UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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Refer to NMFS No: WCRO-2022-01144

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August 25, 2023

Michael T. Jackson
Superintendent, Umatilla Agency
USDI–Bureau of Indian Affairs
P.O. Box 520
Pendleton, OR 97801

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for Approval/Issuance of Range Unit Grazing Permits Umatilla Indian Reservation, in the Umatilla subbasin (HUC 1707010305) Umatilla County, Oregon and McCoy Creek (HUC 170706010402), in the Upper Grande Ronde subbasin of Union County, Oregon

Dear Mr. Jackson:

Thank you for your letter of May 2, 2022, 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 Approval/Issuance of Range Unit Grazing Permits Umatilla Indian Reservation.

NMFS also reviewed the likely effects of the proposed action on essential fish habitat (EFH), pursuant to section 305(b) of the Magnuson–Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)), and concluded that the action would adversely affect the EFH of Pacific Coast salmon. Therefore, we have included the results of that review in Section 3 of this document.

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 ("2019 Regulations," see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government's request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the biological opinion

(opinion) and incidental take statement (ITS) would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different.

After reviewing the current status of the species, the environmental baseline, the effects of the proposed action, and the cumulative effects, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of ESA-listed Middle Columbia River steelhead or Snake River Basin steelhead. NMFS also determined the action will not destroy or adversely modify designated critical habitats for these species. We provide rationale for our conclusions in the attached opinion. The enclosed opinion is based on information provided in your biological assessment, requested additional information provided by Confederated Tribe of the Umatilla Indian Reservation employees Amanda Lowe and Mike Lambert, and other sources of information cited in the opinion. This document also includes a "not likely to adversely affect" analysis for Snake River Basin steelhead and Snake River spring/summer Chinook salmon and their critical habitat.

As required by section 7 of the ESA, NMFS provided an ITS with the opinion. The ITS includes reasonable and prudent measures (RPMs) that NMFS considers necessary or appropriate to minimize incidental take associated with the proposed action. The take statement sets forth terms and conditions, including reporting requirements, that the Bureau of Indian Affairs and any person who performs the action must comply with to carry out the RPMs. Incidental take from the proposed action that meets these terms and conditions will be exempt from the ESA take prohibition.

Please contact Colleen Fagan, Interior Columbia Basin Office, La Grande, Oregon, 541-962-8512 or colleen.fagan@noaa.gov, if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Nancy L Munn

Nancy L. Munn, Ph.D.
Acting Assistant Regional Administrator
Interior Columbia Basin Office

Enclosure

cc: Amanda Lowe, CTUIR
Mike Lambert, CTUIR

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

Approval/Issuance of Range Unit Grazing Permits Umatilla Indian Reservation

NMFS Consultation Number: WCRO-2022-01144

Action Agency: USDI–Bureau of Indian Affairs

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 (*Oncorhynchus mykiss*)	Threatened	Yes	No	Yes	No
Middle Columbia River steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No
Snake River Basin spring/summer Chinook salmon (*O. tshawytscha*)	Threatened	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: Nancy L Munn

Nancy L. Munn, Ph.D.
Acting Assistant Regional Administrator
Interior Columbia Basin Office

Date: August 25, 2023

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ACRONYM GLOSSARY

AUM	Animal Unit Month
BA	Biological Assessment
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
CHART	Critical Habitat Analytical Review Team
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
DMA	Designated Monitoring Area
DPS	Distinct Population Segment
DQA	Data Quality Act
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FR	Federal Register
HAPC	Habitat Area of Particular Concern
HUC	Hydrologic Unit Code
HUC5	Fifth-field Hydrologic Unit Code
ICRD	Interior Columbia Recovery Domain
ICTRT	Interior Columbia Basin Technical Recovery Team
ITS	Incidental Take Statement
MCR	Middle Columbia River
MIM	Multiple Indicator Monitoring
MPG	Major Population Group
MSA	Magnuson–Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NPCC	Northwest Power and Conservation Council
NWFSC	Northwest Fisheries Science Center
ODFW	Oregon Department of Fish and Wildlife
Opinion	Biological Opinion
PBF	Physical or Biological Feature
PCE	Primary Constituent Element
RM	River Mile
RPM	Reasonable and Prudent Measure
SR	Snake River
SRB	Snake River Basin
UIR	Umatilla Indian Reservation
USGCRP	U.S. Global Change Research Program
VSP	Viable Salmonid Population

1. INTRODUCTION

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

1.1. Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.), as amended, and implementing regulations at 50 CFR part 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 part 600.

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

1.2. Consultation History

NMFS began conversations with the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) regarding the consultation process for its grazing program and management recommendations to protect ESA-listed Middle Columbia River (MCR) and Snake River Basin (SRB) steelhead in January 2022.

NMFS received the USDI–Bureau of Indian Affairs' (BIA) request for formal consultation for Approval/Issuance of Range Unit Grazing Permits Umatilla Indian Reservation on May 9, 2022. The request included a biological assessment (BA) prepared by the BIA and CTUIR. The BIA concluded that the proposed action is "likely to adversely affect" MCR steelhead and SRB steelhead and their designated critical habitat.

NMFS sent an additional information request via email to the BIA on June 13, 2022. On June 28, 2022, the CTUIR requested until July 29 to provide requested additional information. Between June 2022 and January 2023, NMFS communicated with the BIA and CTUIR via email, phone calls, and video meetings regarding additional information needed to initiate consultation. NMFS also provided comments on updated BAs. NMFS requested additional information on baseline habitat conditions in each range unit, steelhead use and distribution within each range unit, Chinook salmon use and distribution in McCoy Creek, the amount of critical habitat in each range unit; clarification on monitoring and metrics that will be used to determine if livestock grazing is having an effect on ESA-listed species and their critical habitat (e.g., the use of end of season objectives for stubble height, percent bank alteration, and percent woody browse use); an analysis of effects on individual MCR and SRB steelhead; and an analysis of effects on EFH.

NMFS and CTUIR met on November 28, 2022, to discuss EFH present in the action area. NMFS provided the CTUIR with EFH information including maps and draft language used in other grazing consultations. The CTUIR also agreed to modify its proposed action to include redd monitoring in all grazing units with stream reaches accessible to steelhead and livestock. NMFS received the revised Final BA from the BIA on January 9, 2023, and the last of the requested information on January 17, 2023. Consultation was initiated on January 17, 2023.

1.3. Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (see 50 CFR 402.02). Under the MSA, "Federal action" means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal agency (see 50 CFR 600.910). The BIA proposes to authorize livestock grazing on 12 range units on the Umatilla Indian Reservation (UIR) for a period of 10 years (2023–2032). Eleven range units are located within the Umatilla subbasin and one range unit is located within the Upper Grande Ronde subbasin (Figure 1).

1.3.1. Grazing History

The Umatilla Indian Reservation was established by the Treaty of June 9, 1855. From the 1880s to the 1920s, large numbers of sheep, cattle, and horses were grazed, impacting the ecological condition of rangelands. Since the 1920s, the CTUIR substantially reduced livestock numbers to balance forage supply with livestock numbers. The CTUIR established sixteen range units comprised of allotted, tribal, and fee patent lands in the late 1950s to improve management of rangelands and grazable woodlands. Since the 1950s, four of the sixteen range units were combined with other existing range units due to changes in land ownership and management goals and objectives. The BIA and CTUIR have implemented three major changes to the range management program on the UIR since the mid-1990s: (1) deferment of permitted livestock grazing in Isqúulktpe Creek, (2) development of livestock water sources in the uplands, and (3) change in season of use from continuous late spring through early fall grazing to spring grazing to discourage use of riparian areas by cattle.

1.3.2. Bureau of Indian Affairs Proposed Action

The BIA proposes to authorize the type and number of livestock that will use the range unit, the period(s) of use, the range unit areas to be used, and the amount of usage (animal unit months [AUMs]) allowed under each lease. The proposed grazing use for each of the 12 range units and CTUIR's determinations of effect are included in Table 1.

The BIA determined that actions authorized in two of the range units (6 and 8) were likely to adversely affect MCR steelhead and their critical habitat. The BIA also determined that actions authorized in Range Unit 15 were likely to adversely affect SRB steelhead and their critical habitat (Table 1). These three range units comprise 11,200 acres in the Umatilla subbasin and 5,479 acres in the Upper Grande Ronde subbasin.

Three range units contain critical habitat for ESA listed steelhead that is accessible to livestock: Range Units 6 and Range Unit 8 (MCR steelhead), and Range Unit 15 (SRB steelhead). Critical habitat has been designated in these three range units in Buckaroo, Moonshine, Cottonwood, McCoy, and Ensign creeks (Table 2). Nine range units do not contain MCR steelhead, SRB steelhead, or their critical habitat: Range Units 5, 7, 9, 10, 11, 12, 14, 16, and 20.

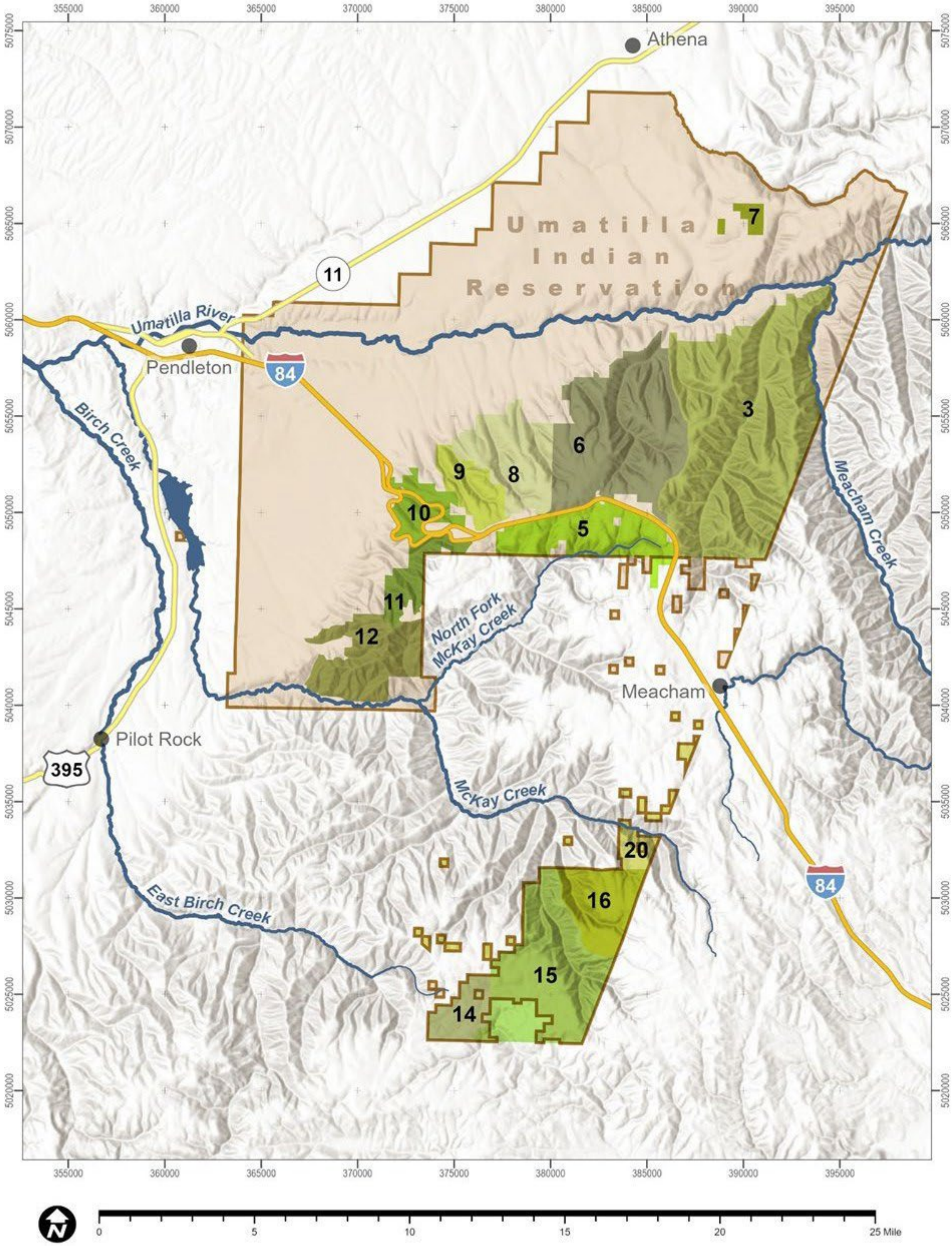

Figure 1. Location of grazing range units on the Umatilla Indian Reservation.

Table 1. Range unit number, acreage, animal unit months, season of use, and effect determination for 12 range units proposed for permitting by the Bureau of Indian Affairs on the Umatilla Indian Reservation for 2023–2032. Highlighted range units contain critical habitat for steelhead that is accessible to livestock.

Range Unit	Trust Acres	Tribal Fee Acres On-Off[1]	Animal Unit Months (AUM)[2]	Season of Use	Effect Determination	
					Steelhead	Critical Habitat
5	2,441	1,860	215	6/1 to 10/1	No Effect	No Effect
6	7,934	2,097	360	4/15 to 7/1	LAA	LAA
7	521	-	116	5/1 to 6/15	No Effect	No Effect
8	3,266	1,160	295	4/15 to 7/1	LAA	LAA
9	876	80	64	5/1 to 7/15	No Effect	No Effect
10	947	160	111	4/15 to 7/1	No Effect	No Effect
11	1,406	-	187	5/1 to 6/15	No Effect	No Effect
12	2,643	2,025	234	4/15 to 6/15	No Effect	No Effect
14	1,786	40	140	6/1 to 7/1	No Effect	No Effect
15	5,479	1,942	247	6/15 to 9/15 or 7/15 to 10/15, alternating years	LAA	LAA
16	3,512	-	100	6/15 to 9/31	No Effect	No Effect
20	1,942	-	51	6/15 to 9/31	No Effect	No Effect
Total	32,753	9,364	2,265			

[1] Lands within or adjacent to the subject range unit, owned or legally encumbered by permittee for grazing purposes, used in common with the lands covered by the grazing permit on the cited range unit.
[2] One animal unit is the equivalent of one calf, paired with a mature cow, and 1 AUM represents the amount of forage consumed by a cow-calf pair in a single month.

Table 2. Range unit number and miles of streams containing Middle Columbia River (MCR) or Snake River Basin (SRB) steelhead critical habitat accessible to livestock grazing on the Umatilla Indian Reservation, 2023–2032.

Range Unit	Range Unit Acreage	Stream Name	Hydrologic Unit Code (HUC)	Critical Habitat Present in Range Unit	Steelhead Species
6	10,031	Buckaroo Creek and tributaries	1707010305	6.9 miles	MCR
8	4,426	Moonshine Creek	170701030504	1.8 miles	MCR
		Cottonwood Creek	170701030507	1.9 miles	MCR
15	1,942	McCoy Creek and Ensign Creek	170706010402	0.4 miles	SRB

1.3.3. Proposed Grazing Program for Range Units 6, 8, and 15

The proposed action consists of the following components: (1) livestock numbers and season of use; (2) grazing standards, forage use criteria, and regulatory requirements on Trust lands within the UIR; (3) conservation measures aimed at minimizing the impacts of livestock on riparian areas; and (4) monitoring and adaptive management procedures to adjust grazing practices if necessary to protect natural resources, including ESA-listed fish and their habitat.

Grazing Season

Proposed grazing in Range Units 6 and 8 will occur in the spring and early summer to promote livestock use of uplands and to reduce the amount of time livestock spend in riparian areas. Range Unit 15 will be grazed either June 15 to September 15, or July 15 to October 15, in alternating years. Range Unit 15 will be grazed later because its high elevation delays site access and forage suitability.

Grazing Standards

For Range Units 6, 8, and 15, the BIA has established the following grazing use criteria:

- At the end of the grazing season, the average stubble height of riparian vegetation (grasses and grass-like species) is to be no less than 6 inches.
- Stream bank alteration along streams is to be less than 20 percent at the end of the livestock grazing season.
- Utilization of the current leader growth of key riparian shrubs along streams is to be less than 50 percent at the end of the livestock grazing season.

Conservation Measures

- Salt will be placed within one-quarter mile of any water source on public lands to attract livestock away from riparian areas.

BIA and CTUIR Monitoring

The BIA or CTUIR will conduct implementation monitoring and effectiveness monitoring at Range Units 6, 8, and 15 to evaluate the short and long-term effects of grazing. Implementation and effectiveness monitoring will include:

1. Annual spawning ground surveys per the procedures outlined in the Umatilla Basin Production Monitoring and Evaluation Spawning Survey Protocol (BA, Appendix A).
    a. Will occur at least twice in Range Units 6 and 8, beginning in March or April depending on site access.
    b. Will occur in Range Unit 15 once the site is accessible, likely in June, and prior to livestock turnout.
    c. If redds are identified, the CTUIR will monitor for trampling every two weeks or, where feasible, protect redds from trampling with temporary electric fencing or other means.
    d. Spawning ground surveys and incidents of trampling will be reported to NMFS in end of year reporting.

2. Full Bureau of Land Management (BLM) Multiple Indicator Monitoring (MIM) at the onset of each new permit, and then at a minimum of every 5 years.
    a. Initial monitoring will include establishment of a streambank and riparian designated monitoring area (DMA). The DMAs will be established in each range unit in the reach that best reflects impacts of grazing on sensitive areas or on the range unit as a whole. The BIA and CTUIR will use collected data to determine long-term trends over time of three variables to determine whether grazing use levels are appropriate for each range unit. These three variables are: (1) residual pool depth, (2) percent stable banks, and (3) percent undercut banks.
    b. If the trend of any of these three indicators is negative, the CTUIR will analyze why the trend is negative, whether this is detrimental to the function of the riparian area, and modify the current grazing management strategy as necessary.
    c. Results will be submitted to NMFS with end of year reporting.

3. Annual end of grazing season monitoring of stubble height, percent bank alteration, and percent browse utilization at DMAs, utilizing the MIM protocol. Result will be submitted to NMFS with end of year reporting.

Adaptive Management

If grazing use criteria or resource objectives are not met, the BIA and CTUIR will analyze why they were not met, whether this is detrimental to the function of the riparian area, and modify the current management strategy as necessary. Adaptive management actions will be initiated if any of the following occur:

1. If monitoring, surveys, or site inspections demonstrate that a negative trend in physical or biological features (PBFs) is occurring from livestock grazing, the BIA may close portions of a range unit or modify authorized grazing. If warranted, reinitiation of consultation and/or coordination would occur with NMFS.

2. If annual grazing use criteria are not met, then the BIA will include proposed measures to reduce the potential for further degradation in an annual report to NMFS. Measures to reduce degradation may include, but are not limited to: establishing or adjusting season of use, decreasing livestock numbers, and/or implementation of additional minimization or avoidance measures.

3. If the monitored criteria demonstrate that grazing use is not allowing for maintenance or restoration of ESA-listed species habitat functions, the BIA shall take appropriate action to reduce allocated AUMs as soon as practicable, but not later than the start of the next grazing year upon determining that existing grazing management needs to be modified.

4. Any relevant information regarding ESA-listed fish distribution, spawning locations, or watershed conditions that would modify assumptions used in the preparation of the BA.

Leases may be terminated by the BIA for reasons such as noncompliance with rules or unauthorized use.

Annual Report

At a minimum the annual report to NMFS will include the following:

1. Summary of authorized grazing use and actual use (e.g., AUMs, livestock numbers, grazing use dates, unauthorized grazing, etc.)
2. Summary of monitoring data collected and range unit inspections.
3. Summary of grazing use indicator monitoring data collected (e.g., stubble height, shrub utilization, streambank alteration, etc.)
4. Adaptive management actions taken to date and any recommendations for future management actions to reduce impacts to ESA-listed fish and downward trends to aquatic and riparian habitats and designated critical habitat.
5. Results of spawning ground surveys and redd trampling monitoring.

We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not. Entities holding grazing leases on Trust lands may also graze livestock on adjacent private lands. However, grazing on private land adjacent to BIA range units would continue to occur regardless of whether the permittees are able to the use the BIA range units.

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

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

The BIA determined the proposed action is not likely to adversely affect (NLAA) Snake River spring/summer Chinook salmon. Our concurrence is documented in the "Not Likely to Adversely Affect" Determinations section (Section 2.12).

2.1. Analytical Approach

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

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

The designations of critical habitat for the two steelhead species in this opinion use the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The ESA Section 7 implementing regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the final rule revising the definition and adding this term (84 FR 44976, 44977; August 27, 2019), that revision does not change the scope of our analysis, and in this opinion we use the terms "effects" and "consequences" interchangeably.

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

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their critical habitat using an exposure–response approach.

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

2.2. Rangewide Status of the Species and Critical Habitat

In this opinion we examine the status of each species that is likely to be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' "reproduction, numbers, or distribution" for the jeopardy analysis. We also examine the condition of critical habitat throughout the designated area, evaluate the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discuss the function of the PBFs that are essential for the conservation of the species.

2.2.1. Status of the Species

For Pacific salmon and steelhead, we commonly use the four "viable salmonid population" (VSP) criteria (McElhany et al. 2000) to assess the viability of the populations that, together, constitute the species. These four criteria (spatial structure, diversity, abundance, and productivity) encompass the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. When these parameters are collectively at appropriate levels, they maintain a population's capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment.

"Spatial structure" refers both to the spatial distributions of individuals in the population and the processes that generate that distribution. A population's spatial structure depends on habitat quality and spatial configuration, and the dynamics and dispersal characteristics of individuals in the population.

"Diversity" refers to the distribution of traits within and among populations. These range in scale from DNA sequence variation in single genes to complex life history traits (McElhany et al. 2000).

"Abundance" generally refers to the number of naturally produced adults (i.e., the progeny of naturally spawning parents) in the natural environment (e.g., on spawning grounds).

"Productivity", as applied to viability factors, refers to the entire life cycle (i.e., the number of naturally spawning adults produced per parent). When progeny replace or exceed the number of parents, a population is stable or increasing. When progeny fail to replace the number of parents, the population is declining. McElhany et al. (2000) use the terms "population growth rate" and "productivity" interchangeably when referring to production over the entire life cycle. They also refer to "trend in abundance", which is the manifestation of long-term population growth rate.

For species with multiple populations, once the biological status of a species' populations has been determined, we assess the status of the entire species using criteria for groups of populations, as described in recovery plans and guidance documents from technical recovery teams. Considerations for species viability include having multiple populations that are viable, ensuring that populations with unique life histories and phenotypes are viable, and that some viable populations are both widespread to avoid concurrent extinctions from mass catastrophes and spatially close to allow functioning as metapopulations (McElhany et al. 2000).

In the summary that follows, we describe the status of MCR steelhead, SRB steelhead, and their designated critical habitat that occurs within the geographic area of this proposed action and are considered in this opinion. More detailed information on the status and trends of these listed resources, and their biology and ecology, are in the listing regulations and critical habitat designations published in the Federal Register (Table 3), applicable recovery plans (NMFS 2009; NMFS 2017), and the viability analysis prepared by the Northwest Fisheries Science Center (NWFSC) for the status reviews (Ford 2022). These additional documents are incorporated by reference and are available on the [NMFS West Coast Region website](https://www.westcoast.fisheries.noaa.gov/) (https://www.westcoast.fisheries.noaa.gov/).

Table 3. Listing status, status of critical habitat designations and protective regulations, and relevant Federal Register (FR) decision notices for ESA-listed species considered in this opinion.

Species	Listing Status	Critical Habitat	Protective Regulations
Snake River Basin steelhead	Threatened 8/18/1997; 62 FR 43937	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160
Middle Columbia River steelhead	Threatened 3/25/1999; 64 FR 14517	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160

Snake River Basin Steelhead Distinct Population Segment

The Snake River Basin steelhead was listed as a threatened evolutionarily significant unit (ESU) on August 18, 1997 (62 FR 43937), with a revised listing as a distinct population segment (DPS) on January 5, 2006 (71 FR 834). On August 18, 2022, in the agency's 5-year review for SRB steelhead, NMFS concluded that the species should remain listed as threatened (NMFS 2022a).

This species includes all naturally spawning steelhead populations below natural and manmade impassable barriers in streams in the Snake River basin of southeast Washington, northeast Oregon, and Idaho. The DPS also includes the progeny of the following six artificial propagation programs: Dworshak National Fish Hatchery, Salmon River B-run, South Fork Clearwater B-run, East Fork Salmon River Natural, Tucannon River, and the Little Sheep Creek/Imnaha River

(85 FR 81822). The Snake River Basin steelhead listing does not include resident forms of *O. mykiss* (rainbow trout) co-occurring with steelhead.

Reasons for the decline of this species include substantial modification of the seaward migration corridor by hydroelectric power development on the mainstem Snake and Columbia Rivers, loss of habitat above the Hells Canyon Dam complex on the mainstem Snake River, and widespread habitat degradation and reduced streamflows throughout the Snake River basin (Good et al. 2005). Another major concern for the species is the threat to genetic integrity from past and present hatchery practices, and the high proportion of hatchery fish in the aggregate run of SRB steelhead over Lower Granite Dam (Good et al. 2005; Ford 2011). Despite implementation of restoration projects, widespread areas of degraded habitat persist, and further habitat degradation continues across the basin, with a lack of habitat complexity, simplified stream channels, disconnected floodplains, impaired instream flow, and a lack of cold water refugia continuing to threaten the persistence of this DPS (NMFS 2022a). Other new or continuing threats include climate change, harvest and hatchery management, predation, and hydropower.

Life history. Adult SRB steelhead enter the Columbia River from late June to October to begin their migration inland. After holding over the winter in larger rivers in the Snake River basin, steelhead disperse into smaller tributaries to spawn from March through May. Earlier dispersal occurs at lower elevations and later dispersal occurs at higher elevations. Juveniles emerge from the gravels in 4 to 8 weeks, and move into shallow, low-velocity areas in side channels and along channel margins to escape high velocities and predators (Everest and Chapman 1972). Juvenile steelhead then progressively move toward deeper water as they grow in size (Bjornn and Rieser 1991). Juveniles typically reside in fresh water for 1 to 3 years, although this species displays a wide diversity of life histories. Smolts migrate downstream during spring runoff, which occurs from March to mid-June depending on elevation, and typically spend 1 to 2 years in the ocean.

Spatial structure and diversity. The Interior Columbia Technical Recovery Team (ICTRT) identified 24 extant populations (Table 4) within this DPS, organized into five major population groups (MPGs) (ICTRT 2003). The ICTRT also identified a number of potential historical populations associated with watersheds above the Hells Canyon Dam complex on the mainstem Snake River, a barrier to anadromous migration. The five MPGs with extant populations are the Clearwater River, Salmon River, Grande Ronde River, Imnaha River, and Lower Snake River. In the Clearwater River, the historic North Fork population was blocked from accessing spawning and rearing habitat by Dworshak Dam. Current steelhead distribution extends throughout the DPS, such that spatial structure risk is generally low. For each population in the DPS, Table 4 shows the current risk ratings for the four parameters (spatial structure, diversity, abundance, and productivity) of a VSP. Steelhead in McCoy and Ensign creeks are part of the Upper Grande Ronde River population, which is part of the Grande Ronde River MPG.

Snake River Basin steelhead exhibit a diversity of life-history strategies, including variations in freshwater and ocean residence times. Most Snake River populations support a mixture of the two run types, with the highest percentage of B-run fish in the upper Clearwater River and the South Fork Salmon River; moderate percentages of B-run fish in the Middle Fork Salmon River; and very low percentages of B-run fish in the Upper Salmon River, Grande Ronde River, and

Lower Snake River (NWFSC 2015). Maintaining life history diversity is important for the recovery of the species.

The spatial structure risk is considered to be low or very low for the vast majority of populations in this DPS. This is because juvenile steelhead (age-1 parr) were detected in 97 of the 112 spawning areas (major and minor) that are accessible by spawning adults. Diversity risk for populations in the DPS is either moderate or low. Large numbers of hatchery steelhead are released in the Snake River, and while new information about the relative abundance of natural origin spawners is available, the relative proportion of hatchery adults in natural spawning areas near major hatchery release sites remains uncertain (Ford 2022). Reductions in hatchery-related diversity risks would increase the likelihood of these populations reaching viable status.

Table 4. Summary of viable salmonid population (VSP) parameter risks and overall current status and proposed recovery goals for each population in the Snake River Basin steelhead distinct population segment (Ford 2022; NMFS 2017).

Major Population Group	**Population[2]**	**VSP Risk Rating[1]**		**Viability Rating**	
		Abundance/ Productivity	**Spatial Structure/ Diversity**	**2022 Assessment**	**Proposed Recovery Goal[3]**
Lower Snake River[4]	Tucannon River	High	Moderate	High Risk	Highly Viable or Viable
	Asotin Creek	Low	Moderate	Viable	Highly Viable or Viable
Grande Ronde River	Lower Grande Ronde	High	Moderate	High Risk	Viable or Maintained
	Joseph Creek	Low	Low	Viable	Highly Viable, Viable, or Maintained
	Wallowa River	High	Low	High Risk	Viable or Maintained
	Upper Grande Ronde	Very Low	Moderate	Viable	Highly Viable or Viable
Imnaha River	Imnaha River	Very Low	Moderate	Viable	Highly Viable
Clearwater River (Idaho)	Lower Mainstem Clearwater River	Very Low	Low	Highly Viable	Viable
	South Fork Clearwater River	Very Low	Moderate	Viable	Maintained
	Lolo Creek	High	Moderate	High Risk	Maintained
	Selway River	Moderate	Low	Maintained	Viable
	Lochsa River	Moderate	Low	Maintained	Highly Viable
	North Fork Clearwater River			*Extirpated*	*N/A*
Salmon River (Idaho)	Little Salmon River	Very Low	Moderate	Viable	Maintained
	South Fork Salmon River	Moderate	Low	Maintained	Viable
	Secesh River	Moderate	Low	Maintained	Maintained
	Chamberlain Creek	Moderate	Low	Maintained	Viable

Major Population Group	Population[2]	VSP Risk Rating[1]		Viability Rating	
		Abundance/ Productivity	Spatial Structure/ Diversity	2022 Assessment	Proposed Recovery Goal[3]
	Lower Middle Fork Salmon River	Moderate	Low	Maintained	Highly Viable
	Upper Middle Fork Salmon River	Moderate	Low	Maintained	Viable
	Panther Creek	Moderate	High	High Risk	Viable
	North Fork Salmon River	Moderate	Moderate	Maintained	Maintained
	Lemhi River	Moderate	Moderate	Maintained	Viable
	Pahsimeroi River	Moderate	Moderate	Maintained	Maintained
	East Fork Salmon River	Moderate	Moderate	Maintained	Maintained
Salmon River (Idaho)	Upper Mainstem Salmon River	Moderate	Moderate	Maintained	Maintained
Hells Canyon	Hells Canyon Tributaries			*Extirpated*	

[1]Risk ratings are defined based on the risk of extinction within 100 years: High = greater than or equal to 25 percent; Moderate = less than 25 percent; Low = less than 5 percent; and Very Low = less than 1 percent.
[2]Populations shaded in gray are those that occupy the action area.
[3]There are several scenarios that could meet the requirements for ESU recovery (as reflected in the proposed goals for populations in Oregon and Washington). What is reflected here for populations in Idaho are the proposed status goals selected by NMFS and the state of Idaho.
[4]At least one of the populations must achieve a very low viability risk rating.

Abundance and productivity. Historical estimates of steelhead production for the entire Snake River basin are not available, but the basin is believed to have supported more than half the total steelhead production from the Columbia River basin (Mallet 1974, as cited in Good et al. 2005). The Clearwater River drainage alone may have historically produced 40,000 to 60,000 adults, and historical harvest data suggests that steelhead production in the Salmon River was likely higher than in the Clearwater (Hauck 1953). In contrast, at the time of listing in 1997, the 5-year geometric mean abundance for natural origin steelhead passing Lower Granite Dam, which includes all but one population in the DPS, was 11,462 adults (Ford 2011). Abundance began to increase in the early 2000s, with the single year count and the 5-year geometric mean both peaking in 2015 at 45,789 and 34,179, respectively (Ford 2022). Since 2015, the 5-year geometric means have declined steadily with only 11,557 natural origin adult returns for the most recent (2017–2021) 5-year geometric mean (Ford 2022).

Based on 20-year geometric means, productivity for all populations remains above replacement. But cyclical spawner-to-spawner ratios, which reflect the combined impacts of habitat, climate change, and density dependence, have been strongly below replacement since 2010. Productivity is also expected to decline in the coming years due to recent declines in abundance (NMFS 2022a).

Recovery. NMFS completed a recovery plan for SRB steelhead in 2017 (NMFS 2017). The proposed recovery targets for each population are summarized in Table 1 of the recovery plan.

The greatest opportunities for advancing recovery include: (1) prioritizing actions that improve habitat resilience to climate change; (2) reconnecting stream channels with floodplains; (3) developing local- to basin-scale frameworks that prioritize restoration actions and integrate a landscape perspective; (4) implementing restoration actions at watershed scales; and (5) connecting tributaries to mainstem migration corridors (NMFS 2022a).

For SRB steelhead, the life stage that appears to be the most vulnerable to climate change is juvenile rearing (Crozier et al. 2019). Summer habitats may have reduced flow, or loss of tributary access, from irrigation withdrawals. High summer water temperatures are also prevalent. Climate change has and will cause earlier snowmelt timing, reduced summer flows, and higher air temperatures; all of which will exacerbate the low flows and high-water temperatures for juvenile SRB steelhead. This DPS is also considered to have only moderate capacity to adapt to climate change impacts. Given the extrinsic factors currently increasing the vulnerability of many populations to climate change impacts, it is unclear whether their adaptability would be sufficient to mitigate the risk climate change poses to the persistence of this DPS.

Summary. Based on information available for the 2022 viability assessment (Ford 2022), none of the five MPGs are meeting their recovery plan objectives and the viability of many populations remains uncertain. The recent, sharp declines in abundance are of concern and are expected to negatively affect productivity in the coming years. Overall, available information suggests that SRB steelhead continue to be at a moderate risk of extinction within the next 100 years. This DPS continues to face threats from tributary and mainstem habitat loss, degradation, or modification; predation; harvest; hatcheries; and climate change (NMFS 2022a).

Middle Columbia River Steelhead Distinct Population Segment

On March 25, 1999, NMFS listed the MCR steelhead DPS as a threatened species (64 FR 14517). On August 16, 2022, in the agency's 5-year review for Upper Columbia River steelhead, NMFS concluded that the species should remain listed as threatened (NMFS 2022b).

The Middle Columbia River steelhead DPS includes all naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from the Columbia River and its tributaries upstream of the Wind and Hood Rivers (exclusive) to and including the Yakima River; it excludes fish originating from the Snake River basin. It also includes steelhead from three artificial propagation programs: the Touchet River Endemic Program; Umatilla River Program; and the Deschutes River Program (85 FR 81822). This DPS does not include steelhead in the upper Deschutes River basin, which are designated as part of an experimental population (71 FR 834).

Estimates of historical (pre-1960s) abundance indicate that the total historical run size for this DPS might have been in excess of 300,000. Total run sizes for the major steelhead stocks above Bonneville Dam were estimated in the early 1980s to be approximately 4,000 winter steelhead and 210,000 summer steelhead. Based on dam counts for this period, the MCR steelhead DPS represented the majority of this total run estimate, so the returns to this DPS were probably somewhat below 200,000 at that time. It was also estimated that 74 percent of the returns to this DPS were of hatchery origin at that time.

Several factors led to NMFS' 1999 conclusion that MCR steelhead were threatened: destruction and modification of habitat; overutilization for recreational purposes; impacts of hydropower development and operation; and high percentages of hatchery fish spawning naturally. Despite efforts to reduce the impact of these threats, extensive miles of stream remain inaccessible or unsuitable for steelhead, many habitat threats continue, and threats from on-going development remain (NMFS 2022b).

Life history. Summer steelhead enter freshwater between May and October and require several months to mature before spawning; winter steelhead enter freshwater between November and April and spawn shortly thereafter. Summer steelhead usually spawn farther upstream than winter steelhead (NMFS 2009). Steelhead may enter streams and arrive at spawning grounds weeks or months (and even up to a year) before they spawn. They are therefore vulnerable to disturbance and predation. They need cover, in the form of overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water, turbulence, and/or turbidity. Once in the river, steelhead apparently rarely eat and grow little, if at all (NMFS 2009).

Summer rearing takes place primarily in the faster parts of pools, although young-of-the-year are abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Depending on water temperature, steelhead eggs may incubate for 1.5 to 4 months before hatching. Young steelhead typically rear in streams for 1 to 3 (or sometimes more) years before migrating to the ocean. Some juveniles move downstream to rear in larger tributaries and mainstem rivers. Most fish in this DPS spend 1 to 2 years in saltwater before re-entering freshwater (NMFS 2009). Repeat spawning for Columbia River basin steelhead ranges from reported rates of 2 to 4 percent above McNary Dam (Busby et al. 1996) to 17 percent in the unimpounded tributaries below Bonneville Dam (at River Mile (RM) 146.1). Adult survival to allow repeat spawning of MCR steelhead is compromised by the need to pass multiple mainstem dams multiple times (NMFS 2022b).

Spatial structure and diversity. The DPS comprises 20 historical populations (three of which are extirpated) grouped into the following four MPGs: Cascades Eastern Slope Tributaries; John Day River; Yakima River; and Umatilla/Walla Walla (Table 5). The spatial structure risk ratings are either very low or low for 13 populations and moderate for the four remaining extant populations. Diversity risk ratings are moderate for the vast majority of populations in this DPS. The most common reason for moderate diversity risk ratings are genetic impacts from hatchery supplementation and/or straying from out-of-basin stocks (Ford 2022). Updated information indicates that stray levels into the John Day River populations have decreased in recent years. Out-of-basin hatchery stray proportions remain high in spawning reaches within the Deschutes River basin and the Umatilla, Walla Walla, and Touchet River populations. The Yakima River upper mainstem population is the only one with a high-risk rating for the integrated spatial structure/diversity metric. This is due to a substantial decrease in distribution from historic levels and loss of life history and phenotypic diversity inferred from habitat degradation (including passage impacts). Steelhead in the Umatilla River are part of the Umatilla River population, which is part of the Umatilla/Walla Walla MPG.

Abundance and productivity. As reported in the most recent viability assessment (Ford 2022), the 5-year (2015–2019) geometric mean abundance estimates for 16 of the 17 evaluated populations are lower than the corresponding estimates for the previous 5-year period by varying degrees, with an average decline of 43 percent. Only the Klickitat River population exhibited an increase in spawner abundance. The 15-year trends in natural origin spawner abundance is slightly negative for 10 populations, neutral for two populations, and slightly positive for four populations. Some of the positive trends are driven largely by peak returns in the earlier years of the averaging time period. Natural origin spawning estimates are highly variable relative to minimum abundance thresholds across the populations in the DPS (Ford 2022). Freshwater productivity is considered to be low to moderate across the populations. Two of the four MPGs contain populations that have achieved a low or very low risk rating for the integrated abundance/productivity metric. However, this is insufficient for these MPGs to be considered viable on the whole. The majority of populations are not achieving their desired abundance and productivity targets.

Recovery. The recovery strategy consists of a DPS-wide recovery plan (NMFS 2009) and associated geographic management unit plans (Klickitat, NMFS 2009; Oregon, Carmichael and Taylor 2010; Rock Creek, NMFS 2009; SE Washington, SRSRB 2011; White Salmon River, NMFS 2013; and Yakima Basin, YBFWRB 2009). In these plans, NMFS adopted the viability criteria metrics defined by the ICTRT (ICTRT 2007) as the biological recovery criteria for the DPS. The recovery and management unit plans call for achieving MPG-level viability (low risk), through different combinations of viability status of the MPGs component populations (NMFS 2009). For example, at least half of the populations in the MPG must be viable and at least one population must be highly viable for the MPG to be regarded as viable (NMFS 2009). The recovery documents described the most likely scenario to achieve viability in each MPG. The latest viability ratings for MCR steelhead populations and their proposed viability ratings to support recovery are summarized in Table 5. Overall, none of the MPGs currently meet viability criteria (Ford 2022; NMFS 2022b). The newly re-established run in the White Salmon River and the developing time series of population data from the Klickitat River and Rock Creek warrant consideration in the recovery plan.

Widespread areas of degraded or inaccessible habitat continue to persist for all four MPGs due to: (1) dams and irrigation infrastructure; (2) low summer flows and high summer water temperatures; (3) disconnected floodplains; and (4) loss of riparian function. Other factors pertain to some MPGs more than others, such as grazing effects in the John Day River MPG, and levees in the Walla Walla and Umatilla Rivers and in the Yakima River MPGs. Finally, the effects of increasing floodplain development and other anthropogenic factors likely offset at least some restoration benefits, but are not well documented or quantified. There remain numerous opportunities for habitat restoration or protection throughout the range of this DPS. The greatest opportunities to advance recovery of the species over the next five years include: (1) protect and enhance cold water refugia habitat in the Columbia River; (2) advance water conservation agreements, improve streamflows, and lower water temperatures in tributary habitats; (3) restore complex floodplain habitats; and (4) provide/improve passage and screening (NMFS 2022b).

Crozier et al. (2019) recently completed a climate vulnerability assessment for Pacific salmon and steelhead, including MCR steelhead. Crozier et al. (2019) concluded that the MCR steelhead DPS has a high risk of overall climate vulnerability based on its high risk for biological sensitivity, high risk for climate exposure, and moderate capacity to adapt. The adult freshwater stage was rated the most highly vulnerable life stage due to high summer stream temperatures.

Summary. Overall, this DPS is at a moderate risk of extinction. Recent 5-year returns experienced steep declines across most populations. Natural origin spawning estimates are highly variable relative to minimum abundance thresholds across the populations in the DPS. Four of the populations are rated at "low" or "very low" risk for abundance and productivity, while the remaining populations are rated as "moderate" to "high" risk. Additional priority recovery actions and best management practices that apply to all populations and protect the highest quality habitats and conserve ecological processes that support population viability must be implemented to recover this species.

Table 5. Summary of viable salmonid population (VSP) parameter risks and overall current status and proposed recovery goals for each population in the Middle Columbia River steelhead distinct population segment (Ford 2022; NMFS 2009).

Major Population Group (MPG)	**Population (Run Type)[7]**	**VSP Risk Rating[1]**		**Viability Rating**	
		Abundance/ Productivity	**Spatial Structure/ Diversity**	**2022 Assessment**	**Proposed Recovery Goal[2]**
Cascades Eastern Slope Tributaries[3]	Klickitat River (summer/winter [sw])	Moderate	Moderate	Maintained	Viable
	White Salmon River (summer [su])			*Functionally Extirpated*	
	Rock Creek (su)	High	Moderate	High Risk	Maintained
	Fifteenmile Creek (winter [wi])	Moderate	Low	Maintained	Viable
	Deschutes River Westside (su)	High	Moderate	High Risk	Viable
	Deschutes River Eastside (su)	Moderate	Moderate	Maintained	Viable
	Crooked River (su)			*Extirpated*	
John Day River[4]	John Day River Lower Mainstem (su)	Moderate	Moderate	Maintained	Viable
	North Fork John Day (su)	Very Low	Low	Highly Viable	Viable
	Middle Fork John Day (su)	Very Low	Moderate	Viable	Option
	John Day River Upper Mainstem (su)	Moderate	Moderate	Maintained	Option
	South Fork John Day River (su)	Very Low	Moderate	Viable	Maintained
Umatilla / Walla Walla[5]	Touchet River (su)	High	Moderate	High Risk	Option
	Walla Walla River (su)	Moderate	Moderate	Maintained	Option
	Umatilla River (su)	Moderate	Moderate	Maintained	Viable
	Willow Creek (su)			*Functionally Extirpated*	
Yakima River[6]	Yakima River Upper Mainstem (su)	Moderate	High	High Risk	Option
	Naches River (su)	Moderate	Moderate	Maintained	Option

Major Population Group (MPG)	Population (Run Type)[7]	VSP Risk Rating[1]		Viability Rating	
		Abundance/ Productivity	Spatial Structure/ Diversity	2022 Assessment	Proposed Recovery Goal[2]
	Toppenish Creek (su)	Moderate	Moderate	Maintained	Maintained
	Satus Creek (su)	Low	Moderate	Viable	Option

[1]Risk ratings are defined based on the risk of extinction within 100 years: High = greater than or equal to 25 percent; Moderate = less than 25 percent; Low = less than 5 percent; and Very Low = less than 1 percent.
[2]There are several scenarios that could meet the requirements for species recovery, as indicated by the "Option" label. See the MPG specific notes for more detail.
[3]In order for the MPG to be viable, at least one of the four populations targeted for viable status, must be highly viable.
[4]In order for the MPG to be viable, then (1) either the Middle Fork John Day or John Day River Upper Mainstem populations should be viable and the other may be maintained; and (2) at least three populations should be viable, one of which should be highly viable.
[5]In order for the MPG to be viable, at least two populations should be viable, one of which should be highly viable.
[6]In order for the MPG to be viable, at least two populations should be viable, one of which should be highly viable.
[7]Populations shaded in gray are those that occupy the action area.

2.2.2. Status of Critical Habitat

In this section, we examine the status of designated critical habitat by examining the condition and trends of the essential PBFs of that habitat throughout the designated areas (Table 6). These features are essential to the conservation of the ESA-listed species because they support one or more of the species' life stages (e.g., sites with conditions that support spawning, rearing, migration, and foraging). The proposed action affects freshwater spawning, rearing, and migration habitats.

Table 6. Physical and biological features of critical habitat designated for ESA-listed steelhead species considered in this opinion, and corresponding species life history events.

Physical or Biological Features		Species Life History Event
Site Type	**Site Attribute**	
Freshwater Spawning	Substrate Water quality Water quantity	Adult spawning Embryo incubation Alevin growth and development
Freshwater Rearing	Floodplain connectivity Forage Natural Cover Water quality Water quantity	Fry/parr/smolt growth and development
Freshwater Migration	Free of artificial obstruction Natural cover Water quality Water quantity	Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Estuarine Areas	Forage Free of artificial obstruction Natural cover Salinity Water quality Water quantity	Adult sexual maturation and "reverse smoltification" Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration

For salmon and steelhead, NMFS' critical habitat analytical review teams (CHART) ranked watersheds within designated critical habitat at the scale of the fifth-field hydrologic unit code

(HUC5) in terms of the conservation value they provide to each ESA-listed species that they support (NMFS 2005). The conservation rankings are high, medium, or low. To determine the conservation value of each watershed to species viability, the CHART evaluated the quantity and quality of habitat features (e.g., spawning gravels, wood and water condition, and side channels), the relationship of the area compared to other areas within the species' range, and the significance of the population occupying that area to the species' viability criteria. Thus, even if a location had poor habitat quality, it could be ranked with a high conservation value, if it were essential due to factors such as limited availability (e.g., one of a very few spawning areas), a unique contribution of the population it served (e.g., a population at the extreme end of geographic distribution), or the fact that it serves another important role (e.g., obligate area for migration to upstream spawning areas).

Critical Habitat has been designated in the Interior Columbia recovery domain (ICRD), which includes Buckaroo, Moonshine, and Cottonwood creeks in the Umatilla subbasin; and McCoy and Ensign creeks in the Upper Grande Ronde subbasin. Habitat quality in tributary streams in the ICRD varies from excellent in wilderness and roadless areas to poor in areas subject to heavy agricultural and urban development (Wissmar et al. 1994; NMFS 2009). Intense agriculture, alteration of stream morphology (i.e., channel modifications and diking), riparian vegetation disturbance, wetland draining and conversion, livestock grazing, dredging, road construction and maintenance, logging, mining, and urbanization (EPA 2020a; Lee et al. 1997; McIver and Starr 2001; NMFS 2009) have degraded critical habitat throughout much of the ICRD. Reduced summer stream flows, impaired water quality, and reduced habitat complexity are common problems for critical habitat in developed areas, including the Umatilla River and streams on the UIR.

Migratory habitat quality in this area has been affected by the development and operation of the Columbia River System dams and reservoirs in the mainstem Columbia River, Bureau of Reclamation tributary projects, and privately owned dams in the Snake and Upper Columbia River basins. For example, construction of Hells Canyon Dam eliminated access to several likely production areas in Oregon and Idaho, including the Burnt, Powder, Weiser, Payette, Malheur, Owyhee, and Boise river basins (Good et al. 2005), and Grand Coulee and Chief Joseph dams completely block anadromous fish passage on the upper mainstem Columbia River.

Hydroelectric development modified natural flow regimes, resulting in higher water temperatures and changes in fish community structure, leading to increased rates of piscivorous and avian predation on juvenile salmon and steelhead, and delayed migration for both adult and juveniles. Physical features of dams such as turbines also kill migrating fish. In-river survival of emigrating juveniles is inversely related to the number of hydropower projects encountered. Similarly, development and operation of extensive irrigation systems and dams for water withdrawal and storage in tributaries have altered hydrological cycles.

A series of large regulating dams on the middle and upper Deschutes River affect flow and block access to upstream habitat, and have extirpated one or more populations from the Cascades Eastern Slope major population. Also, operation and maintenance of large water reclamation systems such as the Umatilla Basin and Yakima projects have significantly modified flow regimes and degraded water quality and physical habitat in this domain.

Many stream reaches designated as critical habitat in the ICRD are over-allocated, with more allocated water rights than existing streamflow. Withdrawal of water, particularly during low-flow periods that commonly overlap with agricultural withdrawals, often increases summer stream temperatures, blocks fish migration, strands fish, and alters sediment transport (Spence et al. 1996). NMFS has identified reduced tributary streamflow as a major limiting factor for MCR and SRB steelhead in this area (NMFS 2007; NMFS 2011).

Many stream reaches designated as critical habitat are listed on Oregon's and Washington's Section 303(d) lists for water temperature. Many areas that were historically suitable rearing and spawning habitat are now unsuitable due to high summer stream temperatures. Removal of riparian vegetation, alteration of natural stream morphology, and withdrawal of water for agricultural or municipal use all contribute to elevated stream temperatures. Contaminants such as insecticides and herbicides from agricultural runoff and heavy metals from mine waste are common in some areas of critical habitat.

The ICRD is a very large and diverse area. The CHART determined that few watersheds with PBFs for Chinook salmon or steelhead are in good-to-excellent condition with no potential for improvement. Overall, most ICRD watersheds are in fair-to-poor or fair-to-good condition. However, most of these watersheds have some or high potential for improvement.

Despite these degraded habitat conditions, the hydrologic unit codes that have been identified as critical habitats for this species are largely ranked as having high conservation value. Conservation value reflects several factors, including: (1) how important the area is for various life history stages, (2) how necessary the area is to access other vital areas of habitat, and (3) the relative importance of the populations the area supports relative to the overall viability of the ESU or DPS.

A summary of the status of critical habitats considered in this opinion is provided in Table 7.

Table 7. Critical habitat, designation date, Federal Register (FR) citation, and status summary for critical habitat for the two steelhead species considered in this opinion (NMFS 2005).

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. These subbasins contain 271 occupied and 20 unoccupied watersheds. Habitat quality in tributary streams varies from excellent in wilderness and roadless areas, to poor in areas subject to heavy agricultural and urban development (Wissmar et al. 1994). 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 Columbia River Systems. We rated conservation value of

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
		HUC5 watersheds as high for 220 watersheds, medium for 44 watersheds, and low for 27 watersheds. The Lower Snake/Columbia River corridor is considered to have high conservation value (NMFS 2005).
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 HUC5 watersheds with physical and biological features 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. We rated conservation value of occupied HUC5 watersheds as high for 78 watersheds, medium for 24 watersheds, and low for 9 watersheds. The Columbia River corridor is considered to have high conservation value.

HUC5 = Fifth-field Hydrologic Unit Code

2.2.3. Climate Change

One factor affecting the status of SRB and MCR steelhead considered in this opinion, and aquatic habitat at large, is climate change. As observed by Siegel and Crozier in 2019, long-term trends in warming have continued at global, national, and regional scales. The five warmest years in the 1880 to 2019 record have all occurred since 2015, while 9 of the 10 warmest years have occurred since 2005 (Lindsey and Dahlman 2020). The year 2020 was another hot year in national and global temperatures; it was the second hottest year in the 141-year record of global land and sea measurements and capped off the warmest decade on record (https://www.ncei.noaa.gov/news/global-climate-202011). Events such as the 2014–2016 marine heatwave (Jacox et al. 2018) are likely exacerbated by anthropogenic warming, as noted in the annual special issue of Bulletin of the American Meteorological Society on extreme events (Herring et al. 2018). The U.S. Global Change Research Program (USGCRP) reports average warming in the Pacific Northwest of about 1.3ºF from 1895 to 2011, and projects an increase in average annual temperature of 3.3ºF to 9.7ºF by 2070 to 2099 (compared to the period 1970 to 1999), depending largely on total global emissions of heat-trapping gases (predictions based on a variety of emission scenarios including B1, RCP4.5, A1B, A2, A1FI, and RCP8.5 scenarios). The increases are projected to be largest in summer (USGCRP 2018).

Climate change generally exacerbates threats and limiting factors, including those currently impairing salmon and steelhead survival and productivity. The growing frequency and magnitude of climate change-related environmental downturns will increasingly imperil many ESA-listed stocks in the Columbia River basin and amplify their extinction risk (Crozier et al. 2019, 2020, 2021). This climate change context means that opportunities to rebuild these stocks will likely diminish over time. As such, management actions that increase resilience and adaptation to these changes should be prioritized and expedited. For example, the importance of improving the condition of and access and survival to and from the remaining functional, high-elevation spawning and nursery habitats is accentuated because these habitats are the most likely to retain remnant snowpacks under predicted climate change (Tonina et al. 2022).

Climate change is already evident. It will continue to affect air temperatures, precipitation, and wind patterns in the Pacific Northwest (ISAB 2007; Philip et al. 2021), resulting in increased droughts and wildfires and variation in river flow patterns. These conditions differ from those under which native anadromous and resident fishes evolved and will likely increase risks posed by invasive species and altered food webs. The frequency, magnitude, and duration of elevated water temperature events have increased with climate change and are exacerbated by the Columbia River hydrosystem (EPA 2020b, 2020c; Scott 2020). Thermal gradients (i.e., rapid change to elevated water temperatures) encountered while passing dams via fish ladders can slow, reduce, or altogether stop the upstream movements of migrating salmon and steelhead (e.g., Caudill et al. 2013). Additional thermal loading occurs when mainstem reservoirs act as a heat trap due to upstream inputs and solar irradiation over their increased water surface area (EPA 2020b, 2020c, 2021). Consider the example of adult sockeye salmon in 2015, when high summer water temperatures contributed to extremely high losses of Columbia River and Snake River stocks during passage through the mainstem Columbia and Snake River (Crozier et al. 2020), and through tributaries such as the Salmon and Okanogan Rivers, below their spawning areas. Some stocks are already experiencing lethal thermal barriers during a portion of their adult migration. The effects of longer or more severe thermal barriers in the future could be catastrophic. For example, Bowerman et al. (2021) concluded that climate change will likely increase the factors contributing to prespawn mortality of Chinook salmon across the entire Columbia River basin.

Columbia River Basin salmon and steelhead spend a significant portion of their life cycle in the ocean, and as such the ocean is a critically important habitat influencing their abundance and productivity. Climate change is also altering marine environments used by Columbia River Basin salmon and steelhead. This includes increased frequency and magnitude of marine heatwaves, changes to the intensity and timing of coastal upwelling, increased frequency of hypoxia (low oxygen) events, and ocean acidification. These factors are already reducing, and are expected to continue reducing, ocean productivity for salmon and steelhead. This does not mean the ocean is getting worse every year, or that there will not be periods of good ocean conditions for salmon and steelhead. In fact, near-shore conditions off the Oregon and Washington coasts were considered good in 2021 (NOAA 2022). However, the magnitude, frequency, and duration of downturns in marine conditions are expected to increase over time due to climate change. Any long-term effects of the stressors that fish experience during freshwater stages that do not manifest until the marine environment will be amplified by the less-hospitable conditions there due to climate change. Together with increased variation in freshwater conditions, these downturns will further impair the abundance, productivity, spatial structure, and diversity of the region’s native salmon and steelhead stocks (ISAB 2007; Isaak et al. 2018). As such, these climate dynamics will reduce fish survival through direct and indirect impacts at all life stages (NOAA 2022).

All habitats used by Pacific salmon and steelhead will be affected by climate dynamics. However, the impacts and certainty of the changes will likely vary by habitat type. Some changes affect salmon at all life stages in all habitats (e.g., increasing temperature), while others are habitat-specific (e.g., stream-flow variation in freshwater, sea-level rise in estuaries, upwelling in the ocean). How climate change will affect each individual salmon or steelhead stock also varies widely, depending on the extent and rate of change and the unique life-history characteristics of different natural populations (Crozier et al. 2008). The continued persistence of salmon and steelhead in the Columbia basin relies on restoration actions that enhance climate resilience (Jorgensen et al. 2021) in freshwater spawning, rearing, and migratory habitats, including access to high elevation, high quality cold-water habitats, and the reconnection of floodplain habitats across the interior Columbia River basin.

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 within the boundaries of 12 cattle grazing range units on the UIR. Eleven range units are located in the Umatilla River subbasin and one range unit (Range Unit 15) is located within the Upper Grande Ronde subbasin. There are two range units that support MCR steelhead (Range Units 6 and 8) in the Umatilla subbasin, and three streams in these range units designated as critical habitat: Buckaroo Creek in Range Unit 6, and Moonshine and Cottonwood Creeks in Range Unit 8. All freshwater life history stages of MCR steelhead use Range Units 6 and 8 in the action area. There is one range unit that supports SRB steelhead (Range Unit 15) in the Upper Grande Ronde subbasin, and two streams in this range unit designated as critical habitat: McCoy and Ensign Creeks. All freshwater life history stages of SRB steelhead use Range Unit 15 in the action area. Range Units 5, 7, 9, 10, 11, 12, 14, 16, and 20 do not contain MCR or SRB steelhead or their critical habitat.

Maps of Range Units 6, 8, and 15 are included in the BA (pages 18–20), incorporated here by reference, and located:

1. Range Unit 6 – Located in Buckaroo Creek subbasin (HUC 170701030503)
2. Range Unit 8 – Located in Moonshine Creek and Cottonwood Creek subbasins (HUCs 170701030504 and 170701030507)
3. Range Unit 15 – Located in McCoy Creek subbasin (HUC 170601040203)

2.4. Environmental Baseline

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

2.4.1. Critical Habitat in the Action Area

Middle Columbia River Steelhead Critical Habitat in the Action Area

The Umatilla River Basin is designated critical habitat for MCR steelhead. Critical habitat is designated in Buckaroo, Moonshine, and Cottonwood Creeks, including the action area.

The Oregon Department of Environmental Quality completed a Total Maximum Daily Load and Water Quality Management Plan for the Umatilla Subbasin in 2001 (ODEQ 2001). Streams in the action area are listed as water quality limited for temperature, sediment, and habitat modification (Table 8).

Table 8. Water Quality Impaired Stream Reaches in Range Units 6 and 8 of the Confederated Tribes of the Umatilla Indian Reservation's grazing program.

Parameter	Stream	Segment	Criterion
Temperature	Buckaroo Creek	Mouth to Headwaters	Rearing 64°F
Sediment	Buckaroo Creek	Mouth to Headwaters	>30 Nephelometric Turbidity Units, for 48 hours
	Cottonwood Creek	Mouth to Headwaters	
Habitat Modification	Buckaroo Creek	Mouth to Headwaters	ODFW Habitat Benchmarks
	Cottonwood Creek	Mouth to Headwaters	
	Moonshine Creek	Mouth to Headwaters	

Water temperature is a concern throughout most of the Umatilla subbasin during periods of low flow (May until early November), including the action area. The highest water temperatures occur in late July and early August when ambient air temperatures are high. High stream temperatures in the action area are caused primarily by riparian vegetation disturbance (reduced stream surface shade), summertime diminution of flow, and channel widening (increased surface area exposed to solar radiation) (ODEQ 2001).

Present sediment yields are above "natural rates" in most HUCs on non-forested areas of the UIR due to extensive replacement of native vegetation by exotic plants and agriculture as well as the extensive road network. The primary sources include both bank and upland erosion of tributaries and tributary watersheds, both of which may be accelerated by land uses (ODEQ 2001). Anthropogenic activities that impact aquatic and terrestrial environments in the Umatilla Subbasin and action area include agriculture, timber harvest, livestock grazing, and transportation. The Umatilla/Willow Subbasin Plan summarized the negative impacts of these activities, their ecological effects, and the extent of their effects in the subbasin (NPCC 2004).

Invasive weeds occur in patches of varying sizes and densities in the action area adjacent to human development. In many of the grasslands, native bunchgrasses have been severely diminished and replaced by invasive annual grasses.

Range Unit 6. Buckaroo Creek is a seasonal, intermittent stream with a wide, incised channel and nearly vertical eroding banks. The floodplain is mostly hydrologically disconnected from flows up to a 50-year flood event. Longitudinally, the stream includes reaches of differing channel morphology, including reaches that are confined by bedrock hillslopes, impacted by human alterations, or are less confined within a broad accessible floodplain. The valley bottom is typically wide (300 to 800 feet) throughout. Upstream, the reach transitions into dense conifer stands, and the bank slopes are steep enough to preclude cattle from utilizing the riparian areas.

Cattle and feral horses graze in the uplands and in riparian corridors. Historic, intensive grazing caused a decline in vegetative cover on the steep hillslopes from foraging and hoof trampling. The exposed and disturbed soils are highly susceptible to water and wind erosion. Sheet and rill and gully erosion transport sediments to the stream, especially during extreme rain events. Bank stability is low because of altered riparian vegetation and trampled streambanks. Large flood events have eroded the hillslopes and unstable banks, leaving deep sediment deposits in the channel and on the floodplain.

There are seven spring developments on either side of Buckaroo Creek providing upland watering sources for cattle. This has limited the amount and intensity of trailing near the stream. There are approximately three undesignated cattle crossing areas on the lower half of Buckaroo Creek within the range unit. Cattle have access to both sides of the stream throughout the grazing period.

Invasive weeds are a concern along Buckaroo Creek. Himalayan blackberry (*Rubus armeniacus*) is common and creates dense impenetrable thickets that crowd out native species. A gravel bar encompasses approximately 4 percent of the stream along the lower reach. Upstream from the gravel bar, there is a concentration of white alder (*Alnus rhombifolia*), water birch (*Betula occidentalis*), willow (*Salix sp.*), and black cottonwood (*Populus trichocarpa*).

Development of off-stream watering locations, reduction in number of animals grazing within the unit, and setting the grazing season of use to spring and early summer, has improved range unit conditions including minimizing erosion since the early 1900s.

Range Unit 8, Moonshine Creek. Moonshine Creek is a seasonal, intermittent stream. Stream manipulation has resulted in an incised, straightened channel. The removal of riparian vegetation contributes to the instability of the easily-erodible, silt upland soils, and stream alluvium. Active floodplains are confined to a narrow band within the incised channel. Abandoned floodplains exist three to four feet above the active incised channel. Historic farming practices on the silty loess soils result in high rates of erosion from surface water runoff.

There is a high concentration of woody shrubs and trees along the stream length that falls within Range Unit 8, which provide shade and streambank stability. Moonshine Creek is dry in the summer months, after seasonal snow melt diminishes. There are four spring developments within the unit to provide water to cattle in the uplands, outside of the riparian area.

Conditions along Moonshine Creek have improved from the early 1900s as a result of changes in grazing management (development of off-stream watering locations, reduction in AUMs, spring and early summer season use). Bank stability has improved and erosion has decreased, and woody shrubs and trees have increased. Recent ground surveys demonstrate an increase in the amount of woody and herbaceous vegetation within the greenline. However, invasive plants are still prevalent in the riparian area and uplands.

There are no designated livestock crossing areas within the range unit, though cattle have access to both sides of the stream. There is one two-track road that crosses the creek at RM 2.3.

Range Unit 8, Cottonwood Creek. The majority of Cottonwood Creek is a seasonal, intermittent stream, with impaired hydrologic function. The channel has become deeply incised with reduced stream meander. Streamflow is mostly from annual snow melt, and the creek usually goes dry by mid-summer. Floodplains are beginning to develop along the deeply entrenched channel. These floodplains are at a lower elevation than the original floodplain, and are more confined. Overbank flow onto the floodplain is rare.

Approximately 90 percent of the channel is shaded by shrubs and trees. Floodplain vegetation is limited to a narrow strip along the channel. Some species of willow are present, for example narrowleaf willow (*S. exigua*), and form dense clonal colonies from sprouting of root shoots in several areas along the stream. Black hawthorn (*Crateagus douglasii*) is common in the open and in the understory of black cottonwood. Black hawthorn forms dense, nearly impenetrable thickets, with a sparse herbaceous layer, in areas with a deeply incised channel along the lower half of the stream. These woody plants provide high amounts of streambank stability. Invasive weeds are abundant on the upper terraces. The herbaceous and woody vegetation community is improving.

There are no designated livestock crossings, though cattle have access to both sides of the stream. Some trailing is visible upslope from the stream. However, cattle have access to six spring developments to create uniform utilization of the pasture. A two-track road crosses the stream at the north boundary of the range unit.

Snake River Basin Steelhead Critical Habitat in the Action Area

The Grande Ronde River Basin is designated critical habitat for SRB steelhead. Critical habitat is designated in McCoy Creek, including the action area (Range Unit 15).

McCoy Creek within Range Unit 15 is included on Oregon's 2021 303(d) list for water temperature, habitat modification, and sediment. McCoy Creek is fed primarily by seasonal snow melt and is seasonally intermittent. The channel is incised approximately one foot in some spots, along with braiding and a large volume of woody debris. Tree cover is dense along the stream reach. The substrate consists mainly of large cobble, with some areas of sand-sized sediment.

There is minimal trailing on the west side of the stream. There is one spring development approximately one-half mile from McCoy Creek, and two additional spring developments in the pasture to draw cattle out of the riparian area and into the uplands.

The range unit has an upward trend in habitat conditions, with regeneration of woody shrubs and shade present over the channel.

2.4.2. Middle Columbia River and Snake River Basin Steelhead in the Action Area

The proposed action will take place within the Umatilla/Walla Walla Basin MPG boundaries of MCR steelhead and will affect the Umatilla River population. The proposed action will also take place within the Grande Ronde River MPG boundaries of SRB steelhead and affect the Upper Grande Ronde River population.

Middle Columbia River Steelhead

Umatilla/Walla Walla Basin MPG. The Umatilla/Walla Walla MPG does not meet viability criteria because the abundance and productivity of the Umatilla and Walla Walla populations are considered at moderate risk, the Touchet River population abundance and productivity is at high risk, and all three populations have moderate risk for spatial structure and diversity. Overall, the Umatilla and Walla Walla River populations are considered maintained while the Touchet River population is considered at high risk. Recovery criteria for the Umatilla/Walla Walla MPG requires two populations to meet viability criteria and the third population to be maintained. The ICTRT also calls for at least one population to be highly viable. Umatilla River is the only large population, and therefore needs to be at least viable. In addition, either the Walla Walla River or Touchet River population also needs to be viable. Under current conditions, the Umatilla River population is the closest to being highly viable. Of the remaining two populations, the Walla Walla is much closer to reaching viable status than the Touchet River population.

The Umatilla River population occupies the Umatilla River Subbasin as well as three additional tributaries that flow directly into the Columbia River (Alder, Glade, and Fourmile creeks) on the Washington side just downstream of the mouth of the Umatilla River. Within the Umatilla River Subbasin, 10 of 13 watersheds are occupied by MCR steelhead. Current spawning distribution is somewhat limited relative to historical distribution and is concentrated in Birch Creek, Isqúulktpe Creek, Meacham Creek, Upper Umatilla River, and the North and South Forks of the Umatilla River.

Adult steelhead returns to the Umatilla Basin have been monitored at Three Mile Falls Dam since 1967. Up through 1989, fish were enumerated by a mechanical counter and it is possible that adult steelhead returns were overestimated in some years because the counter could not account for steelhead that fell back over the dam and then re-ascended, counting the same fish at least two or three times, if not more. Beginning in 1990, however, all adult steelhead have been trapped and counted at Three Mile Falls Dam, which provides more accurate count data.
The most recent 5-year geometric mean of 2,541 for natural spawners (2015–2019) is above the minimum abundance threshold of 1,500 for a “large” sized population (Table 9). However, this is 21 percent lower than the 2010–2014 5-year geometric mean. A large population must also have sufficient intrinsic productivity (greater than 1.26 recruits per spawner at the minimum abundance threshold) to achieve a 5 percent or less risk of extinction over a 100-year timeframe. The recent 20-year geometric mean productivity is 0.98, below the minimum of 1.26 required at the threshold abundance. The Umatilla population therefore does not meet the combined abundance and productivity criteria for recovery.

Table 9. The 5-year geometric mean number of natural origin spawner counts for the Umatilla River population of Middle Columbia River steelhead. Numbers in parentheses are the 5-year geometric means of total spawners for each period. "Percent change" is between the two most recent 5-year periods (Ford 2022).

Minimum Abundance Threshold	1990–1994	1995–1999	2000–2004	2005–2009	2010–2014	2015–2019	Percent Change
1,500	1070 (1,346)	925 (1,664)	2,355 (3,324)	1,946 (2,517)	3,101 (3,687)	2,541 (2,877)	-21 (-22)

Within the Recovery Plan (NMFS 2009), NMFS identifies several limiting factors and proposed actions for the Umatilla River population, including: (1) high water temperature, (2) sediment routing, (3) impaired fish passage, (4) degraded channel structure and complexity, (5) low flows, and (6) effects of naturally spawning stray hatchery fish on viability. The primary threats are: (1) hatchery production that results in high proportions of stray hatchery fish in natural spawning areas; (2) current land use practices that reduce habitat quality, quantity and disrupt ecosystem functions; and (3) the Columbia River mainstem hydrosystem.

Snake River Basin Steelhead

Upper Grande Ronde River MPG. The Upper Grande Ronde River MPG does meet viability criteria because although two of the four populations, Joseph Creek and Upper Grande Ronde River, are considered viable, the other two populations, Lower Grande Ronde River and Wallowa River, are considered high risk. The recovery plan recommends that each extant MPG should include viable populations totaling at least half of the populations historically present, with all major life-history groups represented (ICTRT 2007). The remaining populations also must achieve at least "maintained" status. In addition, the viable populations within an MPG should include proportional representation of large and very large populations historically present, and one of these populations should be highly viable.

The Joseph Creek and Upper Grande Ronde populations are at low and very low risk, respectively, for abundance and productivity. Joseph Creek and the Upper Grande Ronde populations are the most likely to satisfy the MPG-level requirement for one "highly viable" and one "viable" population. The average abundance levels have decreased from the prior review period and the productivity remains high. The Upper Grande Ronde population decreased 31 to 36 percent from the previous 5-year review (Table 10). Although declining from the past review period, abundance and productivity risk ratings still fall in the "low" to "very low" region of the viability curves for their respective size categories (Joseph Creek = basic and Upper Grande Ronde = large). One of the aggregate natural origin stock groups identified based on genetic sampling at Lower Granite Dam includes all four Grande Ronde River populations (Copeland et al. 2015). While the relatively high misclassification rates associated with this group precluded developing reliable direct estimates of annual escapements for use in the 2022 review, the results indicate that the estimated returns to Joseph Creek and the upper Grande Ronde River would account for the majority of the aggregate Grande Ronde River run. The Wallowa River and Lower Grande Ronde populations have a "high" abundance and productivity risk rating, reflecting the lack of population-specific data and the overall downward trends of populations in the DPS. More specific data on annual returns are needed to assign updated specific abundance and productivity ratings to these two populations (Ford 2022).

The combined spatial structure and diversity metric for all four populations in this MPG remains unchanged from the last review. The Grande Ronde River steelhead MPG is rated as "maintained" status. Both the Joseph Creek and Grande Ronde River Upper Mainstem populations meet the criteria for "viable," and the remaining two populations are provisionally rated as "high risk" based on the limited abundance and productivity data.

Table 10. The 5-year geometric mean number of natural origin spawner counts for the Upper Grande Ronde River population of Snake River Basin steelhead. Numbers in parentheses are the 5-year geometric means of total spawners for each period. "Percent change" is between the two most recent 5-year periods. The upper row is from the long-term dataset from weir and redd surveys. The lower row is from the PIT-tag-based population estimation method based on mixture model and tag detection network across the distinct population segment (Ford 2022).

Minimum Abundance Threshold	**1990-1994**	**1995-1999**	**2000-2004**	**2005-2009**	**2010-2014**	**2015-2019**	**Percent Change**
1,500	1,029 (1,307)	1,443 (1,805)	1,165 (1,284)	1,453 (1,459)	2,572 (2,604)	1,639 (1,655)	-36 (-36)
1,500					1,213 (1,220)	832 (838)	-31 (-31)

2.5. Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action (see 50 CFR 402.02). A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered the factors set forth in 50 CFR 402.17(a) and (b).

2.5.1. Effects on Middle Columbia River and Snake River Basin Steelhead

Cattle grazing on the UIR has the potential to affect ESA-listed fish by disturbing rearing, holding, or spawning salmonids; by trampling incubating redds as cows wade through or cross instream habitats; and through impacts to habitat (described below in Section 2.5.2). Some of these effects can result in injury and death.

Neither MCR or SRB steelhead or their critical habitat are present in Range Units 5, 7, 9, 10, 11, 12, 14, 16, or 20. Therefore, NMFS does not expect effects to ESA-listed steelhead or their critical habitat in these range units.

Presence and Exposure

All freshwater life stages of steelhead will likely be present in each of the three Range Units (8, 9, and 15) during the grazing season.

MCR steelhead. The action area of Buckaroo, Moonshine, and Cottonwood Creeks is used by MCR steelhead for spawning, rearing, and migration. Juvenile MCR steelhead use occurs throughout the year. The majority of adult steelhead (94.6 percent) return to the Umatilla River October–April. Steelhead spawning in the Umatilla Basin and these tributaries primarily begins as early as January, peaks in early- to mid-April, and is mostly complete by June 1. Fry emerge from the gravel in late April through early July. Grazing will occur April 15–July 1 in Range Units 6 and 8. Therefore, adults, eggs, fry, and juvenile MCR steelhead will be present during the grazing season.

SRB steelhead. The action area of McCoy and Ensign Creeks is used by SRB steelhead for rearing and migration, and possibly spawning. Juvenile SRB steelhead use occurs throughout the year. Adult steelhead enter the Grande Ronde River as early as July but most adults enter from September through March. Spawning occurs from March through mid-June, peaking late April through May. Fry emerge from May through July. Grazing in Range Unit 15 along McCoy and Ensign creeks will occur June 15–September 15 or July 15–October 15, in alternating years. Therefore, adults, eggs, fry, and juvenile SRB steelhead will be present during the grazing season.

Fish Disturbance

To promote the use of upland habitat, the BIA proposes early season grazing; spring and early summer grazing for Range Units 6 and 8, and early summer to fall grazing in Range Unit 15. Range Unit 15 is grazed later due to its high elevation, later accessibility, and later forage suitability. Middle Columbia River and SRB steelhead migration, spawning, incubation, and rearing will be occurring in each range unit during grazing.

Adult MCR steelhead. Within the action area, there are three fish-bearing streams (10.6 miles) where cattle have access to stream segments accessible to, or potentially accessible to, listed MCR steelhead: Buckaroo (6.9 miles), Moonshine (1.8 miles), and Cottonwood (1.9 miles) creeks. As cattle approach streams to drink or cross they could interrupt spawning behavior by forcing adult steelhead to retreat to nearby cover. Most of the spawning by adult MCR steelhead occurs February through May, peaking in April. Adult steelhead either die or swim downstream after constructing redds. Because spawning will be occurring when cattle enter range units (April 15), adults may be disturbed by grazing livestock. These disruptions will only occur occasionally and in dispersed areas. We consider the probability of cattle interrupting spawning or other adult behavior to be low given that cattle will be spending the majority of their time in the uplands, high spring streamflow, the presence of steep canyons in some reaches, the absence of documented spawning in the action area in Cottonwood Creek, and the limited amount of documented spawning in Buckaroo and Moonshine creeks. However, since cattle have access to all streams, some minor disturbance of spawning adults is still reasonably certain to occur.

Therefore, NMFS expects a very small number of adult MCR steelhead will be disturbed by cattle grazing in Range Units 6 and 8.

Adult SRB steelhead. There is 0.4 miles of McCoy and Ensign creeks accessible to livestock and SRB steelhead. Most of the spawning by adult SRB steelhead occurs March through May, and is mostly completed by mid-June. Livestock use will not occur until June 15 or July 15, in alternating years. In addition, during index redd surveys conducted by the Oregon Department of Fish and Wildlife (ODFW) 1990–2010, very few redds (0–11) were documented annually in the lower 7 miles of McCoy Creek, approximately 5 miles below Range Unit 8. Because cattle will not be turned out prior to June 15, and the small number of redds in McCoy Creek, NMFS does not expect the proposed action to result in disruption of adult SRB steelhead spawning.

Juvenile MCR and SRB steelhead. Although cattle will be spending the majority of their time in the uplands, rearing juvenile MCR and SRB steelhead are also likely to be present in many areas and disturbed by cattle approaching and entering streams. Disturbance of juvenile steelhead can lead to behavioral changes detrimental to steelhead growth or survival through alteration of feeding success, increased exposure to predators, or displacement into less suitable habitat. We expect most juveniles affected by cattle approaching and entering streams to move to adjacent suitable cover to avoid injury or death. However, given the length of streams in the range units with rearing MCR steelhead (10.6 miles) and SRB steelhead (0.4 miles), and poor habitat conditions in sections of some range units, disturbance of a small number of juvenile MCR steelhead and SRB steelhead is still reasonably certain to occur. NMFS expects this disturbance to result in behavioral changes to essential juvenile behaviors of feeding and sheltering, with a small number of juveniles entering open water and increasing their risk of predation. Therefore, NMFS expects a small number of juvenile MCR steelhead and a very small number of juvenile SRB steelhead will experience sufficient disturbance to cause behavioral changes and increased risk of predation.

Redd trampling. Of more concern is that livestock standing in or crossing streams may trample redds. The likelihood of redd trampling is determined by the joint occurrence of cattle using a stream and steelhead redds being present at the same place and time. Steelhead incubation within the action area typically occurs from March through June, with fry emergence late April through early July. During this time, redds are susceptible to trampling by livestock. The proposed grazing season overlaps the incubation period in five streams currently accessible to steelhead and cattle. If redd trampling occurs, it may kill or injure all, or a portion of, fish developing in the redd. Salmonid embryos are vulnerable to mechanical disturbance, and their sensitivity varies with developmental stage (Peterson et al. 2010). For instance, Roberts and White (1992) reported that a single wading incident on a simulated rainbow trout redd killed 43 percent of pre-hatching embryos and twice-daily wading throughout embryo development killed at least 83 percent of eggs and pre-emergent fry.

MCR steelhead. The CTUIR will conduct spawning ground surveys at least twice in Range Units 6 and 8, beginning in March or April depending on site access, per the procedures outlined in Appendix A of the BA. If redds are identified, the CTUIR will monitor for trampling every two weeks or, where feasible, protect redds from trampling with temporary electric fencing or other means. Because redds will likely be present and may not be protected, NMFS concludes that it is reasonably certain that a small number of MCR steelhead redds will be trampled over the 10-year term of this opinion. Trampling will result in the death or injury of MCR steelhead eggs, alevins, and/or juveniles. Although redd trampling is possible, the total number of redds trampled is expected to be low because of the spring and early summer grazing strategy, upland water sources, and the historically low density of redds documented in Buckaroo, Moonshine, and Cottonwood Creeks.

Cattle will have access to 6.9 miles of spawning and rearing areas in Buckaroo Creek and its tributaries during critical spawning and incubation times. From 2009 to 2021, Umatilla Basin summer steelhead redd densities in Buckaroo Creek in the action area ranged from 0.38 to 6.87 redds per square kilometer (0.15 to 2.65 redds per square mile) (Figure 2). In the valley bottom, Buckaroo Creek averages 300 (0.057 miles) to 800 feet (0.15 miles) wide. Conservatively assuming a channel width of 800 feet (0.15 miles) for all 6.9 miles of Buckaroo Creek in the action area, and a redd density of 2.65 redds per square mile, NMFS estimates 3 redds in the 1.035-square-mile action area of Buckaroo Creek.

Cattle will have access to 3.7 miles of spawning and rearing areas in Moonshine Creek (1.8 miles) and Cottonwood Creek (1.9 miles) during critical spawning and incubation times. Steelhead redds have not been documented in Cottonwood Creek in the action area. Therefore, NMFS does not expect steelhead redds in the action area in Cottonwood Creek during the 10-year timeframe of this consultation.

From 2009 to 2021, Umatilla Basin summer steelhead redd densities in Moonshine Creek in the action area ranged from 0.38 to 6.87 redds per square kilometer (0.15 to 2.65 redds per square mile) (Figure 2). Conservatively assuming a channel width of 10 feet (0.0019 miles) for all 1.8 miles of Moonshine Creek in the action area, and a redd density of 2.65 redds per square mile, NMFS estimates 0.01 redds in the 0.0034 square mile action area of Moonshine Creek.

Gregory and Gamett (2009) reported that cattle trampled 12 percent to 78 percent of simulated bull trout redds while grazing the Federal pastures they evaluated. It is not known if the evaluated pastures were grazed to the same annual use indicators proposed for these range units. They did note that stocking intensity (number pairs/capable[1] grazing area [acres]/grazing days) significantly influenced redd trampling rates with the highest stocking intensity generating the highest observed trampling levels and vice versa. Both Range Units 6 and 8 have a low stocking intensity. We also expect cattle use to primarily be in upland areas well above the streams during steelhead incubation. Therefore, NMFS assumed a potential trampling rate of 12 percent.

Applying the 12 percent redd trampling rate to the maximum number of four steelhead redds that could be present in Buckaroo and Moonshine Creeks results in up to one MCR steelhead redd potentially being trampled by livestock every year ($4 \times 0.12 = 0.48$) in the action area.

[1] Gregory and Gamett (2009) used the term "suitable area" but as defined in their paper (i.e., areas <30 percent slope, <1,600 meters from water, and producing at least 225 kg/ha of useable forage) the current and correct term is "capable area" (Personal Communication, Mike Helm, SCNF GIS Specialist, September 9, 2014).

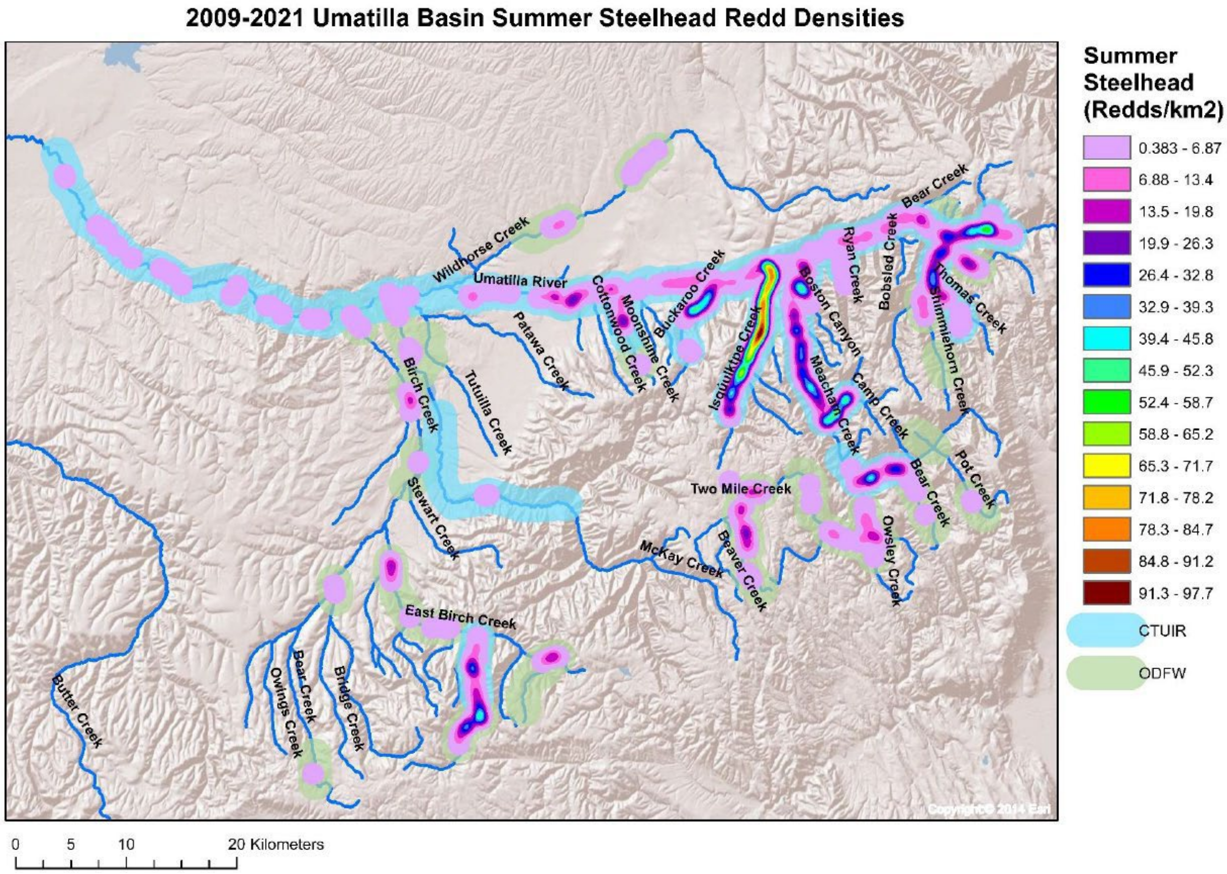

Figure 2. Summer steelhead redd densities in the Umatilla Basin, 2009–2021.

SRB steelhead. Steelhead incubation within the action area typically occurs from March through July, with fry emergence May through July. The proposed grazing season overlaps the incubation period in McCoy and Ensign Creeks. In Range Unit 15, redd monitoring will occur once site access is possible, likely in June, prior to livestock turnout. If redds are identified, the CTUIR will monitor for trampling every two weeks or, where feasible, protect redds from trampling with temporary electric fencing or other means. Redd monitoring has not previously occurred in the range unit. Redd surveys were conducted by the ODFW in index reaches in the lower 7 miles of McCoy Creek, 1990–2010, 5 to 12 miles downstream of Range Unit 15. The total number of redds in the index reaches ranged from 0 to 11, and averaged 3.25. Because spawning is known to occur in McCoy Creek and may occur in Range Unit 15, redds may be present and not protected. Therefore, NMFS concludes that it is reasonably certain that a very small number of SRB steelhead redds will be trampled over the 10-year term of this opinion. Trampling will result in the death or injury of SRB steelhead eggs, alevins, and/or juveniles. Although redd trampling is possible, the total number of redds trampled each year is expected to be very low, one or fewer, because of the early grazing strategy and the historically low number of redds documented in McCoy Creek 5–12 miles below the range unit.

Summary of Effects to Middle Columbia River and Snake River Basin Steelhead

- After reviewing the available information, NMFS concludes that it is reasonably certain that one or fewer MCR steelhead redds, and one or fewer SRB steelhead redds, per year will be trampled over the 10-year term of this opinion. Trampling will result in the death or injury of MCR and SRB steelhead eggs, alevins, and/or juveniles.

- Because spawning will be occurring when cattle enter Range Units 6 and 8, a very small number of adult MCR steelhead will likely be disturbed by grazing livestock. These disruptions will only occur occasionally and in dispersed areas.
- A small number of rearing juvenile MCR steelhead and a very small number of rearing juvenile SRB steelhead will likely be disturbed by cattle approaching and entering streams. We expect this disturbance to result in changes to essential juvenile behaviors of feeding and sheltering, with a small number of juvenile MCR steelhead and a very small number of SRB steelhead juveniles entering open water and increasing their risk of predation.

2.5.2. Effects on Critical Habitat

The BIA authorizes grazing on 13 range units on the UIR of which it has determined three are likely to adversely affect MCR steelhead and SRB steelhead. Together, these three range units contain an estimated 10.6 miles of MCR steelhead critical habitat and 0.4 miles of SRB steelhead critical habitat.

Numerous publications have documented the detrimental effects of livestock grazing on stream and riparian habitats (Johnson et al. 1985; Menke 1977; Meehan and Platts 1978; Cope 1979; American Fisheries Society 1980; Platts 1981; Peek and Dalke 1982; Ohmart and Anderson 1982; Kauffman and Krueger 1984; Clary and Webster 1989; Gresswell et al. 1989; Kinch 1989; Chaney et al. 1990; Belsky et al. 1997). These publications describe a series of synergistic effects that can occur when cattle over-graze or impact riparian areas, including: (1) reduction or elimination of woody and hydric herbaceous vegetation along a stream; (2) streambank collapse, stream widening, and channel incision due to livestock trampling; (3) streambank erosion without vegetation to slow water velocities and hold the soil; (4) a lower water table elevation; and (5) loss of hydric, deeply rooted herbaceous vegetation that may be replaced by upland species with shallower roots and less ability to bind the soil. These effects have the potential to adversely affect steelhead critical habitat in the action area where cattle have access to streams and they concentrate their grazing and loafing in streamside areas.

Effects of cattle grazing in the action area are constrained primarily by the number of AUMs, season of use, and the location of the range units with respect to streams and critical habitat. The BIA will permit early season grazing; spring and early summer in Range Units 6 and 8 and early summer and fall in Range Unit 15 (high elevation and no access and forage prior to June), to reduce the impacts of cattle grazing on steelhead critical habitat. Spring use normally results in better livestock distribution between riparian and upland areas due to flooding, generally cooler temperatures of riparian areas, and highly palatable upland forage (Clary and Booth 1993; Leonard et al. 1997; Parsons et al. 2003). The hill slope growing season begins earlier than the riparian growing season due to warmer temperatures on slopes. Riparian vegetation is often inundated during spring grazing making it unavailable for forage, soils in riparian areas are wet enough to discourage livestock use, and riparian temperatures are generally cooler making the hill slopes more desirable for cattle and limiting the time cattle spend in riparian areas to drink or cross the stream (Clary and Webster 1989; Kinch 1989). Spring/Early season use also provides more opportunity for regrowth and plant recovery than summer or fall use and results in more residual cover (Leonard et al. 1997; Wyman et al. 2006).

BIA will use monitoring and adaptive management to ensure that grazing is meeting objectives for streams and riparian areas. The BIA will use stubble height, streambank alteration, and shrub browse information collected at DMAs every year at the end of the grazing season to monitor the short-term impacts of cattle on riparian areas. These endpoint indicators will be used to assess resource impacts of current-year grazing to help determine if the annual timing, frequency, and duration of livestock use is appropriate to meet objectives. If objectives are not met, the BIA will analyze why they were not met, whether this is detrimental to the function of the riparian area, and what changes to management should be made.

Goss and Roper (2018) found that stubble height or streambank stability were suitable indicators of grazing impacts on stream habitat attributes important to salmon and trout. In an analysis of 153 stream reaches subjected to grazing within the Interior Columbia Basin, they found that width-to-depth ratio, streambank angle, percent undercut banks, streambank stability, residual pool depth, percent pools, percent pool-tail fine sediments less than 2 millimeters, and wood frequency all trended toward lower-quality salmonid habitat as streambank alteration increased or as stubble height decreased.

Stubble height. Stubble height has a direct relationship to the health of herbaceous riparian plants and the ability of the vegetation to provide streambank protection, to filter out and trap sediment from overbank flows, and in small streams to provide overhead cover (University of Idaho Stubble Height Review Team 2004; Roper 2016; Saunders and Fausch 2007). On monitoring sites across 17 National Forest and four BLM units in the Interior Columbia River basin, Goss (2013) found a linear relationship between increasing stubble height and multiple components of high-quality salmonid habitat, including: increasing residual pool depth, increasing streambank stability, increasing percent undercut banks, and decreasing streambank angle. This suggests that across stream and riparian conditions evaluated within the Interior Columbia River basin, the higher the stubble height the greater the likelihood that stream conditions favored by salmonids will be present (Goss 2013).

Multiple studies have evaluated minimum stubble heights necessary to protect stream habitat from the impacts of livestock grazing. Using monitoring data from Federal lands in the Columbia basin, Goss and Roper (2018) found that stubble height was related to streambank disturbance, and streambank disturbance began to increase 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 7 to 9 years of monitoring. Clary (1999) found that while a 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, a 6.5-inch stubble height was needed to improve all measured habitat metrics. These studies reinforce the observation that higher stubble heights are positively correlated with improving stream conditions for fish habitat.

After reviewing the available scientific literature, including all 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 (1989), who suggested a 6-inch starting point for stubble height objectives in the presence of ESA-listed or sensitive fish.

In the proposed action, the stubble height criteria is 6 inches, which might allow significant streambank alteration to occur if it were the only criterion used to manage grazing, or if streams were dominated by herbaceous vegetation. However, riparian areas in most of the streams in these range units are dominated by shrubs and trees and not grass. Woody browse is a more appropriate indicator of livestock use than grass stubble height for these streams. The BIA will use streambank alteration in conjunction with stubble height and shrub utilization to limit physical changes to streams that might otherwise occur with a 6-inch stubble height criterion alone.

Streambank alteration. Streambank alteration measures the amount of annual bank disturbance caused by livestock grazing in riparian areas, the levels of which can then be related to streambank stability and riparian vegetation conditions (Cowley and Burton 2005). Streambank alteration tends to increase with the number of cows present and the time spent by those cows in riparian areas. Excessive bank trampling can cause streams to widen with subsequent decreases in water depth and velocity. In low gradient channels, stream widening can cause mid-channel sediment deposition, which can further erode streambanks and reduce water storage. These impacts reduce the quality of fish habitat by reducing the physical heterogeneity of the stream channel. Of indicators evaluated by Bengeyfield (2006), bank alteration level was the most sensitive.

Cowley (2002) suggested that the maximum allowable streambank alteration necessary to maintain streambank stability is 30 percent, and that applying a 20 percent streambank alteration standard should allow streambanks damaged by grazing to recover. Cowley (2002) also cited studies to support a recommendation that “10 percent or less alteration would seem to allow for near optimal recovery and should not retard or prevent attainment of resource management objectives.” The BIA proposes a maximum 20 percent streambank alteration standard. Based on existing conditions and Cowley (2002) we expect this standard to: (1) prevent negative impacts to streambanks from grazing; (2) maintain properly functioning conditions where they currently occur on the range units; and (3) allow for stream habitat recovery and an upward trend where habitat indicators are not currently properly functioning. However, habitat recovery will likely take longer than if there was no grazing. A more protracted recovery period could result in greater sediment delivery, wider stream channels, reduced vegetative vigor, and higher water temperatures in the action area for a longer period than would occur absent grazing.

Shrub browse. Shrub utilization is the third type of criterion used to manage grazing effects. Burton et al. (2011) consider 40 percent shrub utilization to be light use. Research has shown that heavy to extreme use by grazing animals every year is detrimental to plant health, while light to moderate use maintains overall plant health (Thorne et al. 2005). In general, there is a reduction in seed production when livestock shrub browse is above 55 percent (Winward 2000). There can be a reduction in the overall health of plants, including size and root strength, when heavy and severe utilization levels are sustained over time. Although the BIA is requiring 50 percent maximum shrub use for riparian areas on these range units, this use criterion is expected to keep riparian shrub use below levels detrimental to plant growth or survival because cattle will spend most of their time in the uplands where forage is more palatable, providing the opportunity for regrowth and plant recovery.

The BIA will also conduct MIM monitoring, using the full BLM MIM monitoring protocol, at the onset of each permit and a minimum of every 5 years, to determine the condition and long-term trend of key biological and physical components of aquatic and riparian communities. If the trend of any of these indicators are negative, the BIA will analyze why the trend is negative, whether this is detrimental to the function of the riparian area, and modify the current management strategy as necessary.

Effects to Critical Habitat Physical and Biological Features

The action area includes PBFs for freshwater spawning, rearing, and migration. The essential features of these PBFs that would be affected by the proposed action include floodplain connectivity, water quality (sediment and turbidity), substrate, forage, riparian vegetation, and natural cover. The effects of the proposed action on these essential features are summarized below.

Floodplain connectivity. Riparian grazing and associated removal of riparian vegetation and bank instability can lead to stream downcutting and a drop in the water table. This could lead to a reduction in floodplain connectivity. Because of the BIA's grazing strategy and streambank alteration and utilization criteria (stubble height and shrub utilization), we expect only minor impacts to riparian vegetation and bank stability from the proposed action. Therefore, NMFS expects any effects to the floodplain connectivity PBF will be minor.

Over time, streams that are currently disconnected from their floodplains will be able to reestablish connectivity as riparian conditions improve. However, this can take decades for streams that are significantly incised. The riparian utilization criteria incorporated into the proposed action should help promote an upward trend of improving riparian habitats that in turn aid the long-term development of streambanks, and ultimately, floodplain connectivity.

Water quantity. Riparian grazing and associated removal of riparian vegetation and bank instability can decrease the ability of riparian areas to retain water. When this occurs, high flows in the spring tend to increase in volume, leading to bank damage and erosion. Summer and fall base flows are decreased, often resulting in flows that are insufficient to provide suitable rearing habitat for juvenile salmonids. Some streams that typically flowed perennially may experience periods of no flow in the summer or fall. Li et al. (1994) found that streamflow in a heavily grazed eastern Oregon stream became intermittent during the summer, while a nearby, well-vegetated reference stream in a similar-sized watershed had permanent flows.

Effects of historic season-long and summer livestock grazing in the action area (including trailing and watering), on channel and bank features such as bank stability, undercut banks and width-to-depth ratio, as well as impacts to riparian plant recruitment, have likely affected peak and base flows on some streams. The proposed spring grazing will reduce the amount of time cattle remain in riparian areas, reduce the amount of herbaceous and woody vegetation consumed, and reduce the amount of streambank trampling and compaction. Because of the BIA's grazing strategy and streambank alteration and utilization criteria (stubble height and shrub utilization), we expect only minor impacts to riparian vegetation and bank stability from the proposed action, and do next expect these minor impacts to affect water quantity. Therefore, we do not anticipate any effect to the water quantity PBF.

Water quality. Livestock grazing will cause some minor sediment delivery and short-term increases in turbidity levels, and deposition of cattle waste in riparian areas and streams. There will be a minor, temporary decrease in water quality associated with increased turbidity during high-flow periods downstream from stream crossing and watering access points and areas where cattle have grazed along each creek. A small amount of sediment and a short-term increase in turbidity may also occur when cattle cross or water. Therefore, we expect minor, temporary decreases in the water quality PBF.

Water temperature. Buckaroo Creek, from the mouth to the headwaters, is on Oregon's 303(d) list for temperature. The portion of McCoy Creek on the UIR and in the action area is also included on Oregon's 303(d) list for temperature. Because of higher spring flows, stream temperatures are generally suitable for MCR and SRB steelhead adult migration, spawning, and egg incubation. Concerns about elevated stream temperature are primarily associated with the summer juvenile rearing life stage, which takes place between June and September. Juvenile MCR and SRB steelhead exposed to higher than optimal stream temperatures suffer reduced growth or die due to thermal stress. Continued grazing could impact temperature if grazing reduces shade provided by riparian vegetation, or if stream widening increases the width-to-depth ratio or increases exposure to sunlight (Barton et al. 1985; Platts and Nelson 1989; Li et al. 1994; Maloney et al. 1999; Bottom et al. 1984; Platts 1991; Beschta 1997; Brown 1972).

The BIA's strategy of grazing when upland vegetation is most palatable and use of streambank alteration and utilization criteria (stubble height and shrub utilization) is designed to promote increased vigor and distribution of riparian vegetation and natural rates of recovery. Because of a switch to early season grazing in the mid-1990s and development of upland water sources, riparian vegetation is beginning to recover within each range unit. As riparian vegetation recovers, shade should increase and other factors that influence stream temperatures, such as stream morphology, exposed bare ground, and soil compaction along streams, should improve over time. Therefore, NMFS concludes that grazing practices under the proposed action are unlikely to increase water temperature.

Nutrients. Nutrients consumed by cattle elsewhere on the range are often deposited in riparian zones (Heady and Child 1994). The deposition of nutrients in riparian areas increases the likelihood that elements such as nitrogen and phosphorous will enter the stream. Oregon Department of Environmental Quality has not identified excess nutrients as a problem affecting streams in the action area. Grazing while upland plants are most palatable and use of developed upland springs in each range unit will help limit or reduce the amount of time livestock spend in riparian areas, and recovering riparian vegetation will function to trap and utilize nutrients deposited in riparian areas. In addition, higher spring flows will help dilute nutrients. This should limit the amount of waste livestock deposit in streams and riparian areas and result in negligible effects on MCR and SRB steelhead critical habitat.

Sediment and turbidity. Livestock grazing can trample or result in hoof shear of streambanks, expose bare soil, or generate fine sediments, which may enter streams (McIver and McInnis 2007). Fine sediment entering streams can create turbidity. Increased fine sediment and turbidity can be detrimental to juvenile salmon and steelhead in several ways including avoidance of the area, abandonment of cover, stress, and reduced growth rates (Newcombe and Jensen 1996). At moderate levels, turbidity has the potential to reduce primary and secondary productivity. At higher levels, turbidity may disrupt steelhead feeding and territorial behavior, displace fish from preferred feeding and resting areas, and may injure and kill both juvenile and adult salmonids (Berg and Northcote 1985; Newcombe and Jensen 1996; Spence et al. 1996). Chronic exposure can cause physiological stress responses that can increase maintenance energy and reduce feeding and growth (Servizi and Martens 1991). However, low to moderate levels of turbidity can provide cover from predation (Gregory and Levings 1998).

The Umatilla River produces large amounts of sediment, much of which originates from weathered basalt and unconsolidated loess deposits. The primary sources include both bank and upland erosion of tributaries and tributary watersheds, both of which may be accelerated by land uses, with peak sedimentation occurring during rainstorms or snowmelts (ODEQ 2001). In Range Units 6 and 8, Buckaroo and Cottonwood Creeks are on Oregon's 303(d) list for sediment; and Buckaroo, Cottonwood, and Moonshine Creeks are listed for habitat modification. In Range Unit 15, McCoy Creek is on Oregon's 303(d) list for sediment and habitat modification.

The BIA's strategy of grazing when upland plants are most palatable and use of streambank alteration and riparian utilization criteria limits the amount of vegetation that can be removed from riparian areas and reduces the amount of time livestock spend in riparian areas, thus limiting the amount of fine sediment introduced into streams. In each range unit, riparian vegetation is beginning to recover in areas historically impacted by livestock grazing. The BIA has set a 20 percent streambank alteration objective, and monitoring streambank alteration will help determine if sediment and turbidity are negatively affecting critical habitat.

Because some streambank alteration will occur, the proposed action will result in a small amount of fine sediment entering streams. Streambank trampling and exposure of new or existing bare soil by cattle will primarily generate this fine sediment. The amount of fine sediment introduced into streams by cattle grazing at any one time will be small. Pulses of turbidity caused by this sediment are likely to be small, localized, and of short duration. When fine sediment is introduced to streams during high flows, the turbidity created may not be observable above background levels. Since spring streamflow will be relatively high, we expect no more than a minor, temporary decrease in water quality associated with increased turbidity. There will also be a long-term reduction in turbidity as riparian conditions continue to improve over time, which ongoing monitoring and associated adaptive management measures should help ensure.

Substrate. Grazing can negatively impact stream substrate by increasing substrate fine sediment and cobble-embeddedness when livestock trample streambanks or when grazing has substantially reduced soil-stabilizing riparian vegetation or exposes bare soil (McIver and McInnis 2007). Increased substrate embeddedness decreases interstitial spaces in gravel substrate important for MCR and SRB steelhead spawning, impairs food production, and blocks refugia for young salmonids (Rinne 1990). Excess fine sediment can also impact salmonid eggs in redds by suffocation in the gravels (EPA 1993).

As mentioned above, some streambank alteration will occur and the proposed action is expected to result in a small amount of fine sediment entering streams. Sediment that cannot be transported by the stream can become embedded in spawning gravels, reducing salmonid egg and alevin survival. Since spring streamflow will be relatively high, we expect fine sediment to disperse, and deposition to occur in slow water areas that are not conducive to spawning, so effects to incubating eggs and alevins are likely to be minor. We also expect only minor impacts to refugia and juveniles with high streamflow and sediment dispersal. We further expect there will be a long-term reduction in sedimentation as riparian conditions continue to improve.

Forage. Livestock grazing can reduce the amount of terrestrial and aquatic insect prey available to juvenile MCR steelhead. This reduction is caused by the removal of streamside vegetation or through the introduction of fine sediment into streams (McIver and McInnis 2007; Platts 1991). The BIA's grazing strategy and use of streambank alteration and riparian utilization criteria limits the amount of vegetation that can be removed from riparian areas and reduces the amount of time livestock spend in riparian areas, thus limiting the amount of fine sediment introduced into streams. Riparian vegetation is beginning to recover and high streamflow should disperse sediment. Therefore, any effects to the forage PBF will be minor within the affected stream reaches. NMFS also expects there will be a long-term increase in available forage with a reduction in sedimentation and an increase in riparian vegetation as riparian conditions continue to improve.

Natural cover. MCR and SRB steelhead use various stream features such as undercut streambanks, large woody debris, boulders, and overhanging vegetation to provide cover. The removal of riparian vegetation can reduce overhead cover. Streambank alteration by livestock can eliminate undercut banks, and improperly managed grazing can suppress the recruitment of large woody debris. The introduction of fine sediments can increase substrate embeddedness, reducing the number of hiding places between cobbles and boulders and decreasing pool habitat.

The BIA's proposed grazing schedule and development of upland watering sources promotes livestock use of uplands away from riparian areas. The BIA has established 6-inch stubble height, 20 percent streambank alteration, and 50 percent woody browse utilization criteria, consistent with recommendations made by Clary and Webster (1989); BLM (1996); Clary et al. (1996); Clary and Lenninger (2000); Fink et al. (2000); Cowley (2002); Goss (2013); Roper (2016); and Goss and Roper (2018). Meeting grazing use criteria and grazing when upslope vegetation is most palatable will reduce the amount of time livestock spend in riparian areas and limit the amount of vegetation trampled or removed from riparian areas. The early grazing seasons will allow riparian areas to recover and improve due to having most of the growing season to recover from livestock impacts. Meeting the streambank alteration criteria will reduce the amount of damage to streambanks. The implementation of these management measures will ensure that any effects to the natural cover PBF will remain minor.

Summary of Impacts to Physical and Biological Features

The proposed actions are likely to cause no more than relatively minor or localized effects on PBFs for the following reasons:

- Grazing when upland forage is most palatable – Cows will spend the majority of their time in the uplands where forage is more palatable and temperatures are warmer.
- Early grazing season – The early grazing seasons will allow riparian areas to recover and improve due to having most of the growing season to recover from livestock impacts.
- Higher spring flows – Most riparian areas will be inundated, any increased nutrients will be diluted, and sediment and turbidity will be dispersed.
- Developed upland spring watering sources will decrease the amount of time cattle spend in streams watering.
- Utilization criteria limits the amount of vegetation that can be removed from riparian areas and reduces the amount of time livestock spend in riparian areas, thus limiting the amount of fine sediment introduced into streams.
- Streambank alteration criteria reduces the amount of damage to streambanks.
- Monitoring – End of grazing season use monitoring will occur annually and ensure grazing use criteria are met in each range unit.
- Full MIM monitoring – MIM monitoring will occur a minimum of every 5 years in each range unit, ensuring stream habitat trends are stable or improving.

2.6. Cumulative Effects

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

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

The range units are located in remote, difficult to access areas in the Umatilla and Grande River subbasins. Future population growth and development are not likely to cause greater effects within the action area than those previously described, and recreation is expected to continue at similar levels.

NMFS is not aware of any specific future non-Federal activities within the action area that would cause greater effects to MCR and SRB steelhead or their designated critical habitat than currently occurs. Therefore, NMFS does not expect cumulative effects in the action area to further reduce the conservation value of MCR and SRB steelhead critical habitat, or the productivity, spatial distribution, or abundance of MCR and SRB steelhead populations within the action area.

2.7. Integration and Synthesis

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

2.7.1. Middle Columbia River and Snake River Basin Steelhead

The MCR and SRB steelhead DPSs are listed as threatened, and while some populations are viable, many populations within these DPSs remain at moderate or high risk (Ford 2022). MCR steelhead from the Umatilla River population and SRB steelhead from the Upper Grande Ronde River population inhabit the action area and depend on it to support critical life functions of spawning, rearing, feeding, and migration.

Middle Columbia River Steelhead

The MCR steelhead DPS is not currently meeting the viability criteria described in the Mid-Columbia Steelhead Recovery Plan (NMFS 2009). Middle Columbia River steelhead from the Umatilla River population of MCR steelhead will be affected by the proposed action. Recovery criteria for the Umatilla/Walla Walla MPG, one of four MCR steelhead MPGs, requires two populations to meet viability criteria and the third population to be maintained. The ICTRT also calls for at least one population to be highly viable. Umatilla River is the only large population, and therefore needs to be at least viable. To achieve a viable rating, the Umatilla population must improve in both abundance and productivity and spatial structure and diversity.

Middle Columbia River steelhead use the action area for spawning, rearing, and migration. As described in Section 2.5.1, the proposed action will have effects on adults, redds, eggs, fry, and juveniles from the Umatilla River population. Based on the proposed action, a very small number adult steelhead will be disturbed, a small number of juvenile steelhead will be displaced, and a very small number of redds will be trampled.

Grazing will overlap with spawning and incubation and the BIA has not proposed measures to protect redds. Therefore, NMFS concludes that it is reasonably certain that cattle will trample one MCR steelhead redd per year over the 10-year term of this opinion. Trampling will result in the death or injury of MCR steelhead eggs, alevins, and juveniles. Because spawning will be occurring when cattle enter the range units and the ODFW and CTUIR have documented redds in the action area, adult steelhead will likely be disturbed by grazing cattle. These disruptions will only occur occasionally and in dispersed areas.

We conclude that a very small number of adult MCR steelhead will have spawning or other adult behavior interrupted by cattle, and cattle will trample one redd per year, because: (1) cattle presence in and use of riparian areas will be low due to high flows, cool temperatures, the high palatability of upland vegetation, and the presence of upland watering sources, so the exposure to adults and redds will be limited to a short period a few times per day as cows cross and drink; (2) the limited number of access points; and (3) the low number of redds documented in each range unit during spawning ground surveys conducted from 2009–2021. However, since cattle have access to all streams, some minor disturbance of spawning adults and trampling of redds is still reasonably certain to occur.

Rearing juvenile MCR steelhead are likely to be disturbed by cattle approaching and entering streams. Juvenile MCR steelhead may respond by leaving near shore cover and entering open water where they are more vulnerable to predation. This could lead to death or injury of these individuals. Cattle entering streams may also cause juvenile steelhead to abandon other critical behaviors such as feeding. The number of juvenile steelhead affected would likely be small given these disruptions will only occur occasionally and will likely be limited to stream reaches where cattle can easily approach or enter the water. However, because of the length of stream used by rearing juvenile steelhead and the poor habitat conditions in some of the range units, some disturbance of a small number of juvenile MCR steelhead, resulting in disruption of critical behaviors and entering open water, is still reasonably certain to occur.

NMFS does not expect these effects and reductions to appreciably alter the abundance, productivity, spatial structure, or diversity of the Umatilla River population. It is NMFS' opinion that when the effects of the action and cumulative effects are added to the environmental baseline, and in light of the status of the species, the effects of the action will not cause reductions in reproduction, numbers, or distribution that would reasonably be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of MCR steelhead.

Snake River Basin Steelhead

Snake River Basin steelhead continue to be at a moderate risk of extinction within the next 100 years. The recovery plan recommends that each of the five extant MPGs should include viable populations totaling at least half of the populations historically present, with all major life-history groups represented (ICTRT 2007). The remaining populations also must achieve at least "maintained" status. In addition, the viable populations within an MPG should include proportional representation of large and very large populations historically present. Within any particular MPG, there may be several specific combinations of populations that could satisfy the ICTRT criteria. The Upper Grande Ronde River MPG does meet viability criteria because although two of the four populations, Joseph Creek and Upper Grande Ronde River, are considered viable, the other two populations, Lower Grande Ronde River and Wallowa River, are considered high risk. The Lower Grande Ronde River and Wallowa River populations must achieve at least "maintained" status. The Joseph Creek and Upper Grande Ronde populations are at low and very low risk, respectively, for abundance and productivity. Joseph Creek and the

Upper Grande Ronde populations are the most likely to satisfy the MPG-level requirement for one "highly viable" and one "viable" population.

Snake River Basin steelhead use the action for spawning, rearing, and migration. As described in Section 2.5.1, the proposed action will have effects on redds, eggs, fry, and juveniles from the Upper Grande Ronde River population of SRB steelhead. Based on the proposed action, a very small number of juvenile steelhead will be displaced, and a very small number of redds will be trampled.

Grazing will overlap with spawning and incubation and the BIA has not proposed measures to protect redds. Therefore, NMFS concludes that it is reasonably certain that cattle will trample one SRB steelhead redd per year over the 10-year term of this opinion. Trampling will result in the death or injury of SRB steelhead eggs, alevins, and juveniles. Because is mostly complete when cattle enter the range unit in June, spawning will be completed in years when cattle enter the range unit in July, and we expect very little spawning in the action area. We do not expect spawning adults will be disturbed by cattle.

We conclude that a cattle will trample one redd per year, because: (1) cattle presence in and use of riparian areas will be low due to high flows, cool temperatures, high palatability of upland vegetation, and availability of upland watering sources, so the exposure to redds will be limited to a short period a few times per day as cows cross and drink; (2) the limited number of access points; and (3) the low number of redds documented 5–12 miles below the range unit during spawning ground surveys conducted from 1990–2010. However, since cattle have access to McCoy Creek and steelhead redds have been documented in McCoy Creek, some minor trampling of redds is still reasonably certain to occur.

Rearing juvenile SRB steelhead are likely to be disturbed by cattle approaching and entering streams. Juvenile SRB steelhead may respond by leaving near shore cover and entering open water where they are more vulnerable to predation. This could lead to death or injury of these individuals. Cattle entering streams may also cause juvenile steelhead to abandon other critical behaviors such as feeding. The number of juvenile steelhead affected would likely be very small given these disruptions will only occur occasionally and will likely be limited to stream reaches where cattle can easily approach or enter the water. However, because McCoy Creek is used by rearing juvenile steelhead and 0.4 miles of the creek is in Range Unit 15, disturbance of a very small number of juvenile SRB steelhead, resulting in disruption of critical behaviors and entering open water, is still reasonably certain to occur.

NMFS does not expect these effects and reductions to appreciably alter the abundance, productivity, spatial structure, or diversity of the Upper Grande Ronde River population. It is NMFS' opinion that when the effects of the action and cumulative effects are added to the environmental baseline, and in light of the status of the species, the effects of the action will not cause reductions in reproduction, numbers, or distribution that would reasonably be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of SRB steelhead.

2.7.2. Critical Habitat

Critical habitat is present in the action area for MCR and SRB steelhead. The condition of spawning, rearing, and migration habitat across the range of these species varies from excellent in wilderness and roadless areas to poor in areas subject to intensive human land uses. Within the action area, habitat condition is poor to good, with some PBFs degraded due to the impacts of land use practices, including grazing. Streambanks are generally stable but summer stream temperatures are high in Buckaroo, McCoy, and Ensign Creeks, and all five streams have elevated fine sediment levels and habitat modifications.

As noted in Section 2.2.3, climate change is likely to further impact designated critical habitat. Increases in water temperature and changes to the hydrological regime will reduce suitable salmon habitat and cause earlier migration of smolts. Warmer temperatures will likely lead to increased predation on juvenile salmonids in mainstem reservoirs (ISAB 2007). This is particularly true of non-native species such as bass and channel catfish where climate change will likely further accelerate their expansion (ISAB 2007). In addition, the warmer water temperatures will increase consumption rates by predators due to increased metabolic rates, which influence food demand. Slight changes in environmental conditions during the 10-year permit term due to climate change could amplify the proposed action's effects on water quality to some small degree.

To limit the impacts of cattle on designated critical habitat, the BIA has proposed early season grazing, streambank alteration criteria, and riparian utilization criteria. Based on available scientific literature, NMFS expects that these measures will reduce but not eliminate the potential for small adverse impacts to some of the essential PBFs in the action area. The potential impacts of the proposed action on MCR and SRB steelhead critical habitat are described in Section 2.5.3. The PBFs that could be affected are floodplain connectivity, water quality, substrate, forage, and natural cover. NMFS expects adverse effects to the above PBFs for MCR and SRB steelhead from livestock entering rivers and creeks to drink and cross, consumption of riparian vegetation, and streambank alteration and trampling. The proposed action is likely to cause no more than relatively minor or localized effects on these PBFs. These impacts will not preclude or significantly delay development of the critical habitat features in the watersheds affected by the proposed action, because: (1) impacts to riparian areas on these range units will be localized and dispersed; and (2) we expect the proposed adaptive management strategy for the range units to identify trends in stream habitat conditions over the term of the permit, and for the BIA to adjust grazing practices where habitat conditions and trends are not meeting resource objectives.

Based on our analysis that considers the current status of PBFs, adverse effects from the proposed action will cause no more than a minor or localized decline in the quality and function of PBFs in the action area. Because of the scale and extent of the effects to PBFs, we do not expect a reduction in the conservation value of critical habitat in the action area. Therefore, adding the effects of the action to the environmental baseline and the cumulative effects, and taking into account the status of MCR and SRB steelhead critical habitat, the proposed action is not expected to appreciably reduce the conservation value of the designated critical habitat for MCR or SRB steelhead.

2.8. Conclusion

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

2.9. Incidental Take Statement

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

2.9.1. Amount or Extent of Take

In this biological opinion, NMFS determined that incidental take of MCR and SRB steelhead is reasonably certain to occur. NMFS expects that take may occur in the form of harm or harassment of MCR steelhead adults and juveniles and SRB juveniles when cattle cross or drink from a stream. NMFS is reasonably certain that incidental take of MCR adults and MCR and SRB juvenile steelhead will occur because the proposed action will permit grazing in range units adjacent to streams occupied by adult MCR steelhead and juvenile MCR and SRB steelhead. Also, current habitat condition in sections of each Range Unit is poor and lacks complexity. Therefore, it may not provide adequate escape cover to mitigate for localized disturbance. In addition, NMFS also expects that take in the form of harm and mortality of MCR and SRB eggs, fry, and/or juvenile steelhead when cattle cross or drink from a stream. NMFS is reasonably certain that incidental take of eggs, fry, and or/juvenile MCR and SRB steelhead will occur because grazing will occur along streams where eggs and alevins will be in or emerging from redds, and the BIA does not commit to protection of redds.

There is no practicable means to observe the number of adult or juvenile steelhead harassed, or eggs or alevins injured or killed, as a consequence of cattle walking in streams. It is, however, possible to count the number of redds trampled by cattle. Therefore, we will use the number of redds trampled as a direct measure of redd trampling and as a surrogate for harassment, injury, and death of MCR and SRB steelhead. A trampled redd is a good indicator of the amount of incidental take because: (1) trampled redds have the most biological impact in numbers of individuals seriously injured per incident; (2) trampled redds are indicative of cattle presence in the stream; and (3) trampled redds can be measured in the field by visual observation because redds, unlike individual fish, are stationary and retain evidence of trampling, while individual fish are mobile and unless disturbance is viewed when it occurs, it is impossible to know if a fish has been disturbed by cattle.

Thus, the extent of take related to harm and harassment of adult and juvenile steelhead, and injury or death of eggs and alevins, is one MCR steelhead redd and one SRB steelhead redd trampled per year. NMFS will consider this extent of take exceeded if more than one MCR steelhead trampled redd and more than one SRB steelhead trampled redd is observed per year.

2.9.2. Effect of the Take

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

2.9.3. Reasonable and Prudent Measures

"Reasonable and prudent measures" are measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

The BIA shall:

1. Minimize incidental take of redds from livestock grazing on Range Units 6, 8, and 15 by performing spawning ground surveys, protecting redds, and adjusting grazing management as needed based on monitoring results.
2. Track, monitor, and report on the project to ensure that grazing is implemented as proposed and the amount and extent of take is not exceeded.

2.9.4. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. The BIA or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following terms and conditions implement RPM 1:

    a. A fisheries biologist and/or survey personnel trained by a fisheries biologist with redd identification and data collection experience shall conduct annual spawning ground surveys.
    b. Schedule spawning ground surveys to maximize the likelihood of detecting redds.

c. Conduct biweekly surveys in areas where redd protection measures have been implemented to ensure protection measures are working and effective.
d. Notify NMFS as soon as practicable of any instance of redd trampling.
e. Notify NMFS' Columbia Basin Branch Chief as soon as possible when two MCR or SRB redds have been identified as trampled.
f. Meet with NMFS within one week of identifying two redds as being trampled to develop appropriate protective measures to incorporate that would prevent further take.
g. As soon as practicable, assess the circumstances that contributed to any redd trampling and identify measures to prevent future redd trampling in that range unit.

2. The following terms and conditions implement RPM 2:

   a. Ensure all pastures subject to grazing have an appropriately established DMA prior to livestock turnout, and that all pasture DMAs are monitored in accordance with the proposed action detailed in the BA.
   b. If any proposed monitoring will not occur, contact NMFS immediately.
   c. Ensure that permit holders for all range units are aware of the BIA's resource objectives and riparian use criteria established for stubble height, bank alteration, and woody utilization.
   d. Notify the permittee and NMFS if an exceedance of any criteria (6-inch browse height, maximum of 20 percent streambank alteration, and maximum of 50 percent woody browse) occurs.
   e. If riparian use criteria are exceeded, or monitoring detects a stream channel, aquatic habitat, or riparian habitat downward trend attributed to authorized cattle grazing, meet with NMFS prior to the next grazing season to review grazing management and implement changes to grazing management as needed.
   f. Consistently implement grazing-related standards and guidelines.
   g. Provide an end of year report to NMFS by December 1 of each year. The following shall be included in the report for each range unit:
      1) Actual authorized AUMs.
      2) On-off dates.
      3) Unauthorized grazing.
      4) Results from all monitoring identified as part of the proposed action.
      5) Redd trampling monitoring results including dates, number of redds and adult steelhead observed, and location of redds.
      6) Redd protection measures implemented, and an assessment of their effectiveness.
      7) Review of management and compliance successes and failures.
      8) New habitat trend.
      9) Compliance with each pertinent term and condition contained in this opinion.
      10) Review of adequacy of monitoring program for determining habitat condition and trends.
      11) Adaptive management actions taken to date and any recommendations for future management actions to reduce impacts to ESA-listed fish and to address downward trends and situations where grazing is retarding attainment

of desired conditions in aquatic and riparian areas of streams occupied by steelhead.
12) Management recommendations for subsequent years.
13) Any changes in relevant information regarding ESA-listed fish distribution, spawning locations, or watershed conditions that were learned since completion of this consultation.
14) Submit the monitoring report to:

    Columbia Basin Branch
    National Marine Fisheries Service
    West Coast Region
    CTUIR Grazing
    Attn: WCRO-2022-01144
    crbo.consultationrequest.wcr@noaa.gov

2.10. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

The following recommendations are discretionary measures that are consistent with this obligation and therefore should be carried out by the BIA:

1. Pursue opportunities to protect MCR and SRB steelhead and critical habitat, including development of additional off-channel water sources and cattle exclusion devices such as riparian fencing.
2. Assess the impacts of, and incorporate into livestock grazing strategies, the changing climatic conditions that may change vegetative species distribution and availability for grazing on the UIR, particularly in those upper watersheds that will likely be most affected by a change in the hydrograph (more rain and less snow).

Please notify NMFS if the BIA carries out any of these recommendations that are intended to improve the conservation of listed species or their designated critical habitats.

2.11. Reinitiation of Consultation

This concludes formal consultation for Approval/Issuance of Range Unit Grazing Permits Umatilla Indian Reservation.

Under 50 CFR 402.16(a): "Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action."

2.12. "Not Likely to Adversely Affect" Determination

NMFS received the BIA's request for written concurrence that the proposed action is not likely to adversely affect (NLAA) Snake River (SR) spring/summer Chinook salmon (*O. tshawytscha*) or their critical habitat on May 9, 2022. NMFS prepared this response to the BIA's request pursuant to section 7(a)(2) of the ESA, implementing regulations at 50 CFR 402, and agency guidance for the preparation of letters of concurrence.

Snake River spring/summer Chinook salmon do not use McCoy or Ensign Creeks in the action area for any of their life history. Some rearing does occur near the mouth of McCoy Creek, over 10 miles downstream from the action area. In addition, McCoy and Ensign Creeks in the action area are not designated critical habitat for SR spring/summer Chinook salmon. Therefore, SR spring/summer Chinook salmon and their critical habitat will not be exposed to any of the effects of grazing on the UIR (discountable). Therefore, NMFS concurs that the proposed action is NLAA SR spring/summer Chinook salmon and its designated critical habitat.

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

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). 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) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH (CFR 600.905(b)).

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

3.1. Essential Fish Habitat Affected by the Project

The proposed project area includes EFH for various life history stages of Chinook salmon and coho salmon (*O. kisutch*) (PFMC 2014). The PFMC designated the following five habitat types as habitat areas of particular concern (HAPCs) for salmon: complex channel and floodplain habitat, spawning habitat, thermal refugia, estuaries, and submerged aquatic vegetation (PFMC 2014). The proposed action may adversely affect the following HAPCs: complex channel and floodplain habitat, and spawning habitat.

3.2. Adverse Effects on Essential Fish Habitat

Essential Fish Habitat is located in Range Units 6, 8, 10, and 11 in the Umatilla subbasin and in Range Unit 15 in the Upper Grande Ronde subbasin. Based on information provided in the BA and the analysis of effects presented in Section 2 of this document, NMFS concludes that the proposed action will adversely affect EFH designated for Chinook salmon and coho salmon in Range Units 6, 8, and 15. These effects include minor and or localized reductions in floodplain connectivity, water quality, forage, channel substrate, and natural cover.

Essential fish habitat is also located in Range Unit 10 (Patawa Creek) and Range Unit 11 (South Patawa Creek and South Coyote Creek). Because these locations will also be grazed in spring and early summer and at reduced AUMs, we expect similar effects to EFH as those in Range Units 6, 8, and 15. These effects include minor and or localized reductions in floodplain connectivity, water quality, forage, channel substrate, and natural cover.

3.3. Essential Fish Habitat Conservation Recommendations

NMFS determined that the following conservation recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the impact of the proposed action on EFH.

1. Implement RPM 1 and its terms and conditions described in the ITS in the ESA portion of this document, to minimize adverse effects to EFH due to cattle grazing in riparian areas and crossing and watering in streams.
2. Implement RPM 2 and its terms and conditions described in the ITS in the ESA portion of this document, to ensure completion of monitoring and reporting to confirm that these terms and conditions are effective for avoiding and minimizing adverse effects to EFH.
3. Establish a DMA in Range Units 10 and 11, establish end of use grazing standards in these two range units, and monitor grazing standards at the end of the grazing season. Establish the following end of season grazing use standards:
    - At the end of the grazing season, the average stubble height of riparian vegetation (grasses and grass-like species) is to be no less than 6 inches.
    - Stream bank alteration along streams is to be less than 20 percent at the end of the livestock grazing season.
    - Utilization of the current leader growth of key riparian shrubs along streams is to be less than 50 percent at the end of the livestock grazing season.

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in Section 3.2 above, designated EFH for Pacific Coast salmon.

3.4. Statutory Response Requirement

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

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

3.5. Supplemental Consultation

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

4. Data Quality Act Documentation and Pre-Dissemination Review

The 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 user of this opinion is the BIA. Other interested users include the CTUIR. Individual copies of this opinion were provided to the BIA and CTUIR. The document will be available within two weeks at the NOAA Library Institutional Repository (https://repository.library.noaa.gov/welcome). The format and naming adhere to conventional standards for style.

4.2. Integrity

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

4.3. Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR part 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 reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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