQ-7)	Aquatic habitats in which the distribution of conditions (e.g., bank stability, substrate size, pool depths, size and frequencies, channel morphology, large woody debris size and frequency) in the population of watersheds on the Forest is similar to the distribution of conditions in the population of similar, reference condition watersheds.
Water Quality DC-1 (WQ-1)	Water quality (e.g., temperature, turbidity, and dissolved oxygen) of surface and groundwater is sufficient to support healthy riparian, aquatic, and wetland ecosystems. It is within the range that maintains the biological, physical, and chemical integrity of the system and is capable of benefiting the survival, growth, reproduction, and mobility of individuals composing aquatic and riparian communities.
Stream Channel Function DC-2 (SC-2)	The physical integrity of the aquatic system, including shorelines, banks, and bottom configurations, are properly functioning and in dynamic equilibrium with the flow and sediment regimes under which aquatic systems have evolved.
Key Watershed DC-2 (KW-2)	Roads in key watersheds present minimal risk to aquatic resources.
Watershed Function DC-4	Aquatic and riparian ecosystems resilient to the effects of climate change and other major disturbances.
Riparian Management Area DC-2 (RMA-2)	The species composition and structural diversity of native plant communities in riparian management areas, including wetlands, provides adequate side channels, pools, undercut banks and unembedded substrates. These conditions result in a variety of depths, gradients, velocities, and structure for seasonal thermal regulation, nutrient filtering, appropriate rates of erosion, and channel migration and supplies amounts and distributions of coarse woody debris and fine particulate organic matter sufficient to sustain physical complexity and stability.

In order to ensure consistent, transparent assessment of desired conditions—which are broadly-described goals—the Forests have included a measurement tool as part of the Plan. To assess whether or not an individual proposed project has been designed to maintain or make progress towards desired conditions for aquatic and riparian resources, the Forests will use Watershed Condition Indicators (WCIs). The WCIs are similar to the measurable riparian management objectives (RMOs) in PACFISH. For the Revised Plan, WCIs are the values or qualitative descriptions defined as “functioning appropriately” for different pathways within the NMFS

(1996) and USFWS (1998) Matrices of Pathways and Indicators (Table 2 of Attachment B of the ARCS). The units of measure for WCIs are generally reported in one of two ways: (1) Quantitative metrics that have associated numeric values (e.g., “large woody debris: >20 pieces per mile”); or (2) qualitative descriptions based on field reviews and professional judgment (e.g., “physical barriers: no man-made barriers present”). As another example, the functioning appropriately range for the stream temperature WCI for steelhead and Chinook salmon is 50–57°F.

Measurable WCIs provide a benchmark by which to assess the potential effects of management activities on the landscape. Table 1 of Attachment B of the ARCS shows which WCIs the Forests will use to assess different desired conditions. For example:

- The temperature WCI will be used to measure achievement of several desired conditions, including AQ-1, WQ-1, and RMA-2 (see Table 3 above).
- The road density WCI will be used to assess the achievement of one of the desired conditions for Key Watersheds. Key Watershed DC-2 is for roads in key watersheds to present minimal risk to aquatic resources at the subwatershed scale. The functioning appropriately WCI value associated with this desired condition is “<2 miles of road per square mile, and no valley bottom roads.”

The quantitative and qualitative default WCI values provided are not intended to be standards nor absolute values that precisely define desired conditions. Instead, the values and descriptions comprise a diagnostic tool to promote discussions and evaluations of the environmental functional relationships specific to the watershed being considered for management actions. WCIs are criteria to assist in evaluating progress towards an attainment of soil, water, riparian, and aquatic goals. They do not replace state and federal water quality standards under the Clean Water Act or state laws. They assist with but do not ultimately dictate the Forests’ ESA effects determinations for listed fish and critical habitat from proposed management actions considered through the section 7 consultation process for individual projects and activities.

If default WCI values are not functionally attainable given the inherent characteristics of the watershed being considered, or if better local data are available to help define a more site- or watershed-specific WCI value, then the Forests will make local modifications to that particular WCI. Modification of default indicator values may be completed through a variety of methods such as watershed and project analysis. It can be done using results of broad-scale and Forest-wide monitoring and collection and evaluation of watershed and/or stream reach specific data. Local adaptations to WCIs will ideally be based on reference conditions and the capability of streams in a given biophysical environment. In watersheds with listed salmon and steelhead or their critical habitat, the Forests will coordinate with NMFS through the Level 1 teams on any modifications of WCI values relevant to section 7 consultations on individual projects.

1.3.3.3 Objectives

The Plan includes objectives, which are measurable and time-specific statements of a desired rate of progress toward a desired condition or conditions. Examples of objectives that support the conservation and recovery of ESA-listed species and their critical habitats are provided in Table 5 below. Like goals and desired conditions, the Plan’s objectives are not commitments or final decisions approving projects or activities. Most objectives are expected to be accomplished during the first decade of the Revised Forest Plan period, dependent on available funding. Funding for the types and amounts of riparian and aquatic restoration projects included in the Plan’s objectives will come from multiple sources, both internal and external. Based on ongoing partnerships, the Forests expects the following groups will continue to collaborate with the Forests to implement and/or fund restoration projects through the life of the Plan: the Tribes, Oregon Watershed Enhancement Board, Bonneville Power Administration, watershed councils, and others (personal communication from K. Ramsey, Umatilla National Forest, March 5, 2018). Table 4 shows examples of the Plan’s Watershed Function objectives for priority watersheds in the three Forests.

Table 5. Examples of Plan objectives for listed species and their critical habitats.

Objective	Malheur National Forest	Umatilla National Forest	WWNF
Reducing road-related sedimentation and reducing hydrologic connectivity of the road system by: considering designating routes for other uses, or closing or decommissioning roads where open motor vehicle routes are negatively affecting riparian conditions.	30–35 miles road surface treated (annually)	30–35 miles road surface treated (annually)	30–35 miles road surface treated (annually)
Improve riparian and wetland function by: Restoring floodplain connections, channel morphology, channel structure, and flow regime (flood flows and low flows) (stream miles)	80 miles	90 miles	90 miles
Restoring channel morphology to reflect natural conditions (miles)	38 miles	45 miles	60 miles
Increasing habitat complexity through channel reconstruction, placement of large wood or other structures, habitat enhancement (miles)	75 miles	90 miles	113 miles
Increasing aquatic habitat connectivity through culvert replacement (number of culverts)	90 culverts, 143 stream miles	75 culverts, 68 stream miles	90 culverts, 135 stream miles
Restore habitat quality and connectivity within and between stronghold watersheds for aquatic species, with emphasis on strongholds for ESA-listed aquatic species.	4–6 subwatersheds or 80–120 stream miles	3–5 subwatersheds or 60–100 stream miles	6–9 subwatersheds or 120–180 stream miles

1.3.3.4 Standards and Guidelines

Standards are mandatory constraints upon project and activity decision making. Standards are established to help achieve or maintain desired conditions and to ensure project activities on National Forest System lands comply with applicable laws, regulations, executive orders, and agency directives, and to avoid or mitigate undesirable effects. A project or activity must be consistent with all standards applicable to the type of project or activity and its location in the

planning area. A project or activity is consistent with a standard when its design is in exact accord with the standard; variance from a standard is not allowed except by Forest Plan amendment.

A guideline is a constraint on project and activity decision-making that allows for departure from its terms, so long as the purpose of the guideline is met. Guidelines are established to help achieve or maintain a desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements. Guidelines serve the same purpose as standards, but they differ from standards in that they provide flexibility in defining compliance, whereas standards are absolute constraints.

A project or activity is consistent with a guideline in either of two ways:

1. The project or activity is designed exactly in accord with the guideline; or,
2. A project or activity design varies from the exact words of the guideline, but it is as effective in meeting the purpose of the guideline to contribute to the maintenance or attainment of the relevant desired conditions and objectives.

The ARCS provides a comprehensive list of standards and guidelines designed to conserve and recover listed salmon and steelhead and their critical habitats on the Forests. Table 6 shows a selection of the most important of these standards and guidelines for the recovery of listed species.

Table 6. Examples and excerpts of standards and guidelines supporting the conservation and recovery of listed salmon and steelhead. For the full list of standards and guidelines and complete language, see the BA.

<p>Standard RE-5S. Minimize adverse effects to ESA listed, proposed, and candidate species and their designated and proposed critical habitat in accordance with USFS authorities. Management activities shall not retard recovery of listed, and proposed, and candidate species and their designated and proposed critical habitat in the long-term in accordance with USFS authorities. Federally listed, proposed, and candidate species and their designated and proposed critical habitats shall be managed in accordance with their recovery or other conservation plans, in accordance with USFS authorities.</p>
<p>Standard RMA-1S. When riparian management area desired conditions are functioning properly, projects shall protect or maintain those conditions. When riparian management area desired conditions are not yet achieved, and to the degree that project activities would contribute to those conditions, projects or permitted activities shall restore or not retard attainment of desired conditions. Short-term adverse effects from project activities may occur when they support long-term recovery of riparian management area desired conditions.</p> <p>Exceptions to this standard include situations where USFS authorities are limited (e.g., 1872 Mining law). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of desired conditions to the extent possible within USFS authorities. Use ARCS Attachment B (<i>Use of the Matrix of Pathways and Watershed Indicators and Watershed Condition Framework to Replace RMOs; and Riparian Management Areas – Functions and Ecological Processes</i>) to assist in determining compliance with this standard.</p>
<p>Standard WM-1S. When watershed function desired conditions are being achieved and watersheds are functioning properly, projects shall maintain those conditions. When watershed function desired conditions are not yet achieved, and to the degree that project activities would contribute to those conditions, projects shall restore or not retard attainment of desired conditions. Short-term adverse effects from project activities may occur when they support or do not diminish long-term recovery of watershed function desired conditions and federally listed species.</p>

Exceptions to this standard include situations where USFS authorities are limited (e.g., 1872 Mining law). In those cases, project effects shall be minimized and not retard attainment of desired conditions for watershed function, to the extent possible within USFS authorities. Use ARCS Attachment B to assist in determining compliance with this standard.

Standard TM-1S. Silvicultural treatments shall occur in riparian management areas only as necessary to maintain, enhance, or restore desired conditions for aquatic and riparian resources. When conducted, these activities shall avoid or minimize adverse effects to aquatic and riparian resources. Vegetation in riparian management areas shall not be subject to regularly scheduled timber harvest because they are not part of the timber suitability landbase.

Standard GM-1S. Manage livestock grazing to attain aquatic and riparian desired conditions. Where livestock grazing is found to prevent or retard attaining aquatic and riparian desired conditions, modify grazing practices (such as number of livestock, timing, and physical structures). If adjusting practices is not effective, remove livestock from that area using appropriate administrative authorities and procedures.

Guideline GM-3G. The purpose of this guideline is to manage livestock grazing to help attain and maintain aquatic and riparian desired conditions over time. Specifically, it is intended to maintain or improve vegetative and stream conditions, help ensure the viability of aquatic species, provide important contributions to the recovery of ESA-listed species, and facilitate attainment of State water quality standards.

The annual livestock use and disturbance indicators described below (e.g., stubble height) should be applied to help achieve, over longer timeframes, conditions at site and watershed scales that enable attainment and maintenance of desired conditions. The values specified below are starting points for management. Only those indicators and numeric values that are appropriate to the site and necessary for maintaining or moving towards desired conditions should be applied.¹ Specific indicators and indicator values should be prescribed and adjusted, if needed, in a manner that reflects existing and desired conditions and the natural potential of the specific geo-climatic, hydrologic and vegetative setting in which they are being applied². Indicators and indicator values should be adapted over time based on long-term monitoring and evaluation of conditions and trends. Alternative livestock use and disturbance indicators and values, including those in current ESA consultation documents or non-ESA allotment management plans or allotment National Environmental Policy Act decisions, may be used if they are based on best available science and monitoring data and meet the purpose of this guideline.

1. Where desired conditions for water quality, aquatic habitat, and riparian vegetation have been attained and riparian vegetation is in late-seral conditions, protect or maintain those conditions by managing annual livestock grazing use and disturbance as follows:
 - maintain a minimum of 4-inch residual stubble height of key herbaceous species on the greenline;
 - utilize no more than 30–45 percent of deep-rooted herbaceous vegetation in the active floodplain and, as needed, in other critical portions of the riparian management area;
 - limit streambank alteration to no more than 20–25 percent (measured within 1–2 weeks of livestock removal from the pasture); and,
 - limit use of woody species to no more than 30–40 percent of current year’s leaders along streambanks and, as needed, in other critical portions of the riparian management area.
2. Where desired conditions for water quality, aquatic habitat, and/or riparian vegetation have not yet been attained, but conditions are moving towards those desired conditions, enable continued recovery by managing annual livestock grazing use and disturbance as follows:

¹Not all indicators may apply to a particular site. For example, stubble height is a meaningful indicator for lower gradient streams where herbaceous vegetation plays an important role in stabilizing streambanks. It is generally less useful for steeper channels, where channel morphology is controlled by coarse substrates.

²Indicator values for specific sites should be determined based on consideration of local conditions including, but not limited to, the degree of departure between existing and desired conditions, the current and desired rate of improvement, site sensitivity to grazing, grazing season, the presence of special status species (e.g., ESA-listed species, Regional Forester’s sensitive species) that are sensitive to grazing, whether or not water quality standards and related requirements (e.g., total maximum daily loads for impaired waters) are being met, and the site’s importance in maintaining or attaining those standards and requirements. Consideration of these conditions is especially important in prescribing specific stubble height values within the 4-inch to 6-inch range and streambank alteration values within the 15–20 percent range.

- maintain a minimum of 4-inch to 6-inch residual stubble height of key herbaceous species on the greenline; and,
 - follow the criteria for utilization of deep-rooted herbaceous vegetation, streambank alteration, and use of woody species described in (1).
3. Where desired conditions for water quality, aquatic habitat, and/or riparian vegetation have not been attained and conditions are not moving towards those desired conditions, enable recovery by managing annual livestock grazing use and disturbance as follows:
- maintain a minimum of 6-inch residual stubble height of key herbaceous species on the greenline;
 - utilize no more than 30–35 percent of deep-rooted herbaceous vegetation in the active floodplain and, as needed, in other critical portions of the riparian management area;
 - limit streambank alteration to no more than 15–20 percent; and
 - limit use of woody species to no more than 20–30 percent of current year’s leaders along streambanks and, as needed, in other critical portions of the riparian management area.

Standard KW-1S. In Key Watersheds or subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species that are functioning properly³ there shall be no net increase (1-mile of road-related risk reduction for every new mile of road construction), where they are functioning-at-risk⁴, there shall be a net decrease (1.5 miles of road-related risk reduction for every new mile of road construction), and where they are impaired function, there shall be a net decrease (2.0 miles of road-related risk reduction for every new mile of road construction) in system roads that affect hydrologic function.

Priority for road-related risk reduction shall be given to roads that pose the greatest relative ecological risks to riparian and aquatic ecosystems. Road-related risk reduction will occur prior to new road construction unless logistical restrictions require post-construction risk reduction. This standard shall apply to the affected subwatershed when new system road construction is proposed in that subwatershed, and shall not be offset by reductions in open-road densities in other subwatersheds.

Guideline MM-1G. For operations in RMAs, ensure operators take all practicable measures to maintain, protect, and rehabilitate water quality and habitat for fish and wildlife and other riparian dependent resources that may be affected by the operations. Ensure operations do not retard or prevent attaining aquatic and riparian desired conditions. Exceptions to this guideline include situations where USFS has limited discretionary authorities. In those cases, project effects should be minimized and should not prevent or retard attaining aquatic and riparian desired conditions to the extent possible within those authorities.

Two of the most important standards in the Revised Plan for aquatic and riparian conservation are WM-1S and RMA-1S. These standards state that when watershed and riparian desired conditions are being achieved, projects shall maintain those conditions; and where desired conditions are not yet achieved, projects shall restore or not retard attainment of desired conditions. For example, an action that proposes to revise an allotment management plan would need to comply with all applicable Forest-wide standards and guidelines including WM-1S and RMA-1S. To comply with standard WM-1S the action would need to ensure baselines within desired conditions are maintained before the action could proceed. If the baseline was outside desired conditions, then the action would need to restore or not retard attainment of desired conditions before it could proceed. To assist in determining whether a project is consistent with

³ “Functioning properly”, “functioning-at-risk”, and “impaired function” for the roads and trails indicator of Watershed Condition Framework (WCF) are defined in Watershed Condition Framework Technical Guide, USFS 2011b. Local inventory, assessment and monitoring data and information can be used to refine initial classifications made per WCF.

this standard, the land manager would use the WCIs for different riparian and aquatic habitat components from the Appendix B of the ARCS (See Section 1.3.3.2 Desired Conditions of this Opinion).

Not every project, even in a degraded baseline, will be restorative. Some management actions proposed for a watershed rated as “functioning at unacceptable risk” will result in short-term adverse effects. These management actions are appropriate under the Revised Plan as long as they do not retard the attainment of aquatic and riparian desired conditions.

1.3.3.5 Determination that a Project is Consistent with the Plan

A project or activity approval document must describe how the project or activity is consistent with applicable plan components and meets the following criteria:

1. **Goals, desired conditions, and objectives.** The project or activity contributes to the maintenance or attainment of one or more goals, desired conditions, or objectives, and does not appreciably impede progress toward maintaining or achieving any goals, desired conditions, or objectives, over the life of the plan.
2. **Standards.** The project or activity complies with applicable standards.
3. **Guidelines.** The project or activity:
 - A. Complies with applicable guidelines as set out in the plan; or,
 - B. Is designed in a way that is as effective in achieving the purpose of the applicable guidelines.
4. **Suitability.** A project or activity would occur in an area:
 - A. That the plan identifies as suitable for that type of project or activity; or,
 - B. For which the plan is silent with respect to its suitability for that type of project or activity.

It is not expected that all projects or activities will contribute to all desired conditions and objectives. It should also be recognized that some projects designed to contribute to some desired conditions and objectives may have consequences considered adverse to the achievement of other desired conditions and objectives. In this situation, the responsible Forest official needs to identify and disclose those effects and determine whether those effects will appreciably reduce the opportunity to maintain or desired conditions over the life of the plan. If the project or activity is found to appreciably reduce opportunities to maintain or achieve desired conditions over the long term, then the project is not consistent with the Plan.

An example of where a project might not contribute to a desired condition is minerals management within RMAs. Guideline MM-1G states:

For operations in RMAs, ensure operators take all practicable measures to maintain, protect, and rehabilitate water quality and habitat for fish and wildlife and other riparian dependent resources that may be affected by the operations. Ensure operations do not retard or prevent attaining aquatic and riparian desired conditions. Exceptions to this guideline include situations where USFS has limited discretionary authorities. In those cases, project effects should be minimized and should not prevent or retard attaining aquatic and riparian desired conditions to the extent possible within those authorities.

Thus for mining activities within RMAs where the USFS has limited discretionary authorities, long-term adverse effects in RMAs could occur but should be minimized to the extent possible within those authorities.

1.3.4 Watershed Analysis

Watershed analysis, which can be conducted at multiple spatial scales (subbasin to subwatershed), will be used to inform Plan implementation. Watershed analysis is an interdisciplinary analysis of the status and trends of watershed and aquatic ecosystem conditions. This information serves as a foundation for Plan implementation through the development of strategic and integrated programs and projects that protect and restore aquatic resources, while enabling informed and sustainable resource use and management. These analyses, combined with monitoring and evaluation, provide the context and foundation to adaptively execute the other components of the ARCS, including management of RMAs and Key Watersheds, implementation of Watershed Restoration, and compliance with Plan components.

The watershed analysis process, as described in the Federal guidebook to watershed analysis (Regional Ecosystem Office 1995), includes six steps to be conducted in an interdisciplinary process: (1) Characterize the study watershed; (2) identify important water and aquatic resources and key management issues and questions associated with them; (3) describe current resource conditions and trends and the dominant biophysical processes (natural and human-caused) responsible for them; (4) compare those conditions to applicable reference conditions; (5) synthesize and interpret; and (6) identify opportunities and make management recommendations to maintain or restore watershed and aquatic resources. Watershed analysis thus gives the Forests information to identify activities that would maintain or move aquatic and riparian areas towards desired conditions; and it also helps the Forests evaluate the consistency of potential projects with Plan direction. This includes ensuring that management activities in Key Watersheds and RMAs maintain, restore, or enhance aquatic and riparian resources.

Through implementation of the existing aquatic strategies in the 1990s and early 2000s, watershed analyses have been completed for the majority of National Forest lands within the three Forests. After accounting for wilderness and roadless areas, 83 percent of National Forest acres have completed watershed analyses. Consequently, future work under the revised Plan will largely focus on efficiently updating a portion of those existing analyses to better reflect current watershed conditions and trends, climate change, the latest science and policy, and current restoration opportunities. The Forests have estimated the number of new or updated watershed analyses expected to be completed during the life of the Revised Forest Plan and identified a set

of watersheds for which these updates will be a priority. Criteria for selecting potential watersheds for updated analysis included: (1) Key watersheds; (2) watersheds that are identified as priority watersheds during the life of the Revised Forest Plan; (3) watersheds that support listed species or contain designated critical habitat; and (4) watersheds wherein management activities are likely to occur that may substantially affect aquatic resources (e.g., due to their inherent nature, location, timing or scale).

Watershed analyses should generally be conducted or updated prior to developing and implementing watershed restoration action plans for priority watersheds. In addition, watershed analyses shall be conducted or updated prior to: proposing changes to RMA widths; timber salvage or construction of facilities in RMAs; or construction of permanent system roads in RMAs. Proposed changes to RMA widths must be supported by a watershed analysis. The ARCS provides more detail on products generated from watershed analysis, such as an assessment of the status of the watershed with respect to desired conditions or recommended adjustments to the default widths for RMAs.

1.3.5 Key Watersheds

The revised Plan identifies Key Watersheds, a subset of which are Priority Watersheds. The key and priority watersheds are the primary areas on the Forests where aquatic and riparian restoration will take place. Key watersheds are intended as areas that either provide, or are expected to provide, high-quality habitat or water for rare aquatic and riparian species and/or provide high-quality drinking water to communities that depend upon National Forest watersheds as their municipal water sources. Key watersheds provide a network of refugia for listed species. A network of key watersheds, managed to serve as refugia, is crucial for maintaining and recovering habitat for at-risk stocks of salmon and steelhead (FEMAT 1993). The Forests have identified 170 watersheds as key watersheds, comprising 57 percent of the area of the Malheur National Forest, 57 percent of the Umatilla National Forest, and 71 percent of the WWNF. Key Watersheds have a combination of relative population strength for one of four aquatic species (Chinook salmon, steelhead, inland redband trout, and bull trout), good watershed conditions, and good aquatic and riparian habitat condition. Key Watersheds are subwatersheds or groups of subwatersheds.

Management direction in Key Watersheds is intended to provide the highest relative level of protection and the lowest relative level of risk from activities threatening their integrity and resiliency. For example, Standard KW-1S states:

In Key Watersheds or subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species that are functioning properly there shall be no net increase (1-mile of road-related risk reduction for every new mile of road construction); where they are functioning-at-risk, there shall be a net decrease (1.5 miles of road-related risk reduction for every new mile of road construction); and where they are impaired function, there shall be a net decrease (2.0 miles of road-related risk reduction for every new mile of road construction) in system roads that affect hydrologic function.

Within the group of Key Watersheds, the Forests have selected 70 Priority Watersheds. Priority watersheds are either sites where watershed and habitat restoration is ongoing or sites where

restoration work is planned or expected to occur in the next 10–15 years. Priority watersheds are generally watersheds that are in good to fair condition, but still require some restoration. From among the priority watersheds, each Forest will select two to three subwatersheds for restoration to be completed in the next 5 years. This process will be repeated at 5-year intervals, resulting in a new set of priorities for the completion of restoration work. The BA lists all Key Watersheds and Priority Watersheds. Priority Watersheds initially occur in three extant Snake River spring/summer Chinook populations (Catherine Creek, Upper Grande Ronde, and the Tucannon), three Snake River Basin steelhead populations (Upper Grande Ronde, Imnaha, and Tucannon), and three populations of Middle Columbia River steelhead (North Fork John Day, Middle Fork John Day, and Upper John Day).

1.3.6 Monitoring and Adaptive Management

Monitoring under the Plan is a strategic assessment of the implementation and effectiveness of the Forests' management actions and a means of determining whether or not the Forests are making progress towards achieving the Plan's desired conditions. Monitoring enables Forest managers to make informed, sound decisions by addressing key questions and reducing uncertainties at multiple scales. Monitoring and adaptive management under the Plan are an ongoing cycle of planning and implementing activities, monitoring through collection of data by observation or measurement, evaluation of those data, and subsequent adjustments to activities.

There are two categories of monitoring under the Plan: (1) "Broad scale," which is monitoring that occurs across many Forests, including the three Blue Mountain Forests; and (2) monitoring specific to the Blue Mountains Forest Plan. Together the two categories of monitoring will assist the Forests in determining: whether watershed restoration objectives are being attained; whether water quality best management practices (BMPs) and other standards and guidelines are being implemented and are effective at the site-scale; the status and trend of watershed conditions and aquatic ecosystems; changes in the distribution of listed salmon and steelhead; and the status and trend of stream temperatures.

Broad-scale monitoring is generally authorized and funded by the Regional Forester and focuses on significant issues occurring over broad areas (i.e., many Forests). The key broad-scale monitoring program for aquatic resources in the Blue Mountain Forests is the PACFISH/INFISH Biological Opinion Monitoring Program (PIBO) in the Interior Columbia River Basin, commonly referred to as PIBO monitoring. The PIBO monitoring is a long-term monitoring program that is designed to support implementation and effectiveness monitoring in the Interior Columbia Basin, with regards to instream habitat and riparian conditions. The PIBO monitoring program assesses the condition of stream habitat in reaches with management activities compared to reference reaches. There are over 200 PIBO stream reaches on the Blue Mountains Forests. Periodic monitoring of these reaches started in 2001 and will continue during the life of the Revised Plan.

Use of long-term monitoring, such as PIBO, supports adaptive management actions that would generally be taken by local line officers (i.e., District Rangers or Forest Supervisors). Use of these datasets could include increasing or decreasing the type, scope, scale, or location of different activities (e.g., watershed restoration, timber harvest, road building or decommissioning, fuels

treatment, or livestock grazing) or the implementation of other Revised Forest Plan components (e.g., standards and guidelines). These actions will generally occur over moderate to long timescales (e.g., a decade or more).

The second category of monitoring in the Revised Plan is monitoring specific to the implementation of the Blue Mountains Plan itself. The Plan uses monitoring to answer the following key questions:

1. Is the Plan being implemented correctly?
2. Is the Plan effective in achieving desired results?
3. What is the status and trend of watersheds, water quality, aquatic and riparian resources on the three Forests?
4. Are the underlying assumptions of the Plan valid?

The ARCS provides a list of all aquatic and fish-related monitoring from the Blue Mountains Forest Plans (Attachment A, Table 3 of the ARCS). For each ongoing or planned monitoring effort, the table shows the type (e.g., water temperature) and frequency of proposed monitoring. Examples include:

- To answer the question, “What is the status and trend of stream temperatures?”, the Forests will monitor water temperature annually and evaluate trends at 10-year intervals, using USFS temperature records, other agencies’ temperature data, and USFS Rocky Mountain Research Station water temperature models.
- The Forests will use PIBO effectiveness monitoring to answer the question, “What is the status and trend of riparian vegetation condition?”, based on annual and 5-year monitoring data.
- To answer the question, “What is the status and trend of aquatic habitat?”, the Forests will use both PIBO effectiveness monitoring data and miles of stream habitat improved, measured annually and every 5 years.

The Regional Forester will use monitoring results to support adaptive management actions. Adaptive management actions will generally focus on significant issues occurring over broad areas (e.g., millions of acres). Adaptive management actions could include changes to the Blues ARCS, direction to Forests to develop new Revised Forest Plan direction, adjusted approaches to implementing current Revised Forest Plan direction, or adapting or replacing inaccurate analysis models. (Depending on the nature and magnitude of the change to the Proposed Action, an adaptive management action could trigger reinitiation of ESA consultation, as explained in Section 2.10 Reinitiation of Consultation.)

1.3.7 Consideration of Climate Change

The Plan recognizes that well-connected, high-elevation habitats on public lands will be important to supporting salmon and steelhead survival and recovery as the climate continues to warm. Protecting, maintaining, and restoring these areas is a fundamental objective of the Blues ARCS, as shown through the selection of key watersheds and priority watersheds in headwaters across the three Forests. The Forests will provide additional protections for aquatic habitat in key watersheds, and will focus stream restoration in priority watersheds, as explained in Section 1.3.5 Key Watersheds. Examples of stream habitat restoration actions and management activities under the Plan that address climate change include: reducing flood peaks by enhancing floodplain connectivity and disconnecting roads from streams; reconnecting isolated aquatic habitats by removing anthropogenic barriers; managing riparian forests to provide shade; and actions aimed at improving water quality. A recent climate change vulnerability assessment for the Blue Mountains recommends all of these activities to improve the resiliency of aquatic conditions (Halofsky and Peterson 2017).

Additionally, the Plan considers climate change in the following ways:

- Multiple desired conditions address climate change. For example, Aquatic Habitat Function DC-8 says, “Aquatic and riparian ecosystems are resilient to the effects of climate change and other major disturbances.”
- Some standards and guidelines address climate change. RF-7S states: “New or replaced permanent stream crossings shall be designed to allow for the 100-year flood and its bedload and debris. One-hundred-year flood estimates will reflect the best available science regarding potential effects of climate change.”
- The Forests’ monitoring program will include monitoring climate change variables, such as stream temperature.
- The Plan will incorporate the findings and adaptation strategies of the recent Blue Mountain Climate Change vulnerability assessment (Halofsky and Peterson 2017). The map-based products in the assessment will form the basis for characterizing and monitoring the magnitude and variability of climate change effects across the Blue Mountains landscape. An example of an adaptation strategy from the vulnerability assessment is, “reconnect and increase off-channel habitat and refugia in side channels and channels fed by wetlands.” The Forests will use the vulnerability assessment to: (1) Validate the Plan’s desired conditions, standards and guidelines, and Key and Priority Watershed selections; (2) make additional objectives indicating the Forests’ commitment to addressing vulnerable ecosystems and processes over the next 15 years; and (3) potentially add standards and guidelines.

1.4 Hells Canyon National Recreation Area

The HCNRA is managed to enhance recreational and ecological values. All areas are managed to provide a mixture of primitive, semi-primitive nonmotorized, and semi-primitive motorized recreation opportunities. A large portion of the HCNRA is protected as either wilderness (33.7 percent), wild and scenic rivers (7.6 percent), or research natural areas (1.8 percent), and therefore has relatively little active management. The remaining acres are managed for: (1) Grazing that must enhance native vegetation (approximately 50 percent of the HCNRA is included in active grazing allotments); (2) grasslands managed for maximum forage production; and (3) timber management to provide a variety of tree species and a diversity of healthy forests. Timber management is focused in a small portion of the HCNRA, with 17,700 acres of forested vegetation (2.7 percent of the HCNRA) available for pre-commercial thinning, commercial thinning, or other harvest prescriptions. No new roads will be built in the HCNRA although road relocation and reconstruction may occur.

The Revised Forest Plan carries forward and incorporates the 2003 CMP for the HCNRA without modification. Like the rest of the Forest Plan, the CMP does not authorize, fund, or implement specific activities or projects. All future site-specific actions in the HCNRA, developed under the direction of the CMP, will undergo individual ESA section 7 consultation. For aquatic and riparian protection and conservation, the CMP follows the direction of PACFISH and the PACFISH biological opinions (NMFS 1996; NMFS 1998). Thus, PACFISH standards and guidelines will continue to apply to timber harvest, grazing, mining, road management, recreation, and other activities in the HCNRA. PACFISH activity-specific standards and guidelines were designed to avoid or minimize potential adverse effects to listed fish and their habitat from management activities. An example of this guidance is PACFISH GM-1:

Modify grazing practices (e.g., accessibility of riparian areas to livestock length of grazing season, stocking levels, timing of grazing, etc.) that retard or prevent attainment of riparian management objectives (RMOs) or are likely to adversely affect designated critical habitat. Suspend grazing if adjusting practices is not effective in meeting RMOs and avoiding adverse effects on designated critical habitat.

The CMP is described in detail in Appendix F2 of the BA.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION

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 provides 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 Incidental Take Statement (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. This Opinion does not include an ITS for this framework programmatic action.

The Forests determined the proposed action is not likely to adversely affect Snake River fall Chinook salmon, Snake River sockeye salmon, or critical habitat for either species. Our concurrence is documented in the “Not Likely to Adversely Affect” Determinations section (Section 2.11).

2.1 Analytical Approach

This Opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of “to jeopardize the continued existence of” a listed species, which is “to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species” (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This 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 for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features” (81 FR 7214).

The designations of critical habitat for species uses the term primary constituent element (PCE) or essential features. The new critical habitat regulations (81 FR 7414) replace 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 PCEs, PBFs, or essential features. In this Opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

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

- Identify the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat.
- Describe any cumulative effects in the action area.

- Integrate and synthesize the above factors by: (1) Reviewing the status of the species and critical habitat; and (2) adding the effects of the action, the environmental baseline, and cumulative effects to assess the risk that the proposed action poses to species and critical habitat.
- Reach a conclusion about whether species are jeopardized or critical habitat is adversely modified.
- If necessary, suggest a reasonable and prudent alternatives to the proposed action.

NMFS agrees with the Forests that the proposed action is a *framework programmatic action*, as defined in the Services' final rule on incidental take statements (FR 26832, May 11, 2015), and this also guides our analytical approach to the consultation. The Services' section 7 regulations define a framework programmatic action as "a Federal action that approves a framework for the development of future action(s) that are authorized, funded, or carried out at a later time, and any take of a listed species would not occur unless and until those future action(s) are authorized, funded, or carried out and subject to further section 7 consultation" (50 C.F.R. 402.02). For a framework programmatic action, an incidental take statement is not required at the programmatic level; any incidental take resulting from an action subsequently authorized, funded, or carried out under the program will be addressed in subsequent section 7 consultation, as appropriate.

The Revised Plan provides land management direction for the development of a broad range of projects and activities that are expected to occur in the future on the Blue Mountain Forests. The Plan uses both Forest-wide direction and direction applicable to management areas (e.g., Riparian Management Areas). The proposed action does not authorize specific new on-the-ground actions. For example, the Revised Forest Plan does not authorize new vegetation management projects or watershed restoration projects, nor does it authorize any new grazing or mining, or the building or maintenance of roads or trails. Decisions about such activities will be made later, after projects or activities are proposed and any necessary site-specific section 7 consultation has occurred. Any incidental take caused by such activities will not occur until that time. We therefore consider this to be a framework programmatic action.

To complete our jeopardy and adverse modification analysis, we consider how the proposed Plan will influence the activities it governs and their effects, analyzing to the extent we can - given the plan-level context - the nature and scale of the overall impacts to listed species and critical habitats. A key part of this analysis is to consider how the conservation measures built into the plan will function to offset otherwise adverse effects. Thus, in this Opinion, we conduct a broad-scale examination of the potential effects of implementing the Plan but we do not analyze the site-specific effects of future individual projects on the Blue Mountain Forests. Because any incidental take associated with future projects will not occur until they are carried out or are authorized, we do not provide an incidental take statement with this Opinion but will address such take in subsequent project-specific consultations.

As with any consultation, we assume compliance with the proposed action – i.e., that future site-specific actions and approvals will be implemented consistent with the Plan (and, if that does not occur, there could be a trigger for reinitiation). Accordingly, when we do consultations in the

future on projects being undertaken pursuant to the Plan, we will not second-guess the action agency’s determinations that a project is consistent with the Plan, but will conduct an independent jeopardy/adverse modification analysis on the proposed project consistent with our section 7 regulations and with the Streamlining Procedures (USFS et. al 1999).

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 (listed in Table 7). The status is determined by the level of extinction risk that the listed species faces, based on parameters considered in documents such as the recovery plan, 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’ current “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 that make up the designated area, and discusses the current function of the essential PBFs that help to form that conservation value.

Table 7. Federal Register notices for rules that list species, designate critical habitat, or apply protective regulations to evolutionarily significant units/distinct population segments considered in this consultation.

Species ESU/DPS	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon (<i>Oncorhynchus tshawytscha</i>)			
Snake River spring/summer	T 6/28/05; 70 FR 37160	10/25/99; 64 FR 57399	6/28/05; 70 FR 37160
Steelhead (<i>O. mykiss</i>)			
Snake River Basin	T 01/05/06; 71 FR 834	9/2/05; 70 FR 52630	6/28/05; 70 FR 37160
Middle Columbia River	T 1/05/06; 71 FR 834	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160

Note: Listing status “T” means listed as threatened under the ESA and “E” means listed as endangered.

2.2.1 Status of the Species

This Opinion considers the status of three species: Snake River spring/summer Chinook salmon, Snake River Basin steelhead, and Middle Columbia River steelhead. Each of these evolutionarily significant units (ESU) or distinct population segments (DPS) is composed of multiple populations which spawn and rear in different watersheds across the Snake or Middle Columbia River basins. Having multiple viable populations makes an ESU or DPS less likely to become extinct from a single catastrophic event (ICBTRT 2007). NMFS expresses the status of an ESU or DPS in terms of the status and extinction risk of its individual populations, relying on McElhaney et al.’s (2000) description of a viable salmonid population. The four parameters of a viable salmonid population are abundance, productivity, spatial structure, and diversity. Final recovery plans for each species (NMFS 2009; NMFS 2017) describe these four parameters in detail and the parameter values needed for persistence of individual populations and for recovery of the ESU or DPS.

We summarize the status and available information on each species based on the detailed information on the status of individual populations and the species as a whole provided by the *ESA Recovery Plan for Snake River Spring/Summer Chinook Salmon & Snake River Basin Steelhead* (NMFS 2017), *Middle Columbia River Steelhead Distinct Population Segment ESA*

Recovery Plan (NMFS 2009), and *Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest* (NWFSC 2015) (Table 8). We also identify the major threats or limiting factors for the ESUs/DPS. These three documents are incorporated by reference here. For all three species, many individual populations are not meeting recovery plan abundance and productivity targets, such that each species remains threatened with extinction.

For Snake River spring/summer Chinook salmon, the Blue Mountain Forests overlap with all six extant populations in the Grande Ronde/Imnaha major population group (MPG) and both populations in the Lower Snake MPG. All of the extant populations in the Grande Ronde/Imnaha MPG are currently at high risk of extinction due to population abundance and productivity values below minimum viability targets. In the Lower Snake MPG, one population is at high risk of extinction and the other is considered extirpated (NWFSC 2015).

For Snake River Basin steelhead, the Blue Mountain Forests overlap with all four populations in the Grande Ronde MPG, the single population in the Imnaha MPG, and both populations in the Lower Snake MPG. The WWNF also overlaps with several small steelhead-supporting tributaries to the Snake River in Hells Canyon, remnants of the Hells Canyon MPG which is largely extirpated. These tributaries are not part of the recovery scenario for the DPS (NMFS 2017). NWFSC (2015) tentatively rated the Grande Ronde MPG as viable since one of its component populations is highly viable, one is viable, and the remaining two are provisionally rated as maintained. On the other hand, neither the Imnaha MPG nor the Lower Snake MPG are currently viable.

Table 8. Listing classification and date, status summary (including recovery plan reference and most recent status review), and limiting factors for species considered in this Opinion.

Species	Listing Classification and Date	Status Summary	Limiting Factors
Snake River Basin steelhead	Threatened 1/5/06	<p>This DPS comprises 24 populations organized into five MPGs. Currently, five populations are tentatively rated at high risk of extinction, 17 populations are rated as maintained (moderate risk of extinction), one population is viable, and one population is highly viable. Although abundance has increased since the time of listing, four out of the five MPGs are not meeting the population viability goals laid out in the recovery plan (NMFS 2017).</p> <p>In order for the species to recover, more populations will need to reach viable status through increases in abundance and productivity. Additionally, the relative proportion of hatchery fish spawning in natural spawning areas near major hatchery release sites remains uncertain and may need to be reduced (NWFSC 2015).</p>	<ul style="list-style-type: none"> • Adverse effects related to the mainstem Columbia and Snake River hydropower system and modifications to the species' migration corridor. • Genetic diversity effects from out-of-population hatchery releases. Potential effects from high proportion of hatchery fish on natural spawning grounds. • Degraded freshwater habitat. • Harvest-related effects, particularly for B-run steelhead • Predation in the migration corridor.
Snake River spring/summer-run Chinook salmon	Threatened 6/28/05	<p>This ESU comprises 28 extant and four extirpated populations, organized into five MPGs, none of which are meeting the viability goals laid out in the recovery plan (NMFS 2017). All except one extant population (Chamberlin Creek) are at high risk of extinction (NWFSC 2015). Most populations will need to see</p>	<ul style="list-style-type: none"> • Adverse effects related to the mainstem Columbia and Snake River hydropower system and modifications to the species' migration corridor.

Species	Listing Classification and Date	Status Summary	Limiting Factors
Middle Columbia River Steelhead	Threatened 1/5/06	<p>increases in abundance and productivity in order for the ESU to recover. Several populations have a high proportion of hatchery-origin spawners—particularly in the Grande Ronde, Lower Snake, and South Fork Salmon MPGs—and diversity risk will also need to be lowered in multiple populations in order for the ESU to recover (ICBTRT 2007; ICTRT 2010; NWFSC 2015).</p> <p>This DPS comprises 17 extant populations. Returns to the Yakima River basin and to the Umatilla and Walla Walla Rivers have been higher over the recent brood cycle analyzed in the current NMFS 5-year status review (NWFSC 2015), while natural origin returns to the John Day River have decreased. There have been improvements in the viability ratings for some of the component populations, but the DPS is not currently meeting the viability criteria in the Middle Columbia River steelhead recovery plan (NMFS 2009). More populations will need increases in abundance and productivity for the DPS to recover.</p>	<ul style="list-style-type: none"> • Degraded freshwater habitat, including altered streamflows and degraded water quality. • Harvest-related effects • Predation in the migration corridor. • Potential effects from high proportion of hatchery fish on natural spawning grounds. • Degraded freshwater habitat • Mainstem Columbia River hydropower-related impacts • Degraded estuarine and nearshore marine habitat • Hatchery-related effects • Harvest-related effects • Effects of predation, competition, and disease

For Middle Columbia River steelhead, the Blue Mountain Forests overlap with all three populations in the Umatilla/Wallowa River MPG and all five populations in the John Day MPG. Although some populations in the John Day are meeting viability criteria, the MPG as a whole is not viable (NWFSC 2015). None of the populations in the Umatilla/Wallowa MPG are meeting viability criteria.

2.2.2 Status of Critical Habitat

In evaluating the condition of designated critical habitat, NMFS examines the condition and trends of PBFs that are essential to the conservation of the ESA-listed species because they support one or more life stages of the species. Proper function of these PBFs is necessary to support successful adult and juvenile migration, adult holding, spawning, incubation, rearing, and the growth and development of juvenile fish. Modification of PBFs may affect freshwater spawning, rearing or migration in the action area. Generally speaking, sites required to support one or more life stages of the ESA-listed species (i.e., sites for spawning, rearing, migration, and foraging) contain PBF essential to the conservation of the listed species (e.g., spawning gravels, water quality and quantity, side channels, or food) (Table 9).

Critical habitat includes the stream channel and water column with the lateral extent defined by the ordinary high-water line, or the bankfull elevation where the ordinary high-water line is not defined. In addition, critical habitat for Chinook salmon includes the adjacent riparian zone, which is defined as the area within 300 feet of the line of high water of a stream channel or from the shoreline of standing body of water (58 FR 68543). The riparian zone is critical because it

provides shade, streambank stability, organic matter input, and regulation of sediment, nutrients, and chemicals.

Table 9. Types of sites, physical and biological features, and the species life stage each physical and biological feature supports.

Site	Physical and Biological Features (PBFs)	Species Life Stage
Snake River Basin and Middle Columbia Steelhead^a		
Freshwater spawning	Water quality, water quantity, and substrate	Spawning, incubation, and larval development
Freshwater rearing	Water quantity & floodplain connectivity to form and maintain physical habitat conditions	Juvenile growth and mobility
	Water quality and forage ^b	Juvenile development
	Natural cover ^c	Juvenile mobility and survival
Freshwater migration	Free of artificial obstructions, water quality and quantity, and natural cover ^c	Juvenile and adult mobility and survival
Snake River Spring/Summer Chinook		
Spawning & Juvenile Rearing	Spawning gravel, water quality and quantity, cover/shelter (Chinook only), food, riparian vegetation, space (Chinook only), water temperature and access (sockeye only)	Juvenile and adult.
Migration	Substrate, water quality and quantity, water temperature, water velocity, cover/shelter, food ^d , riparian vegetation, space, safe passage	Juvenile and adult.

^a Additional PBFs pertaining to estuarine, nearshore, and offshore marine areas have also been described for Snake River steelhead and Middle Columbia steelhead. These PBFs will not be affected by the proposed action and have therefore not been described in this Opinion.

^b Forage includes aquatic invertebrate and fish species that support growth and maturation.

Table 10 summarizes designated critical habitat for each species, based on the detailed information on the status of critical habitat throughout the designation area provided in the recovery plans for the species (NMFS 2017; NMFS 2009), which are incorporated by reference here. Across the designation, the current ability of PBFs to support the species varies from excellent in wilderness areas to poor in areas of intensive human land use.

Table 10. Critical habitat, designation date, Federal Register citation, and status summary for critical habitat considered in this Opinion.

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Snake River basin steelhead	9/02/05 70 FR 52630	Critical habitat encompasses 25 subbasins in Oregon, Washington, and Idaho. Habitat quality in tributary streams varies from excellent in wilderness and roadless areas, to poor in areas subject to heavy agricultural and urban development (NMFS 2017). Reduced summer stream flows, impaired water quality, and reduced habitat complexity are common problems. Migration corridor habitat quality has been severely affected by the development and operation of the dams and reservoirs of the Federal Columbia River Power System.

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Snake River spring/summer-run Chinook salmon	10/25/99 64 FR 57399	Critical habitat consists of river reaches of the Columbia, Snake, and Salmon rivers, and all tributaries of the Snake and Salmon rivers (except the Clearwater River) presently or historically accessible to this ESU (except reaches above impassable natural falls and Hells Canyon Dam). Habitat quality in tributary streams varies from excellent in wilderness and roadless areas, to poor in areas subject to heavy agricultural and urban development (NMFS 2017). Reduced summer stream flows, impaired water quality, and reduced habitat complexity are common problems. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Federal Columbia River Power System.
Middle Columbia River steelhead	9/02/05 70 FR 52630	Critical habitat encompasses 15 subbasins in Oregon and Washington containing 111 occupied watersheds, as well as the Columbia River rearing/migration corridor. Most fifth field hydrologic unit code (HUC10) watersheds with PBFs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005). However, most of these watersheds have some or a high potential for improvement. NMFS (2005) rated conservation value of occupied HUC10 watersheds as high for 80 watersheds, medium for 24 watersheds, and low for nine watersheds.

2.2.3 Climate Change Implications for ESA-listed Species and their Critical Habitat

One factor affecting the status of the species and their critical habitat considered in this Opinion is climate change. Likely changes in temperature, precipitation, wind patterns, and sea-level height have implications for survival of all three species in both their freshwater and marine habitats. During the next century average temperatures in the Pacific Northwest are projected to increase 3 to 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 percent 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. 2014). Earlier snowmelt will cause lower stream flows in late spring, summer, and fall, and water temperatures will be warmer (ISAB 2007; Mote et al. 2014). 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). In general, these changes in air temperatures, river temperatures, and river flows are expected to cause changes in salmon and steelhead distribution, behavior, growth, and survival, although the magnitude of these changes remains unclear.

Climate change could affect Snake River spring/summer Chinook salmon, Snake River Basin steelhead, and Middle Columbia River steelhead in the following ways: (a) Winter flooding in transient and rainfall-dominated watersheds may scour redds, reducing egg survival, and may reduce overwintering habitat for juveniles; (b) reduced summer and fall flows may reduce the quality and quantity of juvenile rearing habitat, strand fish, or make fish more susceptible to predation and disease; (c) higher temperatures while adults are holding in tributaries and

migrating to spawning grounds may lead to increased pre-spawning mortality or reduced spawning success; and (d) lethal water temperatures may occur in the mainstem migration corridor or in holding tributaries, resulting in higher mortality rates (NMFS 2017). Both freshwater and marine productivity tend to be lower in warmer years for Snake River Basin steelhead and Snake River spring/summer Chinook salmon populations, and likely for Middle Columbia River steelhead. Climate factors will likely make it more challenging to increase abundance and recover the species by reducing the suitable rearing areas and leading to a more limited run-timing under the warmer future conditions. This possibility reinforces the importance of achieving survival improvements throughout each species' entire life cycle, and across different populations since neighboring populations with different habitat may respond differently to climate change. Existing well-connected, high-elevation habitats on public lands will be important to supporting salmon survival and recovery as the climate continues to warm (Martin and Glick 2008).

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 action area consists of streams and riparian areas that support listed salmon and steelhead within the Forests; and the action area extends to stream reaches and riparian areas directly downstream from the Forest boundaries which could be affected by activities conducted on the Forests and developed under the direction of the revised Plan. For example, a short-term turbidity plume from a culvert replacement could extend several hundred feet downstream from Forest boundaries. These stream reaches occur in the Hells Canyon, Imnaha, Lower Snake-Asotin, Upper Grande Ronde, Wallowa, Lower Grande Ronde, Lower Snake-Tucannon, Walla Walla, Umatilla, Upper John Day, North Fork John Day, Middle Fork John Day, and Lower John Day subbasins (Figure 2). The action area is used by all freshwater life history stages and provides designated critical habitat for the three species considered in this Opinion. The action area is also EFH for Chinook salmon and coho salmon (PFMC 1999), and is in an area where environmental effects of the proposed project may adversely affect EFH for these species.

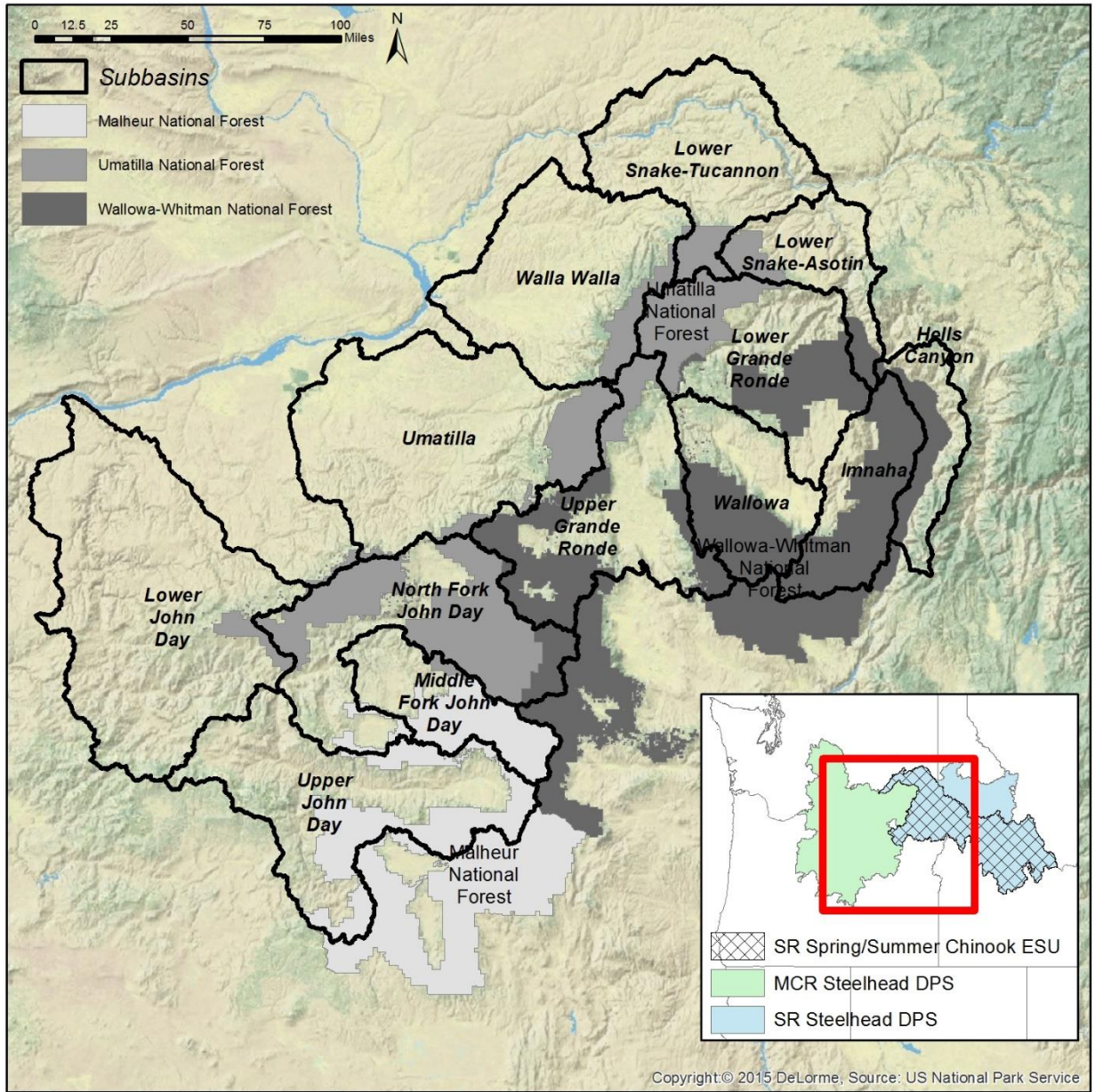


Figure 2. The action area, showing subbasins in which ESA-listed salmon and steelhead overlap with one of the Blue Mountains Forests.

2.4 Environmental Baseline

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 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The action area is important to the survival and recovery of each species because it overlaps with all populations in multiple MPGs for each of the three DPSs/ESUs. Likewise, the action area is

important to the overall conservation value of critical habitat because the action area covers close to 1,000 miles or more of designated critical habitat for each species (MNF, UNF, and WWNF 2018). Many past and present land uses, including livestock grazing, timber harvest, barriers, stream channelization, recreation, and road-building in floodplains, have contributed to current habitat conditions in the action area (NMFS 2017). In some areas historic overgrazing has caused widespread damage to riparian areas, altered riparian plant diversity, and compacted and eroded soils. Road-building in floodplains has constrained and straightened streams, reducing habitat complexity. Historic timber harvest in riparian areas has reduced large wood recruitment to streams. These human activities have led to current baseline conditions for stream habitat, classified by subbasin in Table 11 below. The Forests have evaluated current habitat conditions across the action area primarily by using NMFS' Matrix of Pathways and Indicators (NMFS 1996) and using PIBO effectiveness monitoring data. This Opinion summarizes baseline information presented in detail in the BA.

The Matrix of Pathways and Indicators is a way to characterize baseline habitat conditions for salmonids. The five pathways in Table 12 each represent a significant pathway by which actions can have potential effects on anadromous salmonids and their habitats. For each pathway, the Forests have assessed at the subbasin level (8-digit HUC) whether current conditions are either "functioning appropriately," "functioning at risk," or "functioning at unacceptable risk." For example, channel conditions and dynamics are functioning appropriately if streambank condition averages >90 percent stable at sites across the subbasin. Table 11 shows the Forests' ratings of five pathways for the subbasins in which anadromous fish overlap with Forest boundaries. Although all of the subbasins include private land, the ratings in Table 11 largely reflect conditions within the Forests. This is because stream habitat data available to the Forest subject matter experts who rated the condition of each subbasin were primarily data generated by the Forests, such as PIBO effectiveness monitoring data. Table 11 shows overwhelmingly that at the subbasin scale in the action area, most pathways are functioning at risk or at unacceptable risk for salmonid habitat.

The Forests also used PIBO monitoring data to assess stream habitat baseline conditions in the action area. As described above in Section 1.2 Consultation History, PACFISH and INFISH were implemented in 1995 with the intent of protecting, conserving, and managing riparian habitats for protected anadromous and resident fish species, respectively. Monitoring of the effectiveness of these measures, called PIBO monitoring, began in 2001 as required by NMFS' 1998 PACFISH LRMP Opinion. The PIBO monitoring program assesses the condition of stream habitat in sampled reaches compared to habitat characteristics of streams likely to be functioning properly (i.e., reference conditions), and assesses the trend in habitat conditions over time. PIBO stream habitat metrics include: bank condition, substrate composition, pool habitat quantity and quality, abundance of woody debris, macroinvertebrates, and an overall indicator score for stream habitat condition.

Table 11. Summary of baseline stream and riparian baseline conditions across subbasins in which anadromous fish occur on the Blue Mountain Forests. FA = functioning appropriately; FR = functioning at risk (gray); and FUR = functioning at an unacceptable risk (dark gray).

Subbasin	Pathways				
	Watershed Conditions	Water Quality	Habitat Access	Channel Conditions and Dynamics	Flow/Hydrology
17060101 Hells Canyon	FA	FR	FR	FA	FA
17060102 Imnaha River	FR	FR	FA	FR	FR
17060103 Lower Snake-Asotin	FR	FR	FR	FR	FR
17060104 Upper Grand Ronde	FR	FUR	FA	FUR	FUR
17060105 Wallowa River	FR	FR	FR	FUR	FR
17060106 Lower Grande Ronde	FR	FR	FUR	FR	FR
17060107 Lower Snake-Tucannon	FR	FR	FR	FR	FR
17070102 Walla Walla	FR	FA	FR	FR	FA
17070103 Umatilla	FUR	FUR	FR	FUR	FUR
17070201 Upper John Day	FUR	FUR	FUR	FUR	FUR
17070202 North Fork John Day	FR	FR	FR	FR	FA
17070203 Middle Fork John Day	FR	FUR	FUR	FR	FUR
17070204 Lower John Day	FUR	FUR	FR	FR	FR

By using PIBO data to compare aquatic habitat conditions in the Blue Mountains to reference conditions, the Forests identified a need for improved aquatic habitat conditions at broad scales (UMF, MNF, and WWNF 2017). The USFS has completed repeat PIBO sampling on more than 200 monitoring reaches in the Blue Mountains between 2001 and 2015. This monitoring information indicates overall there has been some recovery of riparian conditions, but that the speed of recovery falls short of occurring at a near natural rate. Large differences remain in several habitat metrics between managed and reference sites. Many of the parameters most closely associated with livestock grazing effects (e.g., bank angle) are still highly departed from

reference conditions. The PIBO trend data across the three Forests indicates that riparian vegetation variables are improving at a faster rate than physical stream habitat (channel) variables. The full PIBO report for the Forests can be viewed in Appendices C through E of the BA. Table 11 summarizes PIBO data and watershed conditions for each Forest.

Table 12. Summary of PIBO data on stream habitat conditions presented in the BA for each Forest.

<p>Malheur National Forest</p> <p>Across the Malheur National Forest, PIBO data show a significant improvement in undercut banks, large wood, bank angle, residual pool depth, and the overall habitat condition index. On the other hand, although the condition of some habitat parameters has improved since 2001, the current status of all of the habitat metrics—except mean substrate and percent pool fines—is still highly departed from reference conditions. In general watershed conditions on the Malheur National Forest are in good condition in headwater wilderness and minimally-managed areas, and in fair or poor condition in managed areas. The most persistent and widespread water quality concern across Malheur National Forest managed lands is high summer stream temperatures, partly caused by lack of stream surface shading and low summer streamflows. Some stream reaches show evidence of fine sediment accumulation from varying sources, such as local stream bank erosion or roads close to streams.</p>
<p>Umatilla National Forest</p> <p>Across the Umatilla National Forest, PIBO data show that some habitat parameters have improved over time (e.g. large wood), while others have deteriorated (e.g., percent pool tail fines and mean substrate condition). The current status of percent pools, bank angle, macroinvertebrates, residual pool depth, and the overall stream habitat condition index score is still highly departed from reference conditions. Overall, stream habitat conditions on the Umatilla National Forest appear to be in better shape than the other two forests. In general watershed conditions on the Umatilla National Forest are in good condition in headwater wilderness and minimally-managed areas, and in fair or poor condition in managed areas. The most persistent and widespread water quality concern across Umatilla National Forest managed lands is high summer stream temperatures, partly caused by lack of stream surface shading and low summer streamflows. Some stream reaches show evidence of fine sediment accumulation from varying sources, such as local stream bank erosion. Road densities vary from fair to poor condition across the Forest.</p>
<p>Wallowa-Whitman National Forest</p> <p>Across the WWNF, PIBO data show that some habitat parameters have improved over time (e.g., large wood, bank stability), while others have deteriorated (e.g., percent pool tail fines and percent pools). The current status of percent pools, bank angle, macroinvertebrates, residual pool depth, and the overall habitat condition index score remains highly departed from reference conditions. In general watershed conditions on the WWNF are in good condition in headwater wilderness and minimally-managed areas, and in fair or poor condition in managed areas. The most persistent and widespread water quality concern across WWNF managed lands is high summer stream temperatures, partly caused by lack of stream surface shading and low summer streamflows. Some stream reaches show evidence of fine sediment accumulation from varying sources, such as local streambank erosion. The WWNF shows a high percentage of subwatersheds in the poor condition for the aquatic habitat and effects from roads and trails.</p>

As with the Matrix of Pathways and Indicators assessment, PIBO data in the Blue Mountains suggest that stream habitat conditions for listed species are degraded in much of the action area. Many of the habitat parameters which are functioning at risk or unacceptable risk, or are below PIBO reference condition values, are also identified by recovery plans as limiting factors for recovery of individual salmon and steelhead populations in the action area. These parameters

include lack of large wood and habitat complexity, high stream temperatures, high percentages of fine sediment, lack of pools, and impaired riparian and streambank conditions (NMFS 2017; NMFS 2009).

Along with past and ongoing land uses, climate change will affect baseline conditions in the future. A climate change vulnerability assessment was completed in 2015 for the Blue Mountains (Halofsky and Peterson 2017). The assessment indicated that significant changes to hydrology (decreased snowpack, earlier snowmelt, higher peak flows, and lower summer flows) may occur in the coming decades. These projected changes may have far-reaching effects on aquatic ecosystems, especially as frequency of drought and large-scale wildfire increases. Chinook salmon, whose eggs overwinter in streambed gravels, could be especially impacted by increased winter flooding and greater movement of streambed gravels and cobbles during winter rain-on-snow events. Lower summer base flows and higher water temperatures will likely impact all ESA-listed fish species in the action area as perennial streams shrink during the summer dry period, forcing fish into smaller wetted channels and less diverse habitats. These changes to habitat conditions driven by climate change will likely begin to occur over the 15-year time frame of the Proposed Action.

2.5 Effects of the Action

Under the ESA, “effects of the action” means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

The Revised Forest Plan will direct how a broad range of projects and activities will be implemented in the future on the Blue Mountains Forests, but the Plan itself will not authorize, fund, or carry out any of these individual projects. Individual future projects developed under the framework of the proposed Plan will be subject to individual section 7 consultations and analysis, and the projects will not take place until these individual consultations are complete. We therefore analyze the effects of the Plan and its direction, focusing on the components of the ARCS, which are the parts of the Plan which most influence how Plan direction will affect listed species and their habitats. We assume that section 7 consultation on site-specific actions will continue to take place according to Streamlining Procedures (USFS et. al 1999). NMFS will not review site-specific actions for compliance with the Plan; that is explicitly the role of the action agency, per the Streamlining Guidelines.

To analyze the effects of the revised Plan, we first identify potential adverse effects from the different categories of activities that the Forests will implement under direction from the Plan (Table 13). We then use the framework laid out in the Interior Columbia Basin Strategy (BLM et al. 2014) to assess the effectiveness of the Plan in leading to a suite of future site-specific projects on the Forests that when, taken together, will result in aggregate and synergistic effects that are not likely to jeopardize the continued existence of listed species or destroy or adversely modify their designated critical habitats.

In the Interior Columbia Basin Strategy, experts from the USFS, NMFS, BLM, USFWS, and the U.S. Environmental Protection Agency (EPA) identified seven fundamental elements that revised Forest Plans should include to promote and achieve conservation of aquatic and riparian resources. To identify these seven elements, the interagency experts used various reliable sources, including the *Integrated Scientific Assessment for Ecosystem Management (PNW-GTR-382, September 1996)*, *An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins (Volumes I through IV - PNW GTR-405, 1997)*, and more recent work (see BLM et al. 2014). The seven elements are:

1. Designation and conservation of riparian areas to maintain and improve riparian function.
2. Designation and protection of population strongholds for listed species.
3. Multiscale analysis.
4. Restoration priorities and guidance.
5. Management direction, such as desired conditions and standards and guidelines.
6. Monitoring and adaptive management.
7. Consideration of climate change.

After first summarizing the potential adverse effects of future site-specific activities implemented under direction from the Plan (Table 1), we analyze the overall effects of the Plan by assessing the Plan's treatment and inclusion of the seven elements identified by the Interior Columbia Basin Strategy. Table 13 provides a summary of the types of adverse effects anticipated as a result of the activities governed by the Plan. The proposed action does not include specific projections about the amounts or intensities of these actions and, given that generality, the analysis of their effects is necessarily general as well. However, as discussed below, the overarching standards of the Plan that apply to all such activities will function to limit the amounts and intensities both at the individual project level and in the aggregate.

Table 13. Summary of potential adverse effects from future site-specific actions, by activity category.

Activity Category	Potential Adverse Effects from Future Site-Specific Actions
<p>Vegetation Management (Timber Harvest, Silvicultural Management, and Fuel and Wildland Fire Activities)</p>	<p>Vegetation management through timber sales for timber production or as a fuel treatment (e.g., thinning and prescribed fire) and managing wildfires to reduce the potential for uncharacteristically severe wildfires can adversely affect watershed processes and aquatic and riparian habitat (Spence et al. 1996; Mehan 1991). Removal of large trees through timber harvest or prescribed fire within RMAs can reduce large wood input to stream channels, reducing the complexity of aquatic habitat. Removal of trees shading streams can result in increased summer stream temperatures. Accelerated erosion from ground disturbing activities associated with vegetation management, such as skid roads, can increase sediment delivery to stream channels.</p>
<p>Livestock Grazing</p>	<p>The potential effects of livestock grazing on fish habitat have been well documented (e.g., Platts 1991; Spence et al. 1996). The potential adverse effects of grazing include soil erosion and sediment delivery to streams; soil compaction; alteration or removal of riparian vegetation that provides shade, cover, a terrestrial food source, and which stabilizes stream banks; and altered channel morphology including channel widening, increased bank instability, and loss of undercut banks. Salmonid species are especially vulnerable to grazing during early development stages, when fish are less mobile, and large numbers of embryos or young are concentrated in small areas. Livestock entering spawning areas can trample redds and destroy or dislodge embryos and fry.</p>
<p>Recreation</p>	<p>The concentrated human use of developed and dispersed camping and recreation sites can lead to soil compaction and trampled vegetation, exposing soils to erosion accelerating sediment delivery to streams. Riparian vegetation may be damaged or destroyed and the resultant increase in solar radiation reaching a stream can increase water temperatures. Large wood recruitment, important for providing complex aquatic habitat and instream cover for fish, may be lost when hazard trees are felled in developed sites and by unauthorized firewood cutting in dispersed sites. Loss of streamside vegetation can result in destabilizing streambanks as the roots holding the banks together are damaged, causing accelerated bank erosion that contributes excess sediment to the stream system and causes channel widening (Spence et al. 1996). Camping and other recreation uses may also cause harassment of spawning fish, especially Chinook salmon that spawn in the late summer and fall. Redds may be damaged, resulting in egg and alevin mortality, if disturbed by campers.</p>
<p>Mining</p>	<p>Spence et al. (1996) reviewed the effects of mining on fish habitat. In general, mining activities can increase sediment delivery, cause changes in the substrate, and increase streambed and streambank instability. Mining activities may fundamentally alter the way water and sediment are transported through a river system, altering the erosional and depositional processes changing channel configuration. Increased turbidity cannot only affect salmonids but also the macroinvertebrate community. Mining operations can damage streamside vegetation that shades streams and stabilizes streambanks. Toxic effects of materials used in mining or metals released into the stream environment can affect growth, reproduction behavior, and migration of salmonids, and can degrade macroinvertebrate habitat.</p>

Activity Category	Potential Adverse Effects from Future Site-Specific Actions
Roads and Trails	<p>Geomorphic impacts of roads include chronic sediment delivery to streams; accelerated mass failures of road cuts and fills, depositing large quantities of sediment in streams; and altered channel morphology if the roads confine streams and prevent connection to the floodplain. Roads constructed in riparian areas damage or remove vegetation, thus reducing stream shade and large woody debris input. Roads constructed in the floodplain may inhibit natural stream channel migration processes (Gucinski et al. 2001). Meredith et al. (2014) found that in the interior Columbia Basin, the presence of near-stream roads resulted in reduced amounts of large woody debris in streams.</p> <p>Roads directly change the hydrology of slopes and stream channels (Trombulak and Frissell 2000). Roads intercept shallow groundwater flow paths, diverting the water along the roadway and routing it to streams at stream crossings. This can cause or contribute to changes in the timing and routing of runoff, the effects of which may be more evident in smaller streams than in larger rivers. Roads can deliver pollutants to aquatic habitat as the chemicals applied to roads or from vehicles run off a road into a stream (Gucinski et al. 2001). Roads can create passage barriers for fish at culverts at road/stream crossings. Chemical contamination of surface water from equipment leaks or roadside herbicide applications is also possible when roads cross or are adjacent to streams.</p>
Special Uses	<p>Effects from the most common permit activities include:</p> <ul style="list-style-type: none"> • Disturbance and stress to fish from in water or shoreline activities. • Entrainment and impingement of fish from improperly screened water diversions. • Impacts to water quality, quantity, and fish and their habitat from water diversions. • Clearance of vegetation along power lines and telephone lines to reduce risks to the infrastructure causing impacts to stream shade, streambank vegetation, and in-channel woody debris. • Sediment and turbidity from issuance of road use permits or granting of right-of-ways. Activities such as rocking and culvert and ditch maintenance, which are intended to prevent erosion in the long term, often produce some short-term sediment delivery. Hauling of logs, heavy traffic, or heavy equipment use on non-paved roads during wet weather can damage the road surface, causing runoff that carries fine sediment particles. This is of particular concern where haul roads and other access routes closely parallel and cross streams containing fish. • Chemical contamination from equipment leaks, refueling, and septic systems associated with cabins, solid waste sites, and group use of other sites.
Watershed Restoration	<p>Watershed restoration projects are designed to create long-term improvements to stream habitat. Project construction can result in small short-term adverse effects to fish and fish habitat such as riparian disturbance and short-term turbidity plumes.</p>

2.5.1 Riparian Management Areas

The Forest’s proposed RMAs are relatively wide, carrying forward the RMA requirements of PACFISH. The scientific literature suggests that these proposed stream buffers are highly protective of streams. Reeves et al. (2016) provide a review of the current science surrounding riparian functions and processes. They conclude, in agreement with an earlier assessment by FEMAT (1993), that most of the key ecological processes within RMAs occur within a distance equal to one site potential tree height from a stream or the floodplain (when present). These processes include root strength for bank stability, shading to moderate water temperature, litter fall, delivery of coarse wood to streams, and filtration of sediment from overland erosion. Similarly, an extensive literature review by Sweeney and Newbold (2014) of stream-side buffers

concluded that buffers equal to or greater than roughly 100 feet wide are needed to protect the physical, chemical, and biological integrity of small streams. The purpose of riparian reserve boundaries of two site-potential tree heights on fish-bearing streams has generally been to enhance the microclimate of the riparian ecosystem within the first tree-height (Reeves et al. 2016).

The RMAs for the proposed Plan extend to roughly two site-potential tree heights for fish-bearing streams and one site-potential tree height for permanently-flowing non-fish-bearing streams. These widths are well beyond the minimum protective buffer widths recommended in the literature. The proposed RMAs are not “no touch,” and management activities are allowed within RMA boundaries. However, per the ARCS, any management within RMAs would have to be designed specifically for the benefit of aquatic and riparian resources. Standard RMA-1S states in part that, “When riparian management area desired conditions are not yet achieved, and to the degree that project activities would contribute to those conditions, projects or permitted activities shall restore or not retard attainment of desired conditions.” Appendix A of this Opinion lists the full suite of standards and guidelines which apply to management activities in riparian areas, such as minimizing temporary roads in RMAs and applying herbicides and other chemicals only to maintain, protect, or enhance aquatic and riparian resources or to restore native plant communities in a manner that does not harm aquatic or riparian resources. These more specific standards and guidelines support the fundamental direction from RMA-1S to restore or not retard attainment of desired conditions in RMAs.

Like the PACFISH/INFISH strategies, RMA widths under the revised Plan can only be modified based on the results of watershed analysis. One difference from PACFISH/INFISH is that the ARCS does not allow adjustments to RMA boundaries through a site-specific analysis. This will restrict the number of adjustments to RMA widths during the life of the Plan because it is unlikely that the Forests will undertake costly watershed analysis requiring large amounts of staff time only for the sake of adjusting RMA widths. Furthermore, since RMA width adjustments are based on watershed analysis, the adjusted widths will be protective of ecological processes for that particular watershed.

Because the RMAs are conservatively wide and because the Plan includes desired conditions, standards, and guidelines qualifying activities within RMAs, the revised Plan represents a precautionary approach to managing RMAs. Highly protective riparian buffers will either avoid or make very small any adverse effects to listed species and their habitat from the collective implementation of management activities near streams, such as timber harvest, road-building, or chemical application. Stream restoration projects will generate effects within RMAs. However, these projects will be evaluated on a project-specific basis, and Plan direction will ensure that short-term effects do not reach levels that degrade or retard attainment of proper functioning condition. Plan direction will ensure that long-term effects of stream restoration projects are beneficial to overall riparian function.

2.5.2 Designation and Protection of Population Strongholds

Population strongholds, as defined by the Interior Columbia Basin Strategy are robust populations occupying high quality habitat that will support expansion and recolonization of the

species into adjacent watersheds (BLM et al. 2014). These areas should conserve key processes likely to influence the persistence of populations or metapopulations (Rieman and Dunham 2000). To protect and maintain population strongholds, the Interior Columbia Basin Strategy recommends that Forest Plans identify watersheds or subwatersheds to be managed to emphasize protection of populations of listed aquatic species. For salmon and steelhead, these watersheds would be at the species' subpopulation scale and would contribute to the conservation and recovery of individual populations. A network of watersheds managed to serve as refugia is crucial for maintaining and recovering habitat for listed salmon and steelhead (FEMAT 1993).

The revised Plan protects salmon and steelhead population strongholds through the designation and management of key watersheds and priority watersheds. The key and priority watersheds are the primary areas on the Forests where aquatic and riparian restoration will take place and will provide a network of refugia for listed species. The Forests have identified 170 watersheds as key watersheds, based on the relative population strength for one of four aquatic species (Chinook salmon, steelhead, inland redband trout, and bull trout), good watershed conditions, and good aquatic and riparian habitat condition. The Plan gives additional protections to key watersheds. For example, Standard KW-1S states that there shall be no net increase in miles of roads if the watershed is functioning properly and a net decrease in roads if the watershed is not functioning properly. Within the group of key watersheds, the Forests have selected 70 Priority watersheds, in which the Forests will conduct habitat restoration during the next 10–15 years. Priority watersheds are generally watersheds that are in good to fair condition, but still require some restoration. Table 5 of this Opinion shows examples of the Plan's objectives for how many restoration projects the Forests will implement in these watersheds over the next 10 years, measured in acres or miles of stream. Completion of the amount of restoration identified in Table 1 is dependent on available internal and external funding sources, and on the continuation of the Forests' ongoing partnerships with groups including the Tribes, Oregon Watershed Enhancement Board, Bonneville Power Administration, watershed councils, and others.

Watersheds identified as key watersheds within National Forest System lands, with few exceptions, possess the best remaining habitat and strongest fish populations in the Blue Mountains (UNF, MNF, and WWNF 2017). The Plan's key watersheds cover most of the overlap between the Forests and both Snake River spring/summer Chinook populations and Snake River Basin steelhead populations, and a lesser but substantial portion of the overlap between the Forests and Middle Columbia River steelhead populations. The extra protections provided by the key watershed designation will therefore benefit the listed species. Priority Watersheds occur in three extant Snake River spring/summer Chinook populations (Catherine Creek, Upper Grande Ronde, and the Tucannon), three Snake River Basin steelhead populations (Upper Grande Ronde, Imnaha, and Tucannon), and three populations of Middle Columbia River steelhead (North Fork John Day, Middle Fork John Day, and Upper John Day). For all three, habitat restoration in the populations in which the Plan's priority watersheds are located is an important recovery strategy in the species' recovery plans (NMFS 2009; NMFS 2017):

- For Snake River spring/summer Chinook, a key recovery strategy is enhancing spawning and summer rearing habitats in the upper Grande Ronde River and Catherine Creek. Both populations need increases in abundance and productivity for the Grande Ronde River MPG to be viable. The Tucannon River is the lone extant population in

the Lower Snake MPG and needs to move from its current moderate-to-high risk of extinction to highly viable in order for the ESU to recover. The Plan's commitments to stream habitat restoration in priority watersheds within all three populations will benefit these populations, potentially leading to increases in population abundance and productivity.

- For Snake River Basin steelhead populations, improving summer rearing habitats in the mainstem Grande Ronde River, Catherine Creek, and tributary production areas is an important recovery strategy (NMFS 2017), which the WWNF's work in priority watersheds will support. The Imnaha River MPG consists of just one population, the Imnaha River, and this population must therefore must reach highly viable status for MPG recovery. Restoring tributary habitat conditions for steelhead spawners and juvenile rearing is an important recovery strategy for this MPG, and again will be helped by the Plan's commitments to habitat restoration in priority watersheds in the headwaters of this population. The Tucannon River population is currently at moderate-to-high risk of extinction and needs to reach viable status for the Lower Snake MPG to be viable. For this population, one of the recovery plan's strategies is to protect, improve, and increase juvenile summer rearing and overwintering habitat in high potential reaches by restoring riparian, channel, and floodplain functions; reducing temperatures; and increasing instream habitat. The Plan's commitment to habitat restoration in the priority watersheds in the headwaters of this population will increase the likelihood of this population reaching viable status.
- For the Middle Columbia River steelhead DPS, degraded floodplain and degraded channel structure, altered sediment routing, degraded water quality (temperature), and altered hydrology are limiting factors for all five John Day River populations. The Middle Columbia River steelhead recovery plan calls for habitat improvements to address these limiting factors. The Plan's commitment to habitat restoration in Priority Watersheds in the North Fork John Day, Middle Fork John Day, and Upper John Day will benefit these populations, potentially leading to increases in population abundance and productivity.

2.5.3 Multiscale Analysis

Watershed analysis is an interdisciplinary analysis of the status and trends of watershed and aquatic ecosystem conditions. This information serves as a foundation for Plan implementation through the development of strategic and integrated programs and projects that protect and restore aquatic resources, while enabling informed and sustainable resource use and management. The Interior Columbia Basin Strategy found that analyses should be at scales (e.g., basin, subbasin, watershed, or subwatershed) that are appropriate for the management activity or program being considered. Watershed analysis under the direction of the Plan will occur at the scale of subbasins to subwatersheds (8–12 digit HUCs). Because 83 percent of USFS acres on the three Forests have completed watershed analyses, work under the revised Plan will largely focus on efficiently updating a portion of existing analyses to better reflect current watershed conditions and trends, climate change, the latest science and policy, and current restoration opportunities. By giving USFS staff and decision-makers information on current conditions and

trends of aquatic and riparian habitat, watershed analysis will allow the Forests to develop actions that make progress towards or do not retard the attainment of desired conditions, thus protecting and conserving listed species.

2.5.4 Watershed Restoration Priorities and Guidance

The Interior Columbia Basin Strategy concluded that to be successful at protecting aquatic and riparian resources, Forest Plans should identify restoration priorities by type of restoration and geographic areas, and that restoration under Plan direction should address limiting factors identified in recovery plans (BLM et al. 2014). The revised Blue Mountains Plan clearly identifies aquatic restoration priorities by including a list of objectives, which are measurable and time-specific statements of a desired rate of progress toward a desired condition or conditions. The Plan's aquatic restoration objectives are listed by type of restoration and miles of acres of restoration that each Forest expects to accomplish during the first decade of the Revised Forest. Table 5 of this Opinion gives examples, such as increasing habitat complexity through channel reconstruction or placement of large wood or other structures on 113 miles of stream in the WWNF. Another objective is to increase aquatic habitat connectivity through 90 culvert replacements on the Malheur National Forest. The Plan's direction is for restoration to occur in the identified Priority Watersheds within each Forest. As previously discussed, objectives to be accomplished during the life of the Revised Forest Plan are subject to available funding, NMFS cannot necessarily rely on these objectives being fully completed. However, because the USFS has been and continues to be actively involved in ongoing restoration projects with local partners in the action area (e.g., the Tribes, Oregon Watershed Enhancement Board, Bonneville Power Administration, watershed councils, etc.), NMFS expects similar efforts going forward.

NMFS understands that objectives are not formal commitments and are subject to the availability of funding. However, NMFS believes a certain amount/rate of restoration is key to the adequacy of the ARCS. Because the Forest's expectation laid out in the BA is that most objectives will be completed in the first decade of plan implementation (see Section 1.3.3.3.), NMFS shares that expectation. In order to track progress of completed restoration objectives, NMFS understands that the Forest Service will share their biennial monitoring reports with NMFS every other year and meet with NMFS to discuss completed restoration projects detailed in those reports (Pers. Comm., Tom Montoya, April 18, 2018). Tracking restoration objectives every two years should adequately allow for timely adjustment to the amount or locations of restoration efforts should the rate of restoration fall short of expectations presented in the BA.

The Forests use two spreadsheets to show how the Plan's restoration objectives address habitat limiting factors from recovery plans. The two spreadsheets are: (1) *List of Recovery or Conservation Strategies for Snake River spring/summer Chinook salmon and Snake River Basin Steelhead Addressed by the Blue Mountains Forest Plan Revision*; and, (2) *List of Recovery or Conservation Strategies for Middle Columbia River Steelhead Addressed by the Blue Mountains Forest Plan Revision*. These spreadsheets were provided to NMFS via email on January 18, 2018. The document for the Snake River species shows, for example, that degraded riparian conditions are a limiting factor for all Snake River Basin steelhead populations in the Northeast Oregon Management Unit; and it shows that the Plan has a restoration objective for each Forest to restore riparian plant species composition by increasing natural seedling establishment, planting, fencing, or modifying riparian management across 300, 165, and 225

acres on the Malheur National Forest, Umatilla National Forest, and WWNF, respectively. The primary tributary habitat limiting factors that will be addressed in this Revised Forest Plan include: impaired fish passage; reduced stream complexity; excess fine sediment; elevated summer water temperatures; diminished streamflow during critical periods; reduced floodplain connectivity and function; and degraded riparian conditions. By outlining restoration objectives for each Forest which address limiting factors for the salmon and steelhead populations which overlap with the Forests, the Plan will likely lead to improved habitat conditions, potentially increasing population abundance and productivity.

2.5.5 Management Direction (Desired Conditions, Standards, and Guidelines)

The Interior Columbia Basin Strategy stated that a Forest Plan should identify desired conditions for aquatic and riparian resources in order to be successful in conserving listed salmon and steelhead (BLM et al. 2014). Desired conditions can be described for the different components of aquatic resources, such as water quality (e.g., temperature) and stream habitat components (e.g., pools). The Interior Columbia Basin Strategy found that a successful aquatic conservation strategy should include a set of indicators that encompass the key characteristics of fish habitat, such as the NMFS matrix of pathways and indicators (NMFS 1996). Indicators are a way to measure if desired conditions are being achieved. Plans should also include activity-specific standards and guidelines to support conserving or achieving those desired conditions (BLM et al. 2014).

The revised Plan describes desired conditions for many aspects of aquatic and riparian resources, including aquatic function, water quality, riparian management areas, and stream channel function. Table 4 of this Opinion gives examples of desired conditions relevant to the conservation of listed salmon and steelhead. Similar to PACFISH, the revised Plan then uses a subset of indicators from the NMFS matrix of pathways and indicators (NMFS 1996) to measure whether or not desired conditions are being achieved. These indicators are called WCIs. Measurable WCIs provide a benchmark by which the Forests can assess the potential effects of management activities on the landscape. If local data are available to help define a more site- or watershed-specific WCI value, then the Forests will make local modifications to the default WCI values from the NMFS matrix. The NMFS (1996) matrix and its associated indicator values have been an effective tool for over two decades in helping the Forests develop individual projects that minimize adverse effects to listed salmon and steelhead.

The revised Plan provides standards and guidelines that support conserving or achieving those desired conditions. As stated above, RMA-1S and WM-1S are the most important standards and guidelines:

***RMA – 1S.** When riparian management area desired conditions are functioning properly, projects shall protect or maintain those conditions. When riparian management area desired conditions are not yet achieved, and to the degree that project activities would contribute to those conditions, projects or permitted activities shall restore or not retard attainment of desired conditions. Short-term adverse effects from*

*project activities may occur when they support long-term recovery of riparian management area desired conditions.*⁵

WM-1S. *When watershed function desired conditions are being achieved and watersheds are functioning properly, projects shall maintain those conditions. When watershed function desired conditions are not yet achieved, and to the degree that project activities would contribute to those conditions, projects shall restore or not retard attainment of desired conditions. Short-term adverse effects from project activities may occur when they support or do not diminish long-term recovery of watershed function desired conditions and federally listed species.*

Each of these standards requires that when watershed and riparian desired conditions are being achieved, projects shall *maintain* those conditions; and where desired conditions are not yet achieved, projects shall *restore or not retard attainment* of desired conditions. A project may have short-term adverse effects if it maintains or makes progress towards desired conditions over the long term. To determine project-level compliance with these standards, the Plan directs the USFS to use the WCIs from the ARCS Attachment B. Therefore, projects implemented under the direction of the revised Plan will either protect properly functioning riparian conditions, or promote or allow for the recovery of desired conditions, as measured by WCIs from the NMFS (1996) matrix—and the same is true for watershed function, per WM-1S. Projects implemented under the Plan will therefore either benefit populations of listed salmon and steelhead that overlap with the Forests or avoid adverse effects to fish or have adverse effects that are small and generally of short duration.

In the proposed action, the Forests described a process whereby this Plan direction on desired conditions would influence the development of an individual project. In particular, in a range allotment where streambank stability is impaired or functioning at risk, a Forest interdisciplinary team will evaluate if current grazing at the water's edge is preventing development of deep rooted plants to hold the streambanks together, leading to the impaired condition. If the interdisciplinary team finds that grazing is causing the impairment, then the team will recommend to the Forest decision-maker a change in grazing practices to allow these indicators to improve.

While WM-1S and RMA-1S are the most important standards for the protection of aquatic resources, many of the Plan's activity-specific standards and guidelines also address riparian and aquatic protection and are included in Appendix A of this Opinion. For example, TM-1S says, "Silvicultural treatments shall occur in riparian management areas only as necessary to maintain, enhance, or restore desired conditions for aquatic and riparian resources ..." Activity-specific standards and guidelines set program-level sideboards to avoid or minimize adverse effects related to timber harvest, road building, fire management, roads management, minerals management, and grazing, and other activities. The Forests will develop and apply additional BMPs at the project level (e.g., as required by U.S. Forest Service Handbook and Manual

⁵Exceptions to this standard include situations where Forest Service authorities are limited (e.g., 1872 Mining law). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of desired conditions to the extent possible within Forest Service authorities.

direction, State requirements, consultation requirements, etc.) to address these effects as future site-specific actions go through consultation and are authorized.

The standards and guidelines addressing grazing are particularly important, given the prevalence of livestock grazing across the Forests and the historic negative impacts of grazing on streams. The Plan's first standard applicable to grazing says, "Manage livestock grazing to attain aquatic and riparian desired conditions. Where livestock grazing is found to prevent or retard attaining aquatic and riparian desired conditions, modify grazing practices ..." (Standard GM-1S). This standard does not specify how to manage livestock grazing, but does require that management either attains or does not retard attainment of desired conditions. GM-3G, however, is more prescriptive. GM-3G states in part that:

Where desired conditions for water quality, aquatic habitat, and/or riparian vegetation have not yet been attained, but conditions are moving towards those desired conditions ... maintain a minimum of 4-inch to 6-inch residual stubble height of key herbaceous species on the greenline.

Multiple studies have evaluated minimum stubble heights necessary to protect stream habitat from the impacts of livestock grazing. Using PIBO monitoring data from Federal lands in the Columbia basin, Goss (2013) found that stubble height was related to streambank disturbance, and streambank disturbance began to increase substantially when stubble heights fell below 10 inches. Bengeyfield (2006) found that a 4-inch stubble height did not initiate an upward trend in stream channel morphology at sites on the Beaverhead-Deerlodge National Forest in Montana, based on seven to 9 years of monitoring. Clary (1999) found that while 5-inch stubble height at the end of the growing season resulted in improvements in most measured aquatic and riparian conditions in an Idaho meadow after 10 years, 6.5-inch stubble height was needed to improve all measured habitat metrics. Pelster et al. (2004) found that during summer and fall grazing greater than 40 percent of cattle diets were willow when stubble heights were less than 8 inches; they suggested that stubble heights greater than 8 inches were needed to reduce willow consumption during these critical periods. Willows enhance salmonid habitat by providing fish with cover, modulating stream temperatures, and contributing leaf detritus and terrestrial insects that expand food sources (Bryant et al. 2006; Clary and Leininger 2000; Murphy and Meehan 1991). This reinforces the idea that higher stubble heights lead to improved fish habitat.

After reviewing the available scientific literature, including all of the studies mentioned above, Roper (2016) strongly recommended 6 inches as a starting point for a stubble height objective, measured at the end of the growing season, for small to medium sized cold water streams inhabited by salmon and trout. This is consistent with Clary and Webster (1990), who suggested a 6-inch starting point for stubble height objectives in the presence of ESA-listed or sensitive fish. Roper (2016) acknowledges that 4 inches or 8 inches could be appropriate stubble height objectives for some stream sites, but that site-specific data would be necessary to support these more liberal or conservative objectives. Furthermore, a 4-inch stubble height could suffice as a move trigger on spring pastures if there is sufficient time for the graminoid and herbaceous vegetation to grow to meet end-of-growing-season objectives (Roper 2016). The scientific literature therefore suggests that maintaining a stubble height of 6 inches would likely allow

recovery of degraded riparian and stream habitat conditions but a stubble height of 4 inches would not do so in many cases.

The BA states that the Forests will *consider* a number of factors when prescribing a minimum stubble height between 4 and 6 inches for a particular pasture, including the presence of listed salmon and steelhead. We therefore assume that for pastures where streams with listed salmon, steelhead, or designated critical habitat are not meeting desired conditions, the Forests will generally prescribe 6-inch minimum stubble heights. For these pastures, we assume the Forests will only prescribe stubble height minimums less than 6 inches where when site-specific data suggests that a 4-inch minimum would protect streams from livestock damage and allow for natural rates of stream recovery. This assumption is based on GM-1S, which says that the Forests will manage livestock grazing to attain aquatic and riparian desired conditions; and based on the scientific literature discussed above, which supports a minimum 6-inch stubble to protect streams from livestock damage. Under this assumption the revised Plan will lead to the development of livestock management actions that promote natural rates of recovery for degraded riparian areas. This means that future livestock actions will either avoid adverse effects or have only very small adverse effects for populations of listed salmon and steelhead.

In conclusion, projects implemented under the management direction of the revised Plan will either protect properly functioning riparian conditions and watershed function, or promote or allow for the recovery of desired conditions, as measured by WCIs from Attachment B of the ARCS. Activity-specific standards and guidelines set program-level sideboards to avoid or keep very small any adverse effects to listed species and their habitat from the collective implementation of activities under the plan.

2.5.6 Monitoring and Adaptive Management

As described by the Interior Columbia Basin Strategy, the purpose of including monitoring and adaptive management in a Forest Plan is to determine if the Plan is being implemented correctly and is achieving desired results, and to provide a feedback loop so that the Plan's management direction may be evaluated and modified if necessary. The Plan relies on both broad-scale monitoring (e.g., PIBO) and monitoring efforts specific to the Blue Mountains Forests. The ARCS provides a list of all aquatic and fish-related monitoring that would occur under the direction of the Plan. This wide range of monitoring efforts will aid the Forests in answering the following questions during the life of the Plan:

- What is the status and trend of stream temperatures across the Forests?
- What is the status and trend of riparian vegetation conditions in subbasins across the Forests (based on annual and 5-year monitoring data from PIBO)?
- What is the status and trend of aquatic habitat on the Forests (based on PIBO effectiveness monitoring data and miles of stream habitat improved, measured annually and every 5 years)?

The Regional Forester will use monitoring results to support adaptive management actions. Adaptive management actions will generally focus on significant issues occurring over broad

areas (e.g., millions of acres). Adaptive management actions could include changes to the Blues ARCS, direction to Forests to develop new Revised Forest Plan direction, adjusted approaches to implementing current Revised Forest Plan direction, or adapting or replacing inaccurate analysis models. Monitoring the status of aquatic and riparian conditions gives the Forests a method to assess whether or not the Plan's standards and guidelines are working to protect and enhance habitat for listed salmon and steelhead. The monitoring program thus provides an additional guard against unanticipated adverse effects to ESA-listed species, though given its open-ended character we have not relied on specific associated benefits.

2.5.7 Consideration of Climate Change

The Interior Columbia Basin Strategy determined that, for land management plans, consideration of climate change is an essential piece of a successful aquatic conservation strategy. Under climate change scenarios, the general expectation for the Interior Columbia Basin is for more precipitation in the winter, less in the summer, and more falling as rain than snow (Mote et al. 2005; Mote and Salathe 2010). These projections suggest stream and river environments will be characterized by more extreme events: high flows and floods, low flows and droughts, and temperature extremes (Hamlet and Lettenmaier 2007; Luce and Holden 2009; Isaak et al. 2010; Mantua et al. 2010; Isaak et al. 2012). The increase in these extreme events could cause species distributions to shift and will increase the risk of extinction for vulnerable populations (Mote et al. 2003; Rieman et al. 2007; Barnett et al. 2008; Isaak and Rieman 2013; Wenger et al. 2011). Addressing climate change in the revised Plan is therefore an important component for promoting the survival and recovery of listed salmon and steelhead on the three Forests. Management decisions on the Forest should be made to ensure that actions do not exacerbate increases in water temperatures or reductions in stream flow during summer and fall (ISAB 2007). For example, riparian buffers designed to maintain or improve stream shade can offset some of the predicted increase in stream temperature (Wehrly et al. 2006; Cristea et al. 2010).

The recent climate change vulnerability assessment for the Blue Mountains (Halofsky and Peterson 2017) recommended several steps to improve the resiliency of aquatic conditions in the area. These included: (1) Increasing soil water storage in floodplains and on hillslopes for instream baseflows and reducing anthropogenic flashiness of storm flows; (2) restoring and maintaining summer stream temperatures (e.g., relocating roads away from streams, managing streamside riparian forest buffer zones to maintain effective shade and cool moist riparian microclimates); (3) identifying high-priority culvert barriers to fish movements, especially in areas potentially providing high-probability refugia for cool and cold-water species in the future; and (4) implementing a hierarchical approach to watershed restoration to ensure restoration is occurring in the most important places. These steps will help create more resilient habitat conditions that can better cope with adverse climate change variability and extremes.

The revised Plan is specifically designed to respond to climate change impacts to listed species and follows several of the recommendations from Halofsky and Peterson (2017):

- The Plan gives direction for reducing flood peaks by enhancing floodplain connectivity and disconnecting roads from streams; reconnecting isolated aquatic habitats by removing anthropogenic barriers; and managing riparian forests to provide shade. Table

5 shows the Plan's objectives how many miles or acres of such projects each Forest will accomplish over the next 10 years.

- The Plan identifies priority watersheds where the Forests will focus their aquatic and riparian restoration efforts. The Forests selected these watersheds based on their importance for ESA-listed fish species and potential for high-quality riparian and aquatic conditions once restored.
- Multiple desired conditions in the Plan address climate change (e.g., Aquatic Habitat Function DC-8: *Aquatic and riparian ecosystems are resilient to the effects of climate change and other major disturbances*). The Plan gives direction for projects to either make progress towards, be neutral to, or slow progress in a negligible way towards this desired condition.

Collectively, the ARCS components are designed to maintain and improve watershed, riparian and aquatic habitat conditions, fish populations, and habitat connectivity, particularly within the key watersheds. Taking into account the qualifiers outlined above, NMFS expects that implementation of the types and amounts of restoration projects identified in Table 5 (objectives) should slowly implement the Blue Mountains vulnerability assessment recommendations and create a network of properly functioning watersheds that are more resilient to withstanding some climate change effects and that are better able to support a variety of aquatic species (MNF, UNF, and WWNF 2018).

2.5.8 Summary of Effects to Species

Many of the activities addressed by the Plan have potential adverse effects to listed fish species and their habitat. The Plan provides a suite of protective desired conditions, standards, and guidelines aimed at avoiding or minimizing these adverse effects. Two overarching, key standards (WM-1S and RMA-1S) apply to all management activities and require aquatic and riparian baselines that are within desired conditions to be maintained. When baselines are not within desired conditions, projects must restore or not retard attainment of desired conditions to the degree that the project contributes to it. Short-term adverse project effects may occur when the project supports or does not diminish long-term recovery of watershed function, desired conditions, and federally listed species—unless the Forests have limited authorities to deny the project (e.g., Greater Mining Act of 1872). In these situations, project effects shall be minimized to the greatest extent possible. These two key standards are instrumental in ensuring that the aggregate of any adverse effects from future site-specific activities will be small and will be offset by beneficial actions such that environmental baselines in watersheds containing listed anadromous fish continue to be maintained or improved.

Furthermore, The Blue Mountains ARCS and Plan components include a comprehensive strategy for conserving aquatic resources, particularly because of the ARCS' restoration objectives and focus on priority watersheds. As restored watersheds accumulate over time through implementation of focused aquatic restoration as directed by the Plan, larger blocks of high-quality, well-connected habitat will be created, increasing the number of refugia. In the Interior Columbia Basin Strategy, USFS, NMFS, BLM, USFWS, and the EPA identified seven

fundamental elements that revised Forest Plans should include to promote and achieve conservation of aquatic and riparian resources (BLM et al. 2014). The revised Plan and the Blues ARCS includes all seven of these elements. In our evaluation of each element, we determined that each element, as described in the Plan and ARCS, is likely to avoid or keep small the aggregate adverse effects from future site-specific projects or benefit listed fish species and their habitat and will be offset to at least some degree by beneficial actions. Because we do not know the project-specific details of future activities that will be conducted under the direction of the Plan, we cannot predict or quantify the specific adverse effects from these future projects. However, based on the Plan's protective suite of standards and guidelines, and on the ARCS's focus on stream and riparian habitat restoration in priority watersheds, we expect the Plan will maintain or improve the viability of the populations of listed species on the Forests.

2.5.9 Effects to Critical Habitat

Many of the activities addressed by the Plan have potential adverse effects to designated critical habitats. The action area is important to the overall conservation value of critical habitat because the action area covers close to 1,000 miles or more of designated critical habitat for each species (MNF, UNF, and WWNF 2018). The PBFs for the three ESUs/DPSs that could be affected by activities conducted under direction from the Plan include: water quality, water quantity, substrate and spawning gravels, floodplain connectivity, forage and food, natural cover, safe passage free of artificial obstructions, riparian vegetation, and water velocity during migration. We expect the Plan's protective RMAs and standards and guidelines will avoid or keep small the aggregate adverse effects that future site-specific projects could have on PBFs and that adverse effects will be offset to at least some degree by beneficial actions. Two overarching, key standards (WM-1S and RMA-1S) apply to all management activities and require aquatic and riparian baselines that are within desired conditions to be maintained. When baselines are not within desired conditions, projects must restore or not retard attainment of desired conditions to the degree that the project contributes to it. The Forests define desired conditions by measurable WCIs that correspond to PBFs for Snake River Basin steelhead and Snake River Chinook salmon (Tables 14 and 15). Because the Plan directs that projects not degrade or retard attainment of WCIs, projects will also not degrade or retard attainment of properly functioning PBFs. Furthermore, as described earlier in this section of the Opinion, several of the key components of the Plan and the ARCS will enhance PBFs and the value of critical habitat across many miles of the designation. These components include focusing the Forests' habitat restoration efforts in priority watersheds and providing objectives for the amount of habitat restoration (subject to the qualifiers outlined above). The proposed action therefore will not reduce and may improve the conservation value for critical habitat at the designation scale for any of the three DPSs/ESUs.

Table 14. Comparison of Critical Habitat Physical and Biological Features for Steelhead to Blue Mountains Watershed Condition Indicators. The “X”s indicate which PBFs correspond with each Water Quality Indicator.

Watershed Condition Indicators	Physical and Biological Features – Steelhead											
	Freshwater Spawning			Freshwater Rearing					Freshwater Migration			
	Water Quality	Water Quantity	Substrate	Water Quantity	Floodplain Connectivity	Water Quality	Forage	Natural Cover	Passage	Water Quality	Water Quantity	Natural Cover
Water Quality												
Temperature	X					X				X		
Sediment - Turbidity	X					X				X		
Chemical Contamination/Nutrients	X					X	X			X		
Habitat Access												
Physical Barriers									X			
Habitat Elements												
Substrate Embeddedness			X									
Large Woody Debris							X	X				X
Pool Frequency/Quality								X				X
Off-channel Habitat					X							
Refugia					X			X				X
Channel Conditions and Dynamics												
Width to Depth Ratio	X				X					X		
Streambank Condition					X			X				X
Floodplain Connectivity					X							X
Flow/Hydrology												
Change in Peak/Base flows		X	X	X							X	
Increase in Drainage Network	X		X			X			X	X		
Watershed Conditions												
Road Density and Location					X			X				X
Disturbance History	X	X	X	X							X	
Riparian Management Areas	X		X		X	X	X	X		X	X	X

Table 15. Comparison of Critical Habitat Physical and Biological Features for Chinook Salmon to Blue Mountains Watershed Condition Indicators. The “X”s indicate which PBFs correspond with each Water Quality Indicator.

Watershed Condition Indicators	Physical and Biological Features – Spring/summer and Fall Chinook Salmon																	
	Spawning and Juvenile Rearing								Migration									
	Spawning Gravel	Water Quality	Water Quantity	Cover/ Shelter	Food	Riparian Vegetation	Space	Water Temperature	Substrate	Water Quality	Water Quantity	Water Temperature	Water Velocity	Cover/ Shelter	Food	Riparian Vegetation	Space	Passage
Water Quality																		
Temperature		X						X		X		X						
Sediment - Turbidity		X								X								
Chemical Contamination/Nutrients		X			X					X				X				
Habitat Access																		
Physical Barriers							X										X	X
Habitat Elements																		
Substrate Embeddedness	X																	
Large Woody Debris				X	X								X	X	X			
Pool Frequency/Quality				X			X						X	X			X	
Off-channel Habitat				X		X								X		X	X	
Refugia				X		X	X							X		X	X	
Channel Conditions and Dynamics																		
Width to Depth Ratio							X	X				X						X
Streambank Condition				X			X							X				X
Floodplain Connectivity				X		X	X						X	X		X	X	X
Flow/Hydrology																		
Change in Peak/Base flows	X		X								X		X					
Increase in Drainage Network		X								X								X
Watershed Conditions																		
Road Density and Location	X	X				X			X	X		X	X			X		X
Disturbance History	X	X	X			X		X	X	X	X					X		
Riparian Management Areas	X	X	X	X	X	X		X	X	X	X	X		X	X	X		

2.5.10 Effects to Species and Critical Habitat from the Hells Canyon National Recreation Area

The Revised Forest Plan carries forward the 2003 CMP for the HCNRA without modification. Future activities carried out under the CMP could have small impacts to water quality, water temperature, instream and riparian habitat, and food sources for salmonids. Specifically:

- Vegetation management activities can accelerate erosion and increase runoff by changing upslope hydrology and road-related disturbance, which can impact water quality, alter hydrologic conditions, increase landslides, and block fish habitat;
- Developed and dispersed camping can frequently result in streambank disturbances, soil compaction, and vegetation removal; and
- Grazing can lead to an increase in sedimentation through increased surface erosion, a decrease in effective vegetative ground cover and root binding strength, streambank instability, stream channel incision, and loss of primary shade in small streams.

However, Management direction from the CMP will continue to minimize adverse effects to listed species and their critical habitat from activities conducted in the HCNRA.

For aquatic and riparian protection and conservation, the CMP follows the substantive conservation direction of PACFISH and NMFS' PACFISH biological opinions (NMFS 1995b; NMFS 1998). Thus PACFISH standards and guidelines will continue to apply to timber harvest, grazing, mining, road management, recreation, and other activities in the HCNRA. PACFISH activity-specific standards and guidelines were designed to avoid or minimize potential adverse effects to listed fish and their habitat from management activities. For example, PACFISH guideline GM-1 directs the Forests to modify grazing practices that retard or prevent attainment of riparian management objectives. NMFS has previously concluded that PACFISH direction of Federal land management is not likely to jeopardize the continued existence of listed salmon and steelhead species or destroy or adversely modify their critical habitat (e.g., NMFS 1995a; NMFS 1995b; NMFS 1998). Moreover, since that time, there has been thorough monitoring of the effectiveness of PACFISH (PIBO monitoring in particular). The monitoring demonstrates that our prior analysis and conclusions remain fundamentally sound and that the standards and guidelines function to keep the adverse effects, including in the aggregate, to acceptable levels and to provide some benefits to listed species and critical habitats (Appendices C through E of the BA). In addition, given the character and location of the HCNRA, only a limited type and number of activities are expected, i.e., recreational activities and small amounts of grazing. Because future activities conducted in the HCNRA will, per the CMP, continue to be developed to meet the direction of PACFISH, and the activities are expected to be limited in type and amount, the Revised Plan as it applies to the HCNRA is likely to avoid or keep small the aggregate adverse effects and provide some benefits to listed species or their critical habitat from the continuation of the CMP.

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). 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.

Across the action area in the Blue Mountains Region, in some areas the Forests manage entire watersheds whereas in other watersheds non-federal lands are interspersed with or adjacent to federal lands. Many different activities occur on State, tribal, and private lands directly upstream or downstream from the boundaries of the three Forests. These activities include livestock grazing, timber harvest, mining, development, and road-building—as well as stream habitat restoration projects addressing limiting factors in the recovery plans. The effects of these activities all contribute to the condition of stream habitat in the action area, as described in 2.4 Environmental Baseline.

Non-Federal actions are likely to continue affecting ESA-listed fish species. The cumulative effects in the action area are difficult to analyze, considering the broad geographic landscape covered by the action area, the uncertainties associated with non-Federal actions, and ongoing changes to the region’s economy. Whether those effects will increase or decrease in the future is not known. Stream habitat restoration projects on non-Federal land in the region are likely to continue at their current rate as entities such as the Grande Ronde Model Watershed or Tribes (NPT, CTUIR, CTWSR) implement the high-priority stream restoration projects identified in planning documents (e.g., ATLAS processes for the Upper Grand Ronde River, Catherine Creek, and the Wallowa Valley). These projects will address limiting factors identified in recovery plans and benefit listed species and their habitat. On the other hand, population is currently increasing in all parts of Oregon, including the eastern counties which overlap with the Blue Mountains Forests. These counties increased in population by 0.7 percent in 2017 (Lehner 2017). Increased human population in the region will lead to increased activities which adversely affect species and their habitat, such as road-building and development near streams. Based on population growth, adverse effects of non-Federal actions to listed species and their habitat are likely to increase.

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).

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 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 diminishes the value of designated or proposed critical habitat for the conservation of the species.

Species

- For all three DPSs/ESUs, many individual populations (including several for each species that overlap with the Forests) are not meeting recovery plan abundance and productivity targets, such that each species remains threatened with extinction.
- Climate change factors will likely make it more challenging to increase abundance and recover each species by reducing the suitable rearing areas and leading to more limited run-timing under the warmer future conditions.
- Many past and present land uses, including livestock grazing, timber harvest, barriers, stream channelization, recreation, and road-building in floodplains, have contributed to current degraded habitat conditions in many non-wilderness parts of the action area (NMFS 2017). The PIBO data indicates that overall there has been some recovery of riparian conditions on the Forests from past damaging land-use practices (MNF, UNF, and WWNF 2017).
- Many of the activities conducted on the Forests have potential adverse effects to listed fish species and their habitat. The Plan provides a suite of protective desired conditions, standards, and guidelines and wide default RMAs aimed at avoiding or minimizing these adverse effects. Of particular importance, plan guidance directs the Forests to develop individual activities that either maintain, restore, or do not retard attainment of desired riparian and aquatic conditions. Through the Plan's various mechanisms (watershed analysis, application of the WCI Matrix at the watershed scale, and monitoring), it will ensure that aggregate adverse effects from future site-specific activities will be avoided or kept small and will be offset to at least some degree by beneficial actions.
- In particular, key components of the revised Plan and ARCS, such as priority watersheds for restoration, will improve stream habitat on the Forests over time.
- Based on the Plan's protective suite of standards and guidelines, and on the ARCS's focus on stream and riparian habitat restoration in priority watersheds, we expect the aggregate and synergistic effect of activities occurring under the Plan will maintain and potentially improve the viability of populations of listed species on the Forests.

Critical Habitat

- For critical habitat for each species, across the designation (including on the Forests) the current ability of PBFs to support the species varies from excellent in wilderness areas to

poor in areas of intensive human land use. Climate change will likely reduce the ability of PBFs to support the species across some parts of the designation in the future.

- Many of the activities addressed by the plan have potential adverse effects to designated critical habitats. However, we expect the Plan's protective RMAs and standards and guidelines, along with the mechanisms that will track and influence broad-scale implementation (e.g., watershed analysis application of the WCI Matrix at the watershed scale, and monitoring), will avoid or keep small the aggregate adverse effects that future site-specific projects could have on PBFs, and that adverse effects will be offset to at least some degree by beneficial actions. Because the Plan directs that projects not degrade or retard attainment of WCIs, projects will also not degrade or retard attainment of properly functioning PBFs (which correspond to WCIs). Several of the key components of the Plan and the ARCS will enhance PBFs and the value of critical habitat across many miles of the designation. These components include focusing the Forests' habitat restoration efforts in priority watersheds and providing objectives for the amount of habitat restoration that the Forests will accomplish in the next 10 years.
- Because the conservation value of critical habitat will be enhanced in many locations on the Forest and will not be appreciably diminished elsewhere, the conservation value of critical habitat at the designation scale will not be appreciably diminished.

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, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' opinion that the proposed action is not likely to jeopardize the continued existence of Snake River Basin steelhead, Middle Columbia River Steelhead, and Snake River spring/summer Chinook salmon or destroy or adversely modify designated critical habitat for any of these species.

2.9 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).

- Every 5 years, review the Forests' implementation of the findings and adaptation strategies of the Blue Mountain Climate Change vulnerability assessment (Halofsky and Peterson 2017) or best available climate change assessments. As necessary, add to or revise the Plan's desired conditions, standards, guidelines, and restoration objectives to address aquatic ecosystems and processes vulnerable to climate change.

- Update watershed condition assessments by 2028 in order to base planning for the next revision of the Forest Plans on up-to-date information on stream, riparian, and watershed conditions.
- Adequately fund the potential monitoring described in the Proposed Action.

Please notify NMFS if the USFS, or another entity, carries out these recommendations so that we will be kept informed of actions that minimize or avoid adverse effects and those that benefit listed species or their designated critical habitats.

2.10 Reinitiation of Consultation

This concludes formal consultation for the Revised Blue Mountains Forest Plan in Northeast Oregon on the Forests.

As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained or is authorized by law and if: (1) New information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion (for instance, if our assumptions described in Section 2.5 are violated); (2) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this Opinion; or (3) a new species is listed or critical habitat designated that may be affected by the action.

2.11 “Not Likely to Adversely Affect” Determinations

We concur with the Forests that the proposed action are not likely to have adverse effects on Snake River fall Chinook salmon, Snake River sockeye salmon, or critical habitat for either species. See Table 16 for the listing status and the protective regulations for each of these species and their designated critical habitat.

Table 16. Federal Register notices for final rules that list threatened and endangered species, designated critical habitat, or apply protective regulations to listed species.

Species	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon (<i>Oncorhynchus tshawytscha</i>)			
Snake River	T 6/28/05; 70 FR 37160	12/28/93; 58 FR 68543	ESA Section 9 applies
Sockeye salmon (<i>O. nerka</i>)			
Snake River	E 6/28/05; 70 FR 37160	12/28/93; 58 FR 68543	ESA Section 9 applies

Note: Listing status: ‘T’ means listed as threatened under the ESA; ‘E’ means listed as endangered).

Fall Chinook salmon occupy larger mainstem rivers, and not tributary streams like steelhead and spring/summer Chinook salmon, and therefore have limited overlap with the Forests. Current distribution and designated critical habitat for the Snake River fall Chinook salmon ESU overlaps with the Forests in three places: (1) The Grande Ronde River within the Grande Ronde River Wild and Scenic River designation; (2) the Imnaha River within the Imnaha River Wild

and Scenic River designation; and (3) Snake River within the HCNRA. The revised Plan classifies Wild and Scenic Rivers as unsuitable for most management activities, and the CMP for the HCNRA is managed to enhance recreational and ecological values, limiting management activities along the Snake River. Recreational floaters on the Grande Ronde River, authorized by the Forests, could momentarily disturb spawning fall Chinook, but the BA expects these encounters to be infrequent given the sparse spawning use by fall Chinook of the section of the Grande Ronde River that overlaps with the Forests. Furthermore, even if fish move, we expect them to move only short distances to an area where they feel more secure and only for a few hours in any given day (Grant and Noakes 1987; Ries 1995; Olson 1996; SNF 2009). Other management activities which could lead to small adverse effects to stream habitat (e.g., timber harvest or grazing, as explained above) will occur upslope from the Wild and Scenic River corridors for the Grande Ronde River and the Imnaha River and upslope of the Snake River in the HCNRA and not adjacent to habitat for Snake River fall Chinook salmon. We therefore conclude that adverse effects to Snake River fall Chinook or its critical habitat from the proposed action will be insignificant, and we therefore concur that the proposed action is not likely to adversely affect the ESU or its critical habitat.

Within the action area, Snake River sockeye occurs only in the mainstem Snake River within the HCNRA, which is part of the migration corridor for Snake River sockeye traveling to and from spawning grounds in central Idaho. As stated above, the HCNRA is managed to enhance recreational and ecological values, limiting management activities along the Snake River. Management activities which could lead to small adverse effects to stream habitat will not occur adjacent to habitat for Snake River sockeye. We therefore conclude that adverse effects to Snake River sockeye salmon or its critical habitat from the proposed action will be insignificant, and that the proposed action is therefore not likely to adversely affect the ESU or critical habitat.

3. MAGNUSON-STEVENSON 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 Forests 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 PFMC designated EFH for Chinook salmon, coho salmon, and Puget Sound pink salmon (PFMC 2014). The proposed action and action area for this consultation are described in the introduction to this document. The action area encompasses EFH for Chinook salmon and coho salmon. The proposed action will affect EFH for the spawning, rearing, and migration life-history stages of both Chinook salmon and coho salmon.

The PFMC has identified five habitat areas of particular concern (HAPC), which warrant additional focus for conservation efforts due to their high ecological importance. Three of the five HAPC are applicable to freshwater and include: (1) Complex channels and floodplain habitats; (2) thermal refugia; and (3) spawning habitat. All three could be affected in streams in the action area.

3.2 Adverse Effects on Essential Fish Habitat

Adverse effects to EFH in the action area are described in the Opinion. The revised Plan will not authorize any individual projects. Individual future projects developed under the framework of the proposed Plan will be subject to individual EFH consultations. Analysis of the effects of individual projects to EFH will occur at a later time, and projects will not take place until these individual consultations are complete. However, direction from the revised Plan will influence the types of projects that the Forests develops, the frequency and location of proposed projects, and some of the conservation measures aimed at EFH associated with each project. The accumulation of effects to EFH at the landscape level from numerous projects—in the event they are not sufficiently minimized at the project-specific level through individual consultation—could adversely affect the three HAPCs (complex channels and floodplain habitats; thermal refugia; and spawning habitat). On the other hand, direction from the revised Plan could benefit EFH by leading to projects across the landscape which protect the best remaining habitat, restore damaged habitat, and minimize adverse effects to EFH from management activities.

3.3 Essential Fish Habitat Conservation Recommendations

NMFS does not have any conservation recommendations for the proposed action.

3.4 Supplemental Consultation

The Forests 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(1)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The 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 Forests. Individual copies of this Opinion were provided to the Forests. This Opinion will be posted on the Public Consultation Tracking System web site (<https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts>). 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 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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APPENDIX A

Complete list of desired conditions, standards, and guidelines in the Blues Aquatic and Riparian Conservation Strategy

DESIRED CONDITIONS

General Forest-Wide Desired Conditions

The general Forest-wide desired conditions described in this section apply at larger (e.g., watershed) scales, not at particular sites. The national hydrologic unit (HU) is the basis for defining the specific scales at which the general Forest-wide desired conditions apply. The three watershed scales most relevant to implementation of the Forest plan are: subbasin (8-digit HU), watershed (10-digit HU), and subwatershed (12-digit HU). Individual project assessments often use data collected at finer scales such as the subwatershed, drainage, valley segment, site, stream reach or scale.

Forest-wide desired conditions pertaining to riparian areas, water, water quantity and quality are described below. The scale(s) at which these generally apply to Forest planning and project planning are identified after each desired condition.

Watershed Function DC-1. The watershed-scale processes that control the routing of water, sediment, wood, and organic material operate at levels that support native aquatic species and the proper function of their habitat and do not require human intervention or restoration. **Scale:** Watershed or Subwatershed.

Watershed Function DC-2. The distribution, diversity, and complexity of watershed features (i.e., submerged and overhanging large wood, log jams, and beaver dams, side channels, pools, undercut banks and embedded substrates) and natural processes provide aquatic and riparian ecosystems to which species, populations, and communities are uniquely adapted. **Scale:** Subbasin.

Watershed Function DC-3. Connectivity exists within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact habitat refugia. These network connections provide unobstructed routes to areas critical for fulfilling all life history requirements of aquatic, riparian-dependent, and upland species of plants and animals. **Scale:** Connectivity is within and between watersheds at the subbasin scale for forest-wide planning; between subwatersheds at the watershed scale for project planning.

Watershed Function DC-4. Aquatic and riparian ecosystems resilient to the effects of climate change and other major disturbances. **Scale:** Subbasin for Forest planning and watershed scale for project planning.

Hydrologic Function DC-1. Flow regimes, including water yield, timing, frequency, magnitude, and duration of runoff, are sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of movement of sediment, nutrients, and wood. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows are within the natural range of variability in which the system developed. **Scale:** Watershed.

Hydrologic Function DC-2. The timing, variability, and duration of floodplain inundation, water table elevation in wetlands, seeps, and springs, and subsurface water connectivity are within the natural range of variability. **Scale:** Watershed and Subwatershed.

Wetland DC-1. The extent and diversity of wetland types is maintained or increased. **Scale:** Subbasin.

Wetland DC-2. The surface and subsurface flow paths that support wetland habitats are undisturbed. The timing and duration of inundation of wetlands are within natural ranges. Plant species composition in wetlands is characteristic of the biophysical setting in which they occur. **Scale:** Subwatershed.

Ground-Water Dependent Ecosystem DC-1. The ecological structure and function of springs, peatlands and groundwater fed wetlands are maintained or restored. **Scale:** Subwatershed.

Ground-Water Dependent Ecosystem DC-2. The aquifer supplying water to groundwater-dependent ecosystems is not being affected by groundwater withdrawal or loss of recharge. Soils of groundwater dependent ecosystems are intact and functional; erosion and deposition are within the natural range. Runout channels, if present, are functioning naturally and are not entrenched, eroded, or substantially altered. Vegetation is composed of the anticipated cover of plant species associated with the site environment; hydric species are present and are not replaced by upland species. Livestock herbivory and trampling are not adversely affecting sites. **Scale:** Subwatershed.

Ground-Water Dependent Ecosystem DC-3. Vegetation is composed of the expected cover of plant species associated with the site environment; hydric species are present and are not replaced by upland species. Livestock herbivory and trampling are not adversely affecting sites. **Scale:** Subwatershed.

Stream Channel Function DC-1. The sediment regime under which aquatic ecosystems evolved is maintained, including the timing, volume, rate and character of input, storage, and transport. **Scale:** Watershed.

Stream Channel Function-2. The physical integrity of the aquatic system, including shorelines, banks, and bottom configurations, are properly functioning and in dynamic equilibrium with the flow and sediment regimes under which aquatic systems have evolved. **Scale:** Subwatershed to watershed.

Stream Channel Function DC-3. Channel morphology, structure, complexity, and diversity are in ranges that are characteristic of the local geology, climate, and geologic processes. **Scale:** Watershed.

Stream Channel Function DC-4. Channel-floodplain connections are intact. Channel bed and bank erosion rates are within natural ranges and do not result in degraded aquatic or riparian habitats or channel alteration. **Scale:** Subwatershed to Subbasin.

Stream Channel Function DC-5. Measures of channel stability and morphology, including width/depth ratio, bank stability, and bank angle are within reference ranges and matches the frequency distribution of reference sites for a given channel type and channel size. **Scale:** Subwatershed to Subbasin.

Stream Channel Function DC-6. Large wood frequency and volume are within the range of variation and potential for streams in individual watersheds. The spatial and temporal distribution of wood in individual streams varies depending on valley, riparian, and channel characteristics and the disturbance processes (fire, flood, debris flow) responsible for transferring material from hillslopes to streams. The frequency distribution of large wood among individual streams is similar to the frequency distribution of reference sites. **Scale:** Watershed.

Stream Channel Function DC-7: In forested watersheds, the distribution and frequency of wood forced channel morphology (forced step pool and forced pool riffle streams), in which the majority of pools are formed by individual pieces or accumulations of large wood, and wood-rich pool riffle streams (Montgomery et al. 1995) is comparable to the distribution in reference watersheds. **Scale:** Watershed.

Stream Channel Function DC-8: The frequency distribution of stream channel and habitat conditions for any given attribute, approaches the frequency distribution of reference conditions for the same attribute in similar channel types. **Scale:** Watershed to sub-basin.

Stream Channel Function DC-9: Pool frequency, size, depth, and volume are within ranges expected of given channel and valley types. **Scale:** Subwatershed to watershed.

Stream Channel Function DC-10: Bank erosion is within a range that does not degrade aquatic or riparian habitats or that leads to channel alteration. **Scale:** Subwatershed to subbasin.

Aquatic Function DC-1. Aquatic habitats contribute to ecological conditions capable of supporting self-sustaining populations of native species and diverse plant, invertebrate, and vertebrate aquatic and riparian-dependent species. Aquatic habitats are key for the recovery of threatened and endangered fish species and provide important habitat components for all native aquatic species. **Scale:** Subwatershed to Subbasin.

Aquatic Function DC-2. National Forest System lands contribute to the protection of population strongholds for state classified sensitive species, and narrow endemics, federally listed or proposed threatened and endangered species, and designated critical habitats. These strongholds provide high quality habitat (e.g., spawning/rearing/over-wintering areas, and critical habitats, including migratory corridors) and support expansion and re-colonization of species to adjacent watersheds, and function in a manner that is resilient to natural disturbance regimes. These areas conserve key demographic processes likely to influence the persistence of populations or metapopulations. Areas adjacent to these high quality habitats are restored (as appropriate) and protected to help ensure adequate connectivity, species distribution, and the maintenance or restoration of fully functioning habitats for all life histories of aquatic species. **Scale:** Subwatershed to Subbasin.

Aquatic Function DC-3. Aquatic habitat elements (e.g., substrate, pools, cover, food, water quality and quantity) are in properly functioning and are sufficiently distributed to ensure egg and embryo survival, fry emergence, and juvenile survival of aquatic species to support self-sustaining populations of native resident and anadromous fish. Spawning and rearing areas contain a minimal amount of fine sediment, ranging in size from silt to coarse sand. **Scale:** Subwatershed to Subbasin.

Aquatic Function DC-4. Native fish species have access to historically occupied aquatic habitats and connectivity between habitats allows for the interaction of local populations. Migratory habitats support juvenile and adult mobility and survival between spawning, rearing, overwintering, and foraging habitats that contain areas that:

- are free of obstruction and excessive levels of predators of federally listed aquatic species;
- have minimal physical, biological, or water quality and quantity impediments (including permanent, partial, intermittent, or seasonal barriers); and
- contain natural cover such as large wood, aquatic vegetation, rocks and boulders, side channels, and undercut banks.

Scale: Subwatershed to Subbasin.

Aquatic Function DC-5. The transfer of wood, sediment, nutrients, and other material that occurs following fires, wind storms, floods, and other natural disturbances is capable of creating and maintaining the range and diversity of riparian and aquatic habitat conditions that occurs in reference watersheds. **Scale:** Watershed.

Aquatic Function DC-6. The potential for large wood recruitment to streams from within forested riparian areas, and from low-order streams to higher-order streams, is similar to the potential in reference watersheds containing the same (riparian) forest vegetation types. (This partly restates WF-1, but is more explicit). **Scale:** Watershed.

Aquatic Function DC-7. Aquatic habitats in which the distribution of conditions (e.g., bank stability, substrate size, pool depths, size and frequencies, channel morphology, large woody debris size and frequency) in the population of watersheds on the Forest is similar to the distribution of conditions in the population of similar, reference condition watersheds. The distribution of conditions in individual streams vary depending on valley, riparian, and channel characteristics. **Scale:** Reference Conditions can be drawn from the Forest or Provincial scales. Conditions assessed at the subbasin scale for Forest and project planning.

Aquatic Function DC-8. Aquatic and riparian ecosystems are resilient to the effects of climate change and other major disturbances. **Scale:** Subbasin scale for Forest planning and watershed scale for project planning.

Species Diversity DC-1. The natural range of habitats for native and desired nonnative fish, wildlife, and plant species, including threatened and endangered species, species identified as regional forester's sensitive species, and surrogate species, is of adequate quality, distribution, and abundance to contribute to maintaining native and desired nonnative species diversity. This includes the ability of species and individuals to interact, disperse, and find security within habitats in the planning area. These habitat conditions are resilient and sustainable considering the range of possible climate change scenarios. **Scale:** The desired condition for species diversity can be applied at a variety of scales (i.e., forest-wide, watershed, and subwatershed). During project analysis and implementation, this desired condition should be used concurrently with information outlined in the strategy and design criteria part of this plan and with consideration of the best available climate change projections.

Species Diversity DC-2. Population strongholds for the fish surrogate species provide high quality habitat and support expansion and recolonization of species to adjacent unoccupied habitats. These areas conserve key demographic processes likely to influence the sustainability of aquatic species. **Scale:** The desired condition for species diversity can be applied at a variety of scales (i.e., forest-wide, watershed, and subwatershed). During project analysis and implementation, this desired condition should be used concurrently with information outlined in the strategy and design criteria part of this plan and with consideration of the best available climate change projections.

Species Diversity DC-3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish exist. Low levels of occurrence of nonnative predatory, interbreeding, or competing species exist, and if present, they are temporally and spatially isolated from federally listed species. **Scale:** The desired condition for species diversity can be applied at a variety of scales (i.e., forest-wide, watershed, and subwatershed). During project analysis and implementation, this desired condition should be used concurrently with information outlined in the strategy and design criteria part of this plan and with consideration of the best available climate change projections.

Species Diversity DC-4. Specialized habitat components, such as caves, standing dead trees, seeps, and springs, are found across the landscape in amounts and types commensurate with the natural communities in which they occur. **Scale:** The desired condition for species diversity can be applied at a variety of scales (i.e., forest-wide, watershed, and subwatershed). During project analysis and implementation, this desired condition should be used concurrently with information outlined in the strategy and design criteria part of this plan and with consideration of the best available climate change projections.

Species Diversity DC-5. Management activities improve the conservation status of species identified as being surrogate species or of local or regional conservation concern. Habitats and populations are managed in accordance with conservation planning documents, recovery plans, best available scientific information, and local knowledge. **Scale:** The desired condition for species diversity can be applied at a variety of scales (i.e., forest-wide, watershed, and subwatershed). During project analysis and implementation, this desired condition should be used concurrently with information outlined in the strategy

and design criteria part of this plan and with consideration of the best available climate change projections.

Federally Listed Species DC-1. Federally listed species (aquatic and terrestrial) are recovered or delisted. Management activities improve the conservation status of listed species and designated critical habitat. Habitats are managed in accordance with conservation planning documents, recovery plans, best available scientific information, and local knowledge. Critical habitat components (i.e., Primary Constituent Elements and Primary Biological Features) are protected and restored to achieve species recovery.

- For listed aquatic species, on National Forest Service lands spawning, rearing, and migratory habitat is widely available and inhabited. Listed aquatic species have access to historic habitat and appropriate life history strategies (i.e., resident, fluvial, adfluvial and anadromy) are supported. Recovery is promoted through cooperation and coordination with tribes, state agencies, federal agencies, and other interested groups.
- For listed terrestrial species, habitat that adequately provides ample resources for all life stages is available and inhabited. Recovery is promoted through cooperation and coordination with tribes, state agencies, federal agencies, and other interested groups.
- For listed plant species, threats such as invasions by aggressive, nonnative plants, adverse livestock grazing management, and changes in fire frequency and seasonality are addressed. Populations achieve recovery through cooperation and coordination with tribes, state agencies, federal agencies, and other interested groups.

Scale: A variety of spatial scales and hydrologic boundaries (ranging from individual projects to subwatersheds to areas as large as populations). Species recovery plans identify activities necessary for recovery at the project (reach), subwatershed and population scales. Species' recovery plans further describe high-priority restoration actions at these scales that address identified limiting factors and threats to listed species and designated critical habitats.

Invasive Species DC-1. Healthy, native and desired nonnative animal communities, and native and desired nonnative plant communities dominate the landscape and are resilient given current and projected climate conditions. Invasive species and other undesirable species (terrestrial and aquatic plants and animals) are absent or occur in small areas and have limited or no impacts on viability of native and desired nonnative species. Existing invasive and undesirable species do not expand their current distributions over the life of the Plan, and their current distributions will be reduced to the extent possible over that period of time. Invasive and undesirable species do not significantly diminish the ability of the national forests to provide the goods and services communities expect or the habitat that plant and animal community diversity depends upon. New invasive species resulting from changes in plant and animal habitats due to changes in climate occur only at low levels. **Scale:** Watershed.

Water Use DC-1. Water is available in sufficient quantity and quality to meet downstream human needs as well as the needs of aquatic species considering the range of possible climate change scenarios. **Scale:** Watershed to Subbasin.

Water Use DC-2. Water quality and quantity of groundwater resources, including seeps, springs, fens, and other groundwater-dependent ecosystems, is sufficient to provide for the extent and diversity of species associated with these habitats. **Scale:** Watershed to Subbasin.

Water Quality DC-1. Water quality (e.g., temperature, turbidity, and dissolved oxygen) of surface and groundwater is sufficient to support healthy riparian, aquatic, and wetland ecosystems. It is within the range that maintains the biological, physical, and chemical integrity of the system and is capable of benefiting the survival, growth, reproduction, and mobility of individuals composing aquatic and riparian communities. **Scale:** Watershed.

Water Quality DC-2. The quality of water within and emanating from the national forests is sufficient to provide for state-designated beneficial uses, including human uses and meets applicable local, state, and tribal water quality criteria. **Scale:** Subbasin.

Desired Conditions for Key Watersheds and subwatersheds with ESA critical habitat for aquatic species

Key Watershed DC-1. Connected networks of watersheds with ecological form, function and processes, and functionally intact ecosystems contribute to and enhance conservation and recovery of specific threatened or endangered fish species and provide high water quality and quantity. The networks contribute to short-term conservation and long-term recovery at the major population group, core area or other appropriate population scale. **Scale:** Watershed to Subbasin.

Key Watershed DC-2. Roads in key watersheds present minimal risk to aquatic resources. **Scale:** Subwatershed.

Key Watershed DC-3. Key watersheds have high watershed integrity and provide resilient aquatic and riparian ecosystems. **Scale:** Subwatershed.

Desired Conditions for Riparian Management Areas

Riparian Management Area DC-1. Riparian management areas (RMAs) within any given watershed reflect a natural composition of native flora and fauna and a distribution of physical, chemical, and biological conditions appropriate to natural disturbance regimes affecting the area. **Scale:** Subwatershed.

Riparian Management DC-2. The species composition and structural diversity of native plant communities in riparian management areas, including wetlands, provides adequate side channels, pools, undercut banks and unembedded substrates. These conditions result in a variety of depths, gradients, velocities, and structure for seasonal thermal regulation, nutrient filtering, appropriate rates of erosion, and channel migration and supplies amounts and distributions of coarse woody debris and fine particulate organic matter sufficient to sustain physical complexity and stability. **Scale:** Watershed scale for forest-wide planning; subwatershed scale for project planning.

Riparian Management Area DC-3. Key riparian processes and conditions (including slope stability and associated vegetative root strength, bank stability, wood delivery to streams, and,

within the riparian management areas, input of leafy and other organic matter to aquatic and terrestrial systems, solar shading, microclimate, and water quality) are operating consistent with natural disturbance regimes. **Scale:** Subwatershed.

Riparian Management Area DC-4. Riparian vegetation has the species composition, structural diversity, age class diversity, and extent that is characteristic of the setting in which it occurs and the hydrologic and disturbance regimes in which it developed. The condition and composition of small habitat patches may change over small temporal and spatial scales but remains relatively constant at larger scales. Plant communities are similar in species composition, age class structure, canopy density, and ground cover to plant associations (Crowe and Clausnitzer 1997) that are representative of a particular setting. **Scale:** Subwatershed to subbasin.

Riparian Management Area DC-5. Riparian shrub communities occupy their historical range and extent. Individual plants are capable of reaching the full potential for a typical individual of a particular species, as defined by plant height, width, and growth form. Individual plants are able to propagate, or reproduce, vegetatively and/or sexually. Plant communities are similar in species composition, age class structure, canopy density, and ground cover to plant associations (Crowe and Clausnitzer 1997) that are representative of a particular setting. **Scale:** Subwatershed.

Riparian Management Area DC-6. Riparian areas consist of native assemblages of riparian-dependent plants and animals free of persistent non-native species and provide for dispersal and travel corridors, as well as connectivity, between geographically important areas for both terrestrial and aquatic animals and plant species within the planning area. **Scale:** Subwatershed.

Riparian Management Area DC-7. The potential for large wood recruitment to streams from within forested riparian areas, and from low-order streams to higher order streams, is similar to the potential in reference watersheds with similar forest vegetation types. **Scale:** Watershed.

STANDARDS AND GUIDELINES

General Riparian Management

Standard RMA-1S. Riparian Management Areas include portions of watersheds where aquatic and riparian-dependent resources receive primary management emphasis. When riparian management area desired conditions are functioning properly, projects shall protect or maintain those conditions. When riparian management area desired conditions are not yet achieved or riparian management areas have impaired function or are functioning-at-risk and to the degree that project activities would contribute to those conditions, projects or permitted activities shall restore or not retard attainment of desired conditions.¹ Short-term adverse effects from project

¹ Per Watershed Condition Framework Technical Guide, U.S. Forest Service (2011), subsequent versions of this guide and/or other comparable methods. Other broad-scale or local inventory, assessment and monitoring data and analysis can be used to refine initial classifications made per WCF. The Watershed Condition Class terminology for functioning properly, “functioning-at-risk”, and impaired function are equivalent to “functioning appropriately” or “, “functioning-at-risk” and “functioning at unacceptable risk” functioning categories within the matrix of pathways and indicators (USFWS 1998, and respectively

activities may occur when they support long-term recovery of riparian management area desired conditions.² Exceptions to this standard include situations where USFS authorities are limited (Alaska National Interest Lands Conservation Act [ANILCA], 1872 Mining law, valid state water right, etc.). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of desired conditions to the extent possible within USFS authorities. Use Aquatic and Riparian Conservation Strategy (ARCS) Attachment B (e.g. diagnostic indicators and RMA ecological process and function descriptions) to assist in determining compliance with this standard.

Standard RMA-2S. Herbicides, insecticides, pesticides and other toxicants, and other chemicals shall be applied only to maintain, protect, or enhance aquatic and riparian resources or to restore native plant communities in a manner that does not harm aquatic or riparian resources.

Standard RMA-3S. Trees felled for safety shall be retained onsite unless in excess of what is needed to achieve aquatic and riparian desired conditions. If the desired quantity and size distribution of large wood has been met on site, the wood can be transported to other aquatic and riparian restoration projects.

Guideline RMA-4G. Water drafting sites should be located and managed to minimize adverse effects on stream channel stability, sedimentation, and in-stream flows needed to maintain riparian resources, channel conditions, and fish habitat. To prevent the spread of invasive species, water should not be discharged into other water bodies.

Standard RMA-5S. Pumps shall be screened at drafting sites to prevent entrainment of fish and shall have one-way valves to prevent back-flow into streams.

Guideline RMA-6G. Fish habitat and water quality should be protected when withdrawing water for administrative purposes.

Standard RMA-7S. Refueling shall occur with appropriate containment equipment and a spill response plan in place. Wherever possible, storage of petroleum products and refueling will occur outside of RMAs. The use of containment devices, absorbent pads, and a developed spill plan will help reduce the risk of fuel and petroleum products from getting into streams and other waterways if an accident were to occur. If refueling or storage of petroleum products is necessary within RMAs, these operations will be conducted no closer than 100 feet from waterways.

equivalent to “Properly Functioning” or “At Risk” or “Not Properly Functioning” categories within the matrix of pathways and indicators used by NMFS (1996).

² The definitions and rationale for the terms maintain, restore, degrade, retard attainment, short-term, and long-term are included in Forest Plan standard WM-1S.

Timber Management in Riparian Management Areas

Standard TM-1S. Silvicultural treatments shall occur in riparian management areas only as necessary to maintain, enhance, or restore desired conditions for aquatic and riparian resources. When conducted, these activities shall avoid or minimize adverse effects to aquatic and riparian resources. Vegetation in riparian management areas shall not be subject to regularly scheduled timber harvest because they are not part of the timber suitability landbase.

Standard TM-2S. Fuelwood cutting shall not be authorized in RMAs unless specifically designed to attain aquatic and riparian desired conditions.

Guideline TM-3G. Use of existing or construction of new landings, designated skid trails, staging, and decking should not occur in riparian management areas, unless they are associated with projects designed to improve riparian management areas conditions. These features should: be of minimum size, be located outside the active floodplain, and avoid negative effects to large wood, bank integrity, temperature, and sediment levels.

Guideline TM-4G. Yarding activities should achieve full suspension over the active channel; unless other alternatives will have less damage to riparian areas and stream channels.³

Standard TM-5S. Silvicultural practices shall include provisions, as appropriate, to avoid detrimental changes in water temperatures, blockages of water courses; including protection for streams, stream banks, shorelines, lakes, wetlands, and other bodies of water, and deposits of sediment.

Standard TM-6S. Silvicultural practices shall include provisions (e.g., Best Management Practices for the maintenance or restoration of soil resources.

Standard TM-7S. Timber harvest on lands not suitable for timber production shall occur only to meet desired conditions for each management area other than timber production.

Guideline TM-8G. In watersheds in which stream channels and aquatic habitats are in properly functioning condition, forest vegetation within RMAs should be managed to maintain or increase large wood recruitment and delivery to streams.

Standard TM-9S. In watersheds in which stream channels and aquatic habitats are not in properly functioning condition, and where instream wood frequency and volume are below reference conditions and/or site potential, manage forest vegetation within RMAs to maintain or increase large wood recruitment and delivery to streams.

Roads Management in Riparian management areas

Guideline RF-1G. New roads and trails should not be constructed within riparian management areas unless no other feasible alternative exists.

³ Active channel is the bank full width of flowing perennial or intermittent streams.

Guideline RF-2G. Temporary roads, including stream crossings, in RMAs should be minimized. Temporary roads, if constructed, should be managed to protect and restore aquatic and riparian desired conditions.

Standard RF-3S. Side-casting (placement of unconsolidated earthen waste materials resulting from road construction or maintenance) in riparian management areas shall be avoided.

Standard RF-4S. Fill material shall not be placed on organic debris in riparian management areas.

Standard RF-5S. Disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow shall be avoided when constructing or reconstructing roads or landings either inside or outside of riparian management areas.

Guideline RF-6G. Wetlands and unstable areas should be avoided when reconstructing existing roads or constructing new roads and landings. Minimize impacts where avoidance is not practical.

Standard RF-7S. New or replaced permanent stream crossings shall be designed to allow for the 100-year flood and its bedload and debris. One-hundred-year flood estimates will reflect the best available science regarding potential effects of climate change.

Standard RF-8S. Where physically feasible, construction or reconstruction of stream crossings will avoid diversion of streamflow out of the channel and down the road in the event of crossing failure.

Standard RF-9S. Construction or reconstruction of stream crossings shall provide and maintain passage for all life stages of all native and desired non-native aquatic and riparian-dependent organisms. Crossing designs shall reflect the best available science regarding potential effects of climate change on peak flows and low flows.

Guideline RF-10G. Fish passage barriers should be retained where they serve to restrict access by undesirable nonnative species and are consistent with restoration of habitat for native species.

Guideline RF-11G. Design roads to minimize delivery of water and sediment from roads to streams. Avoid or minimize disruption of hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow when constructing, reconstructing, and maintenance of roads or landing.

Guideline RF-12G. Road drainage should be routed away from potentially unstable channels, fills, and hillslopes to the extent practicable.

Standard RF-13S. Road maintenance and new road construction shall be designed to minimize adverse effects to threatened, endangered, proposed, or candidate aquatic species and their habitat.

Grazing Management in Riparian management areas

Standard GM-1S. Manage livestock grazing to attain aquatic and riparian desired conditions. Where livestock grazing is found to prevent or retard attaining aquatic and riparian desired conditions, modify grazing practices (such as number of livestock, timing, and physical structures). If adjusting practices is not effective, remove livestock from that area using appropriate administrative authorities and procedures.

Standard GM-2S. New livestock handling and/or management facilities shall be located outside riparian management areas unless they do not prevent or retard attaining aquatic and riparian desired conditions.

Guideline GM-3G. The purpose of this guideline is to manage livestock grazing to help attain and maintain aquatic and riparian desired conditions over time. Specifically, it is intended to maintain or improve vegetative and stream conditions, help ensure the viability of aquatic species, provide important contributions to the recovery of ESA-listed species, and facilitate attainment of State water quality standards.

The annual livestock use and disturbance indicators described below should be applied to help achieve, over longer timeframes, conditions at site and watershed scales that enable attainment and maintenance of desired conditions. The values specified below are starting points for management. Only those indicators and numeric values that are appropriate to the site and necessary for maintaining or moving towards desired conditions should be applied.⁴ Specific indicators and indicator values should be prescribed and adjusted, if needed, in a manner that reflects existing and desired conditions and the natural potential of the specific geo-climatic, hydrologic and vegetative setting in which they are being applied⁵. Indicators and indicator values should be adapted over time based on long-term monitoring and evaluation of conditions and trends. Alternative use and disturbance indicators and values, including those in current ESA consultation documents or non-ESA allotment management plans or allotment National Environmental Policy Act decisions, may be used if they are based on best available science and monitoring data and meet the purpose of this guideline.

⁴ Not all indicators may apply to a particular site. For example, stubble height is a meaningful indicator for lower gradient streams where herbaceous vegetation plays an important role in stabilizing streambanks. It is generally less useful for steeper channels, where channel morphology is controlled by coarse substrates. Moreover, not all numeric values may apply to a particular site (e.g., sites with short graminoids).

⁵ Indicator values for specific sites should be determined based on consideration of local conditions including, but not limited to, the degree of departure between existing and desired conditions, the current and desired rate of improvement, site sensitivity to grazing, grazing season, the presence of special status species (e.g., ESA-listed species, Regional Forester's sensitive species) that are sensitive to grazing, whether or not water quality standards and related requirements (e.g., total maximum daily loads for impaired waters) are being met, and the site's importance in maintaining or attaining those standards and requirements. Consideration of these conditions is especially important in prescribing specific stubble height values within the 4-inch to 6-inch range and streambank alteration values within the 15–20 percent range.

1. Where desired conditions for water quality, aquatic habitat, and riparian vegetation have been attained⁶ and riparian vegetation is in late-seral conditions⁷, protect or maintain those conditions by managing annual livestock grazing use and disturbance as follows⁸:
 - maintain a minimum of 4-inch residual stubble height⁹ of key herbaceous species on the greenline;
 - utilize no more than 30–45 percent of deep-rooted herbaceous vegetation in the active floodplain⁷ and, as needed, in other critical portions of the riparian management area;
 - limit streambank alteration⁸ to no more than 20–25 percent; and
 - limit use of woody species to no more than 30–40 percent of current year’s leaders along streambanks and, as needed, in other critical portions of the riparian management area.
2. Where desired conditions for water quality, aquatic habitat, and/or riparian vegetation have not yet been attained, but conditions are moving towards those desired conditions³, enable continued recovery by managing annual livestock grazing use and disturbance as follows:
 - maintain a minimum of 4-inch to 6-inch residual stubble height of key herbaceous species on the greenline²;
 - follow the criteria for utilization of deep-rooted herbaceous vegetation, streambank alteration, and use of woody species described in (1).
3. Where desired conditions for water quality, aquatic habitat, and/or riparian vegetation have not been attained and conditions are not moving towards those desired conditions³, enable recovery by managing annual livestock grazing use and disturbance as follows:

⁶ Assessment of conditions and trends should be based on best available information at a variety of spatial and temporal scales. Site-specific information is particularly important.

⁷ Late seral conditions means the existing riparian vegetation community is similar to the potential natural community composition (per Winward 2000).

⁸ Per Pacfish/Infish Monitoring, Multiple Indicator Monitoring (BLM Technical Reference 1737-23) protocols or comparable methods for stubble height, streambank alteration, and use of woody species. Per Bureau of Land Management protocols (BLM/RS/ST-96/004+1730) or comparable methods for herbaceous utilization.

⁹ Stubble height criteria apply at the end of the grazing period, when that period ends after the growing season. When the grazing period ends before the growing season does, stubble height criteria can be applied at the end of the grazing period or the end of the growing season.

⁷Active floodplain is defined as the area bordering a stream inundated by flows at a surface elevation that is two times the maximum bankfull depth (measured at the thalweg).

⁸Streambank alteration criteria apply within 1–2 weeks of removal of livestock from each pasture.

- maintain a minimum of 6-inch residual stubble height of key herbaceous species on the greenline;
- utilize no more than 30–35 percent of deep-rooted herbaceous vegetation in the active floodplain and, as needed, in other critical portions of the riparian management area;
- limit streambank alteration to no more than 15–20 percent²; and
- limit use of woody species to no more than 20–30 percent of current year’s leaders along streambanks and, as needed, in other critical portions of the riparian management area.

Guideline GM-4G. During allotment management planning, existing livestock handling or management facilities that prevent or retard attaining aquatic and riparian desired conditions should be removed, as appropriate.

Guideline GM-5G. Livestock trailing, watering, loading, and other handling in riparian management areas should be avoided or minimized.

Standard GM-6S. Livestock grazing shall be managed and implemented to avoid trampling federally listed threatened or endangered fish redds.

Recreation Management

Guideline RM-1G. New facilities or infrastructure should not be placed within expected long-term channel migration zones if it has the potential to impact channel or floodplain function. If some facilities must occur in RMAs (e.g., road stream crossings, boat ramps, docks, and interpretive trails), locate and design them to minimize impacts on floodplains and other riparian dependent resource conditions (e.g., within geologically stable areas, avoiding major spawning sites).

Guideline RM-2G. Existing recreation facility components that are causing unacceptable impacts in riparian management areas should be removed or relocated. Site condition should be restored to improve riparian area function.

Minerals Management

Guideline MM-1G. For operations in RMAs, ensure operators take all practicable measures to maintain, protect, and rehabilitate water quality and habitat for fish and wildlife and other riparian dependent resources that may be affected by the operations. Ensure operations do not retard or prevent attaining aquatic and riparian desired conditions. Exceptions to this guideline include situations where USFS has limited discretionary authorities. In those cases, project effects should be minimized and should not prevent or retard attaining aquatic and riparian desired conditions to the extent possible within those authorities.

Guideline MM-2G. To the maximum extent possible, construct new structures, support facilities, and roads outside of riparian management areas. If new structures, support facilities and roads cannot be constructed outside riparian management areas because of site limitations, then construct and manage them to minimize adverse effects to aquatic and riparian dependent resources. Existing roads and facilities should be maintained to minimize damage to aquatic and riparian dependent resources, and should be removed/relocated if roads and facilities are causing unacceptable impacts in riparian management areas. When structures, support facilities, and roads are no longer required for mineral activities, they should be restored or reclaimed to achieve aquatic and riparian desired conditions.

Standard MM-3S. Mine waste with the potential to generate hazardous material (as defined by the Comprehensive Environmental Response, Compensation, and Liability Act) shall not be authorized within RMAs and/or areas where groundwater contamination is possible. The exception is temporary staging of waste during abandoned mine cleanup.

Guideline MM-4G. Mineral operations should minimize adverse effects to aquatic and riparian-dependent resources in RMAs. Require BMPs and other appropriate conservation measures to mitigate potential mine operation effects.

Standard MM-5S. Mineral activities on National Forest Service lands shall avoid or minimize adverse effects to aquatic threatened or endangered species/populations or their designated critical habitat.

- All suction dredge mining activities in habitat for aquatic threatened or endangered species/populations or in their designated critical habitat shall be evaluated by the District Ranger to determine if the mining activity is causing or “will likely cause significant disturbance of surface resources¹⁰”. A likelihood that a threatened or endangered species "take" (defined in Section 3[18] of the ESA of 1973 as amended) incidental to the mining activity is an example of a significant resource disturbance. Other significant disturbances that do not involve incidental take might involve effects on channel stability or stream hydraulics.
- If the District Ranger determines that placer mining operations are causing or will likely cause significant disturbance to surface resources, the District Ranger shall contact and inform the operator to seek voluntary compliance with 36 CFR 228 mining regulations and to cease operations until compliance.

Wildland Fire Management activities and Fuels management within Riparian management areas

Guideline FM-1G. Locate temporary firefighting facilities (e.g., incident bases, camps, helibases, staging areas, helispots, and other centers) for incident activities outside RMAs.

¹⁰ The phrase “will likely cause significant disturbance of surface resources” means that, based on past experience, direct evidence, or sound scientific projection, the District Ranger reasonably expects that the proposed operations would result in impacts to NFS lands and resources which more probably than not need to be avoided or ameliorated by means such as reclamation, bonding, timing restrictions, and other mitigation measures to minimize adverse environmental impacts on NFS resources.

When no practical alternative exists, all appropriate measures to protect, maintain, restore, or enhance aquatic and riparian dependent resources should be used. If the only suitable location for such activities is within a RMA, use may be granted following review by a resource advisor and discussion with the agency administrator. The resource advisor will work the incident management team to prescribe the location, use conditions, and rehabilitation requirements. Use an interdisciplinary team to predetermine suitable incident base and helibase locations.

Guideline FM-2G. Aerial application of chemical retardant, foam, or other fire chemicals is prohibited within 300 feet (slope distance) of perennial and intermittent waterways. Waterways are defined as any body of water (including lakes, rivers, streams, and ponds) whether or not it contains aquatic life except in cases where human life or public safety is threatened and chemical use could be reasonably expected to alleviate that threat. This includes open water that may not be mapped as such on avoidance area maps and intermittent streams that are running or holding surface water at the time of retardant use.

Standard FM-3S. Portable pump set-ups shall include containment provisions for fuel spills and fuel containers shall have appropriate containment provisions. Vehicles shall be parked in locations that avoid entry of spilled fuel into streams. When drafting, pumps shall be screened at drafting sites to prevent entrainment of aquatic species, screen area shall be sized to prevent impingement on the screens, and shall have one-way valves to prevent back-flow into streams. Use NMFS-approved screening criteria where listed fish or critical habitat are present.

Guideline FM-4G. Locate and configure firelines to minimize sedimentation to waterbodies, capture of overland and streamflows, and development of unauthorized roads and trails. Restore firelines following suppression or prescribed fire activities.

Standard FM-5S. To minimize soil damage when chipping fuels within riparian management areas, chip bed depths on dry soils shall be limited to 7.5 centimeters or less (Busse et al. 2006).

Guideline FM-6G. Disturbed areas, such as firelines, drop-points, camps, roads, and trails, should be restored by actions such as scattering slash piles, replacing logs and boulders, scarifying soils, recontouring terrain, and reseeding with native species.

Guideline FM-7G. Pumping directly from a stream channel should be avoided if chemical products are to be injected directly into the system. When chemicals are used, pumping should be conducted from a fold-a-tank that is located outside the riparian area.

Guideline FM-8G. Minimum impact suppression tactics (MIST) should be utilized in sensitive areas, such as designated wilderness areas, designated wild and scenic river corridors, research natural areas, botanical areas, riparian management areas, cultural and historic sites, developed recreation areas, special use permit areas that have structures, and historic and recreational trails. The MIST techniques should also be used for post fire restoration activities.

Guideline FM-9G. Prescribed burn direct ignition in RMAs should not be used unless site/project scale effects analysis demonstrates that it would not retard attaining aquatic and riparian desired conditions.

Standard FM-10S. Ensure prescribed burn projects contribute to and do not retard the attainment of the aquatic and riparian desired conditions.

Guideline FM-11G. Chemicals or retardant should not be used for suppression or mop-up within riparian areas.

Standard FM-12S. Pumps and charged hoses shall not be back flushed into stream channels, wetlands, or surface water.

Lands and Special Uses, including Hydropower in Riparian management areas

Standard LH-1S. Authorizations for all new and existing special uses, including, but not limited to water diversion or transmission facilities (e.g., pipelines and ditches), energy transmission lines, roads, hydroelectric, and other surface water development proposals, shall result in the re-establishment, restoration, or mitigation of habitat conditions and ecological processes identified as being essential for the maintenance or improvement of habitat conditions for fish, water and other riparian dependent species and resources. These processes include in-stream flow regimes, physical and biological connectivity, water quality, and integrity and complexity of riparian and aquatic habitat.

Standard LH-2S. New support facilities shall be located outside of riparian management areas. Support facilities include any facilities or improvements (e.g., workshops, housing, switchyards, staging areas, and transmission lines) not directly integral to the production of hydroelectric power or necessary for the implementation of prescribed protection, mitigation or enhancement measures.

Guideline LH-3G. If existing support facilities are located within the riparian management areas, they should be operated and maintained to restore or enhance aquatic and riparian dependent resources. At time of permit re-issuance, consider removing support facilities, where practical.

Guideline LH-4G. Land exchanges should avoid the disposition of occupied habitat of threatened, endangered, candidate, proposed, or sensitive species.

Watershed (Forest-wide)

Standard WM-1S. When watershed function¹¹ desired conditions are being achieved and watersheds are functioning properly¹², projects shall maintain¹³ those conditions. When watershed function desired conditions are not yet achieved or watersheds have impaired function or are functioning-at-risk and to the degree that project activities would contribute to those conditions, projects shall restore¹⁴ or not retard attainment¹⁵ of desired conditions. Short-term¹⁶ adverse effects from project activities may occur when they support or do not diminish long-term¹⁷ recovery of watershed function desired conditions and federally listed species. Exceptions to this standard include situations where USFS authorities are limited (ANILCA, 1872 Mining law, valid state water right, etc.). In those cases, project effects shall be minimized and not retard attainment of desired conditions for watershed function, to the extent possible within USFS authorities. Use ARCS Attachment B to assist in determining compliance with this standard.

Standard WM-2S. All projects shall be implemented in accordance with Best Management Practices, as described in National and Regional Technical Guides.

Key Watershed and subwatersheds with ESA critical habitat for aquatic species (Forest-wide)

Standard KW-1S. In Key Watersheds or subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species that are functioning properly¹⁸ there shall be no net increase (1-mile of road-related risk reduction for every new mile of road construction), where they are functioning-at-risk¹⁹, there shall be a net decrease (1.5 miles of road-related risk reduction for every new mile of road construction), and where they are impaired function, there shall be a net decrease (2.0 miles of road-related risk reduction for every new mile of road construction) in system roads that affect hydrologic function. Priority for road-related risk reduction shall be given to roads that pose the greatest relative ecological risks to riparian and aquatic ecosystems. Road-related risk reduction will occur prior to new road construction unless logistical restrictions require post-construction risk reduction. This standard

¹¹ Per Revised Land Management Plan Watershed Function desired conditions (watershed function, hydrologic, riparian, wetland, stream channel, groundwater dependent ecosystem, and aquatic habitat).

¹² Per Watershed Condition Framework Technical Guide (USFS 2011), subsequent versions and/or comparable methods. Other broad-scale or local inventory, assessment and monitoring data and analysis can be used to refine initial classifications made per WCF. The Watershed Condition Framework categories of terminology for “functioning properly”, “functioning-at-risk”, and impaired function are equivalent to the “functioning appropriately” “functioning-at-risk” and “functioning at unacceptable risk” categories within the matrix of pathways and indicators (USFWS 1998), and to the respectively equivalent to “properly functioning” or “at risk” or “not properly functioning” categories within the matrix of pathways and indicators used by NMFS (1996).

¹³ See glossary for definitions of “maintain” and “degrade”.

¹⁴ See glossary for definitions of “restore”.

¹⁵ See glossary for definitions of “retard attainment”.

¹⁶ See glossary for definition of “short-term adverse effects”.

¹⁷ See glossary for definition of “long-term recovery”.

¹⁸ “Functioning properly”, “functioning-at-risk”, and “impaired function” for the roads and trails indicator of Watershed Condition Framework are defined in Watershed Condition Framework Technical Guide, USFS 2011. Local inventory, assessment and monitoring data and information can be used to refine initial classifications made per WCF.

¹⁹ “Functioning properly”, “functioning-at-risk”, and “impaired function” for the roads and trails indicator of Watershed Condition Framework are defined in Watershed Condition Framework Technical Guide, USFS 2011

shall apply to the affected subwatershed when new system road construction is proposed in that subwatershed, and shall not be offset by reductions in open-road densities in other subwatersheds.

Standard KW-2S. In Key Watersheds and subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species, hydroelectric and other surface water development authorizations shall include requirements for in-stream flows and habitat conditions that maintain or restore native fish and other desired aquatic species populations, riparian dependent resources, favorable channel conditions, and aquatic connectivity.

Standard KW-3S. In Key Watersheds and in subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species, new hydroelectric facilities and water developments shall not be located in a Key Watershed unless it can be demonstrated that there are minimal risks and/or no adverse effects to the fish and water resources for which the Key Watershed was established.

Watershed restoration (Forest-wide)

Guideline RE-1G. Watershed restoration projects should be designed to utilize or emulate natural ecological processes to the extent practicable, for meeting and maintaining restoration objectives.

Guideline RE-2G. Watershed restoration projects should be designed to minimize the need for long-term maintenance.

Standard RE-3S. Except where USFS authorities are limited, mitigation or planned restoration shall not be used as a substitute for preventing long-term watershed or habitat degradation.

Standard RE-4S. Minimize water and sediment delivery from roads and trails to streams. This includes roads, or road segments, whether inside and outside of RMAs, that deliver sediment to streams.

Standard RE-5S. Minimize adverse effects to ESA listed, proposed, and candidate species and their designated and proposed critical habitat in accordance with USFS authorities. Management activities shall not retard recovery²⁰ of listed, and proposed, and candidate species and their designated and proposed critical habitat in the long-term in accordance with USFS authorities. Federally listed, proposed, and candidate species and their designated and proposed critical habitats shall be managed in accordance with their recovery or other conservation plans, in accordance with USFS authorities.

²⁰ Retard recovery - management action effects that, individually or in combination with other management actions or natural disturbances, measurably slow the natural rate of recovery.

Invasive Species (Forest-wide)

Guideline IS-1G. Avoid cross contamination between streams, reservoirs and lakes from pumps, suction and dipping devices or any other equipment. Avoid dumping water directly from one stream or lake into another. Disinfect water storage and conveyance equipment including sampling equipment, water tenders, pumps, engines and aircraft prior to use on Forest.

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