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Forest Service

Biological Assessment for the Revised Blue Mountains National Forest Plans - *FINAL*

Malheur, Umatilla and Wallowa-Whitman National Forests

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1. Introduction

The Malheur, Umatilla, and Wallowa-Whitman national forests (Forests) have combined efforts to revise their 1990 land and resource management plans (hereafter Revised Forest Plan). This biological assessment (BA) addresses the effects of the Revised Forest Plan on listed species and their designated critical habitat (DCH), and requests formal consultation. Additionally, to streamline future consultation should proposed or candidate species become listed over the lives of the Revised Forest Plan, this BA addresses the effects of the Revised Forest Plan on proposed and candidate species.

The Revised Forest Plan allocates National Forest System (NFS) lands to 18 management areas (MAs) including: Congressionally Designated Wilderness Areas, Preliminary Administratively Recommended Wilderness Areas, Wilderness Study Area, Wild and Scenic Rivers (includes designated, eligible, and suitable rivers), Research Natural Areas, Botanical Areas, Geological Areas, Historical Areas, Scenic Byways and All American Roads, Nationally Designated Trails, Scenic Areas, Starkey Experimental Forest and Range, Municipal Watersheds, Backcountry (nonmotorized use), Backcountry (motorized use), Riparian Management Areas, General Forest, and Developed Sites and Administrative Areas.

The need for revision of Forest Plans is based on legal requirements, and changed economic, social, and ecological conditions since the 1990 land management plans (or Forest Plans) were adopted, including changes in wildlife habitat, watersheds and aquatic habitats, fire-adapted ecosystems, climate change, and social and economic expectations. Other changes include new laws, regulations, and policies; Congressional direction and court decisions; and conservation agreements. Additionally, Endangered Species Act (ESA) species listings and critical habitat designations, as well as recovery plans, have been updated, and new information based on monitoring and scientific research is available. A Revised Forest Plan is also warranted because the previous Forest Plans are beyond the 10- to 15-year duration provided by the National Forest Management Act 40 (NFMA) (16 U.S.C. 1606(e) (5) (A)).

Wildlife Habitats

The increase in dense, multi-story forest stands provides habitat conditions that sustain a variety of wildlife species at higher densities and in larger areas than possibly occurred when the national forests were dominated by more open forest conditions. The challenge is to balance the need to shift forest conditions toward more open and sustainable conditions with the need to continue to provide habitat for species that prefer the dense, multi-story conditions. An additional challenge is managing public use and land management access to the road system at a level that will not render the surrounding habitat unusable to wildlife due to human disturbance and the loss of snags resulting from firewood collection and hazard tree removal.

Watersheds and Aquatic Habitats

Degraded aquatic and riparian habitat conditions and several other factors have contributed to the federal listing of bull trout across their range; Chinook salmon (both fall and spring/summer) and steelhead in the Snake Basin; and steelhead in the Middle Columbia Basin as threatened under the Endangered Species Act. DCH has been listed for these species. The Magnuson-Stevens Fisheries Conservation and Management Act of 1996 requires consultations with National Marine Fisheries Service when federal land management may adversely impact essential fish habitat (EFH) for commercial fish species, which includes both the ESA-listed and non-listed populations of Chinook and coho salmon in the action area (defined as the combined boundaries of the Malheur, Umatilla, and Wallowa-Whitman national forests, excluding only salmon habitat in the John Day and Walla Walla subbasins).

Water quality does not meet standards in more than 1,200 miles of streams in the action area. These water quality limited stream segments occur in every major drainage in the Blue Mountains and are located on both private and public lands.

Water that flows from NFS lands is used for drinking water, irrigation, and hydroelectric power generation, among other uses. Watershed restoration may have varying societal benefits, depending on geographic location, by improving water quality for downstream users, moderating flood flows, maintaining the quantity of water that flows from streams and rivers on NFS lands, reducing the amount of sediment that enters the streams, and adapting to expected climate change.

Fire-adapted Ecosystems

Fire is a natural part of the ecosystem and ecosystems within the Forests, and the Forests exhibit a wide diversity of natural fire behavior. The cumulative effects of periodic and sometimes extended drought, climate change, increasing vegetative density, shifts in forested species composition, and modified landscape patterns have resulted in conditions at many locations that are outside the range of what is sustainable. These conditions may put the forested ecosystems at high risk of uncharacteristically large and severe fires as well as disturbances from insects and disease. The potential for fires with uncharacteristically severe effects exists on approximately 60 percent of the Forests. In addition, climate change predictions suggest that in the future there may be longer fire seasons and more severe fires. These current and future conditions increase both the challenge and the motivation for restoring the landscape to reduce the severity of fires.

Approximately 20 percent of the Forests are comprised of wildland urban interface: the area where wildfire can pose a substantial threat to human life and property. Firefighter safety and increasingly large fire suppression costs are additional consequences and challenges for fire(s) that occur in a wildland urban interface.

Climate Change

Climate change is a factor beyond the scope of Forests' managers to control; nonetheless, managers have responsibility to address and be responsive to climate-related impacts. Climate change scenarios predict an increase in disturbance events, including large flood events, wildfires, and forest pathogen outbreaks. Climate changes can affect organisms and their habitats in many ways. It may alter behavior, population size, species distributions, plant and animal communities, and ecosystem function and stability. How strongly different species will be affected differs based on their ecology and life history. Species with small population sizes, restricted ranges, specialized habitat requirements, and limited ability to move to different habitats will be most at risk. Similarly, different habitats and ecosystems will be impacted differently, with those in high-altitude regions, such as in the Blue Mountains, among the most vulnerable habitats to effects of climate change (Halofsky et al. 2017; Ruggiero et al. 2008). Current Forest Plans do not address strategies for creating resilient ecosystems in response to climate change, and must be updated to address this increasing threat.

Social and Economic Expectations

Management of public land involves conflicting desires, values, and preferences, depending upon which multiple-user is offering their input and/or which resource is being discussed. The public expects a diversity of uses from the Forests. People frequently disagree about how the Forests should be managed. With interests and opinions that are often held strongly, it is important for public to understand that the U.S. Forest Service (USFS) is bound by many laws and regulations, among which include those where the public can participate to have their voices heard, and see where their desires can be realized in the decision-making process.

Statutory and Regulatory Background

The National Forest Management Act (NMFA)

The NFMA requires the USFS to set up a process for the development and revision of plans for national forests and national grasslands throughout the United States.

The Planning Rule

The first planning rule, adopted in 1979 and amended in 1982 and 1983, known as the 1982 Planning Rule, has guided the development, amendment and revision of the majority of current land management plans in effect throughout NFS lands. The 1982 Planning Rule requires national forests to manage habitat in order “*to maintain viable populations of existing native and desired non-native vertebrate species in the Planning area,*” and further defines a viable population as “*one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the Planning area.*”

The USFS has attempted to revise the planning rule provisions several times since the original planning rule was implemented in 1982. Between 2000 and 2008, three new planning rules were proposed, challenged, and ultimately remanded back to the USFS by the US District Court. Direction for management of species differs between the 2000, 2005, 2008, and 1982 planning rules in regards to viability and sustainability of species. Under the 2000, 2005, 2008 planning rules, national forests were required to assess “*the contribution of National Forest System (NFS) lands to the sustainability of ecosystems and species*” as opposed to “*maintaining viable population of species.*”

After the 2008 Planning Rule was remanded back to the USFS, the Forests were once again revising their Forest Plans with the 1982 Planning Rule. Although a new planning rule was released in 2012, the Forests, having started plan revision under the 2000 Planning Rule, decided to complete their plan revisions under the 1982 Planning Rule. The Forest Plans are being revised under the transition provisions of the 2012 Planning Rule (36 CFR 219), which state that the responsible official may complete and approve the plan revision in conformance with the provisions of the prior planning regulation, including the transition provisions of the reinstated 2000 Planning Rule (36 CFR part 299, published at 36 CFR parts 200 to 299, revised as of July 1, 2010). The transition provisions allow the use of the 1982 Planning Rule procedures (see CFR parts 200 to 299, revised as of July 1, 2000). Given that the 1982 Planning Rule was in place when the Forests began their plan revisions, the objective of this evaluation (starting in 2010) is to ensure the evaluation approach addresses “species viability” and other criteria of the 1982 Planning Rule, while (where possible) meeting the intent of the 2012 Planning Rule.

Endangered Species Act of 1973 [ESA] (16 U.S.C 1531-1536, 1538-1540)

The ESA provides for the conservation of species that are endangered or threatened throughout all or a significant portion of their range, and the conservation of the ecosystems upon which they depend. The purpose of the ESA is to conserve threatened and endangered species and their ecosystems, and to ensure other species do not need to be added to the list of endangered and threatened species. Section 7 of the ESA outlines procedures for interagency cooperation to conserve federally listed species and designated critical habitats. Section 7(a)(1) requires federal agencies to use their authorities to further the conservation of listed species. Section 7(a)(2) requires federal agencies to consult with the National Marine Fisheries Service (NMFS) or U.S. Fish and Wildlife Service (USFWS), depending upon the species, to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species, or destroy or adversely modify DCH.

Critical habitat for listed species consists of: (1) the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical and biological features (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed upon a determination by the Secretary (of the Department of Interior or the Department of Commerce) that such areas are essential for the conservation of the species. Critical habitat is formally designated and published in the Federal Register.

Magnuson-Stevens Fisheries Conservation and Management Act of 1996 (67 FR 2343) (Section 305(b) and its implementing regulations (50 CFR § 600.920).

This Act requires consultation for lakes, ponds, wetlands and other currently viable water bodies, and most of the habitat historically accessible to salmon. The identification essential fish habitat (EFH) is a requirement of the Magnuson-Stevens Act (MSA), as is consultation on actions that may affect EFH. This designation applies only to coho and Chinook salmon habitat within the Revised Forest Plan action area. The location of EFH and effects on EFH would therefore be the same as those described for designated critical habitat for Snake River spring/summer Chinook salmon within this biological assessment. Additionally, the distribution of non ESA listed Middle Columbia spring/summer Chinook in the Umatilla River basins, and coho salmon in the Umatilla River basin, will be analyzed under EFH.

Clean Water Act of 1977 (33 U.S.C. §1251 et seq.)

This Act establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulates quality standards for surface waters.

National Environmental Policy Act of 1969 (42 U.S.C. § 4321 et seq)

This Act requires that all executive federal agencies prepare environmental assessments (EAs) and environmental impact statements (EISs) that report the potential environmental effects of proposed federal agency actions.

Purpose of this BA

The Revised Forest Plan would provide land management direction for forest resources, using both Forest-wide direction and direction specific to management areas. The Revised Forest Plan is strategic in nature. It would not propose specific projects or activities or make decisions authorizing specific projects or activities. For example, the Revised Forest Plan would not include decisions for building or closing specific roads or trails, specific vegetation management projects, or watershed restoration projects. Those decisions are made later, only after projects or activities are proposed, analyzed, and there is the opportunity for public involvement. The Forest Service therefore considers the Revised Forest Plan to be a “framework programmatic” action, as defined in the Services’ 2015 Incidental Take rule, because Forest Plans are federal actions that approve a framework for the development of future action(s) that are authorized, funded, or carried out at a later time, and any take of a listed species would not occur unless and until those future action(s) are authorized, funded, or carried out and subject to further ESA Section 7 consultation.

The Revised Forest Plan is comprised of plan components, including desired conditions, objectives, suitable uses and activities, management and special areas, monitoring and evaluation, and standards and guidelines. Revised Forest Plan components can only be changed by a plan amendment. Within the requirements set forth in the NFMA Planning Rule, land management plans provide a programmatic

framework and the sideboards to guide decisions for all natural resource management activities on a national forest or grassland. The plan components are discussed more thoroughly in Section 2.2.

The purpose of this framework programmatic BA is to provide the basis for consultation with the USFWS and the NMFS on the Revised Forest Plan with respect to assessing the contribution the plan will provide towards the Forests' obligation to further the conservation of listed species (ESA Section 7 (a)(1)), and to assess the potential effects implementing the plan components may have on listed, proposed, and candidate species and their designated and proposed critical habitats (ESA Section 7 (a)(2)). Finally, this BA also will serve as the basis for analysis of the effects of the Revised Forest Plan on EFH.

In addition to the fish species identified above, gray wolf that occur on the Umatilla National Forest (NF) and Malheur NF west of Highway 395 in the action area are listed as endangered. No critical habitat for gray wolf occurs in the action area. On the Wallowa-Whitman NF MacFarlane's Four-O'clock is ESA listed as threatened, and Spalding's catchfly is listed as a threatened species and occurs on the Wallowa-Whitman and Umatilla NFs. No critical habitat for listed plant species occur in the action area. The wolverine is proposed for listing as a threatened species and occurs on the Wallowa-Whitman NF. Whitebark pine is a federal candidate species and occurs on all three Forests within the action area.

The Revised Forest Plan for the Malheur, Umatilla, and Wallowa-Whitman national forests, with the exception of the Hells Canyon National Recreation Area (HCNRA), will replace all current Forest Plan direction for federally listed, proposed, and candidate species and designated/proposed critical habitat on the Forests. The Revised Forest Plan for the Malheur National Forest will apply to the portion of the Ochoco National Forest currently administered by the Malheur National Forest. All such affected lands of the Ochoco National Forest are reflected in tables, figures and narrative in this Biological Assessment for the Malheur National Forest, example: acreage values in table 6 below. Those lands will be managed under the revised Plan for the Malheur National Forest. PACFISH, INFISH, and Eastside Screens¹ that amended current Forest Plan direction and consultation on those strategies will be vacated upon initiation of the Revised Forest Plan, except for the HCNRA, after receipt of the Revised Forest Plan Biological Opinions, and through the signing of the individual Forests' record of decisions (RODs). The National Forest Management Act requires that "permits, contracts and other instruments for use and occupancy" of National Forest System lands be "consistent" with the Forest Plan (16 U.S.C. § 1604(i)). Therefore, the Revised Forest Plan direction will apply to all projects that have decisions made on or after the implementation date of the record of decisions. For ongoing Forest actions however, the National Forest Management Act provides that "[w]hen land management plans are revised, resource plans and permits, contracts, and other instruments, when necessary, shall be revised as soon as practicable". Moreover, these revisions "shall be subject to valid existing rights". For example, for term grazing permits on the Rescission Act schedule not currently undergoing NEPA allotment management plan (AMP) grazing reauthorizations until after the Revised Forest Plan RODs are signed, the Revised Forest Plan direction will be incorporated through term grazing permit modification, prior to grazing activities the year following finalization of the new Plans. However, GM-3G will have an implementation schedule from 5 to 7 years (within 5 years re-evaluate allotments with ESA species, within 7 years non-ESA allotments) that allows the FS time to assess condition and trend of water quality, aquatic habitat, and riparian vegetation conditions based on the best available information at the appropriate spatial scales prior to assigning values from the guideline.

¹ PACFISH, INFISH, and Eastside Screens refer to Pacific Northwest Region (R6) Forest Plan amendments signed in 1995 (USDA Forest Service 1995a through 1995f)

Hells Canyon National Recreation Area Comprehensive Management Plan

The Hells Canyon National Recreation Area (HCRNA) was established in 1975, including the Hells Canyon Wilderness, and Wild and Scenic Rivers (Rapid and Snake rivers). A comprehensive management plan (CMP) was approved in 1982 and incorporated into the Wallowa-Whitman National Forest Land and Resource Management Plan (Forest Plan) in 1990. The law that established Hells Canyon National Recreation Area (HCNRA) (Public Law 94-199) required that a separate management plan be developed for the HCNRA. The HCNRA CMP was developed and approved on April 30, 1982. When the 1990 Forest Plan for the Wallowa-Whitman NF was approved, this CMP was carried forward without amendment under the provisions of the 1982 Planning rule (1982 rule provision 36 CFR 219.2(b)) which states:

... (if), in a particular case, special area authorities require the preparation of a separate special area plan, the direction of any such plan may be incorporated without modification in plans prepared under (these regulations).

In 2003, the CMP was revised and, by amendment, became part of the 1990 Forest Plan for the Wallowa-Whitman NF. The 662,000-acre HCNRA includes about 30,000 acres of lands that are not part of the NFS. The area is managed via its own enabling legislation and the Comprehensive Management Plan Environmental Impact Statement (USDA Forest Service 2003).

As part of the Revised Forest Plan revision for Wallowa-Whitman NF, the CMP was reviewed to determine if there was a need to revise the 2003 consultation for species and critical habitats in the HCNRA. An analysis based on the 2004 current management situation compared to the current situation for the HCNRA showed there was a need to initiate consultation on DCH for bull trout and Snake River steelhead since these were designated after the 2003 CMP consultation was completed. Although the 2003 CMP is being carried forward without modification and is part of the Revised Forest Plan, the effects analysis in this BA concluded that while management direction minimizes adverse effects to bull and steelhead trout DCH, it does not fully prevent them from occurring. As a result adverse effects on DCH primary physical and biological features can occur to some previously consulted on species and their DCH (e.g. Snake River Spring/Summer Chinook, Steelhead Trout, and Bull Trout) that occur within tributary streams in the HCNRA. Therefore, consultation is being reinitiated on Spring/Summer Chinook and their DCH, and Steelhead and Bull Trout within the HCNRA boundary. The Bliss Rapids Snail, Snake River Fall Chinook, and Snake River Sockeye salmon only occur in the mainstem Imnaha and Snake Rivers. Downstream effects in these areas would be similar to those described in the 2003 consultations. Therefore these species will not be discussed further in this BA for the HCNRA. Conferencing is also being completed on proposed wolverine and candidate species whitebark pine.

Species Included in this Biological Assessment

The list of species and DCH addressed in this BA is found in Table 1. Federal agencies under Section 7 of the ESA are required to consult on all endangered or threatened species when the potential exists that the action alternative may affect the species and/or their DCH. Per a Memorandum of Agreement (2000) on ESA consultation for the Revised Forest Plan, the USFS agreed to conference on proposed and candidate species, so these species are included in this BA. Appendix G contains maps of distribution and DCH for ESA listed aquatic species. Watersheds with ESA listed plant species are described in Table 1. For ease of reading, salmon, steelhead, and bull trout are collectively described as “salmonids.”

Table 1. Species, critical habitat, and essential fish habitat covered in this biological assessment.

Species	Listing Status Listing Date and Reference	Critical Habitat/Essential Fish Habitat Listing Date and Reference	Recovery Plan
Middle-Columbia River Steelhead (<i>Oncorhynchus mykiss</i>)	Threatened 3/25/1999 (64FR 57) 1/5/2006 (71FR 834)	CH Designated 9/2/2005 (70FR 52630)	Final Recovery Plan 11/30/2009
Snake River Steelhead (<i>Oncorhynchus mykiss</i>)	Threatened* 8/18/1998 (62FR 43937) 1/5/2006 (71FR 834)	CH Designated * 9/2/2005 (70FR 52630)	Proposed Recovery Plan 10/27/2016
Snake River Spring/Summer Chinook (<i>Oncorhynchus tshawytscha</i>)	Threatened* 4/22/1992 (57FR 14653) 6/28/2005 (70FR 37160)	CH Designated * 12/28/1993 (58FR 68543) 10/25/1999 (64FR 57399) 6/28/2005 (70 FR 37160)	Proposed Recovery Plan 10/27/2016
Snake River Fall Chinook (<i>Oncorhynchus tshawytscha</i>)	Threatened* 4/22/1992 (57 FR 14653).	CH Designated * 12/28/1993 (58 FR 68543)	Proposed Recovery Plan 11/2/2015 80 FR 67386;
Bull Trout (<i>Salvelinus confluentus</i>)	Threatened* 6/10/1998 (63 FR 31647)	CH Designated* 10/18/2010 (75FR 63698)	Final Recovery Plan 9/28/2015
Chinook Salmon (<i>Oncorhynchus tshawytscha</i>)	--	EFH Designated 12/18/2014 (78FR 75449)	--
Coho Salmon (<i>Oncorhynchus kisutch</i>)	--	EFH Designated 12/18/2014 (78FR 75449)	--
Gray Wolf (<i>Canis Lupus</i>)	Endangered (west of Highway 395 only) 5/5/2011 (76FR 25590)	--	
Spalding's Catchfly (<i>Silene spaldingii</i>)	Threatened 10/10/2001 (66FR 51597)	--	Recovery Plan 9/7/2007
MacFarlane's Four-O'clock (<i>Mirabilis matcfarlanei</i>)	Threatened 3/15/1996 (61FR 10693) (downlisted from 10/26/1979 endangered listing)	--	Recovery Plan 6/30/2000
Whitebark Pine (<i>Pinus albicaulis</i>)	Candidate* 07/19/2011(76FR10166)	--	--
Wolverine (<i>Gulo gulo</i>)	Proposed* 2/04/2013(78FR7864)	--	--

*Species and Designated Critical Habitat also assessed for HCNRA

Species Not Included in this Biological Assessment and No Effect Determination

Federally listed species that are found in or adjacent to the Forests but not affected by revision of the Plans include: yellow-billed cuckoo, and Canada lynx. The following provides our rationale for determining that the Revised Forest Plan will have no effect on these species.

Coho Salmon

During the 1990's an experimental population of coho salmon was planted at Bonifer pond off of Meacham Creek, a tributary to the Umatilla River. The run never established, and efforts have since stopped. There is no known coho occupancy on or adjacent to the Umatilla NF (Jeff Duke, ODFW

personal communication 2017). Additional analysis for populations of non-ESA listed coho salmon are provided in the EFH analysis, below. Management strategies and activities analyzed herein for the Revised Forest Plan for the Blue Mountains national forests would have no effect on these species and will not be discussed further in this analysis.

Canada Lynx

The Canada lynx was listed under the endangered species act as threatened on March 24, 2000 (USDI Fish and Wildlife Service 2000b). The Forest Service and the U.S. Fish and Wildlife Service signed a Canada Lynx Conservation Agreement (LCAS) in 2000 (Ruediger et al. 2000) which committed the Forest Service to using the LCAS in determining effects of projects on the lynx until Forest Plans could be revised to adequately conserve the lynx. This agreement was revised in 2005, and provided for the consideration of the LCAS only in habitats that are currently occupied by lynx. The agreement was further revised on May 12, 2006 (Kimball and King 2006) to define “occupied habitat” and identify national forests currently occupied by lynx. This amendment and the Regional Forester’s letter dated June 20, 2006 (USDA Forest Service and USDI Fish and Wildlife Service 2006) identified the Umatilla, Wallowa-Whitman and Malheur national forests as unoccupied habitat. As unoccupied habitat, the LCAS did not apply to these three national forests, and therefore the LCAS did not anticipate that the Forests would be managed for lynx habitat. The unoccupied determination was based on a lack of verified lynx observations (National Lynx Survey results, Forest and District databases, etc.) and a lack of evidence of lynx reproduction.

Critical habitat designations for Canada lynx were revised in the Final Rule published in the Federal Register on February 25, 2009 (USDI Fish and Wildlife Service 2009a), and became effective on March 27, 2009. Five critical habitat units were identified in the Final Rule: (1) Maine, (2) Minnesota, (3) Northern Rockies, (4) North Cascades, and (5) Greater Yellowstone. Critical habitat for Canada lynx was not designated on the Umatilla, Malheur or Wallowa-Whitman NF.

Snow tracking surveys conducted across the Forests in the mid-1990s and again in 2011 for wolverine, Pacific fisher, American marten, and lynx have failed to identify Canada lynx tracks. Field surveys in 1999, 2000, and 2001 using the National Lynx Detection Protocol (McKelvey et al. 1999) also failed to detect lynx on any of the Forests.

As noted above, the conservation actions identified in the LCAS were to be implemented until Forest Plans were revised. Because the Forests are not occupied by Canada lynx, and no DCH occurs on the Forests, there will be no effect to this species from the Plan and this species will not be assessed further in this BA.

Yellow-billed Cuckoo

The western yellow-billed cuckoo was designated as a distinct population segment by the U.S. Fish and Wildlife Service in 2013 and was Federally listed as a threatened species in 2014 (78 FR 61621). The designation of critical habitat for the western distinct population segment of the yellow-billed cuckoo was published August 15, 2014. No critical habitat was designated in Oregon or Washington.

The western population is migratory and overwinters in South America, and formerly nested across much of the western United States and southern British Columbia (Wiles and Kalasz 2017). Currently, the species no longer breeds in western Canada and the northwestern continental United States (Washington, Oregon, and Montana) (USDI Fish and Wildlife Service 2014a, 2014b).

No known sightings have occurred in the action area. Because this species is not known to occur in the action area, there will be no effect to this species from the Revised Forest Plan, and this species will not be assessed further in this BA.

Species Not Included in this Biological Assessment and Found in the HCNRA

A list of species assessed in the BA for the HCNRA CMP is found in Table 2. These species and their DCH in the CMP area will not be addressed further in this BA. Direct, indirect and cumulative effects to fall Chinook and their DCH in the Imnaha River WSR were considered in the Biological Opinion for the Hells Canyon CMP and the May Affect, Not Likely to Adversely Affect determination for the species and DCH remain within those previously considered in that Opinion and will not be revisited in this BA. Conservation recommendations will be carried forward within the CMP area.

Table 2. Species, critical habitat, and essential fish habitat covered in the HCNRA CMP consultation (2003) that will not be addressed in this consultation

Species	Federal Status	Species Present	Habitat Present
Terrestrial			
Canada lynx (<i>Lynx canadensis</i>)	Threatened	unknown	yes
Gray wolf (<i>Canis lupus</i>)	Endangered	unknown	yes
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	Candidate (Threatened)	no	not likely
Aquatic			
Bliss Rapids snail (<i>Taylorconcha serpenticola</i>)	Threatened	yes	yes
Fall chinook salmon-Snake River (<i>Oncorhynchus tshawytscha</i>)	Threatened	yes	Critical Habitat Designated
Sockeye salmon-Snake River (<i>Oncorhynchus nerka</i>)	Threatened	yes	Critical Habitat Designated
Plants			
Howell's spectacular thelypody (<i>Thelypodium howellii</i> ssp. <i>spectabilis</i>)	Threatened	no	not probable
MacFarlane's four o'clock (<i>Mirabilis macfarlanei</i>)	Threatened	documented	yes
Spalding's catchfly (<i>Silene spaldingii</i>)	Threatened	not documented	probable
Ute ladies' tresses (<i>Spiranthes diluvialis</i>)	Threatened	not documented	probable
Water howellia (<i>Howellia aquatilis</i>)	Threatened	not documented	probable

Framework for this BA

This BA is organized into five major headings or sections, including this introduction section.

Section 2.0 will describe the proposed action (programmatically, the Revised Forest Plan).

Section 3.0 will identify the action area that includes all areas to be affected directly or indirectly by the Revised Forest Plan. The section will include an overview of the ownership pattern within the action area to provide a context for the role of the Forest in the conservation of listed, proposed, and candidate species.

Section 4.0 is the Fisheries Chapter, and will describe the environmental baseline as well as the status of listed species and their DCH. The discussion will include the general life history, distribution, current

status or viability of the species, and physical and biological features of DCH, and will describe the overall limiting factors and threats to recovery of the listed, proposed, and candidate species. It will programmatically assess the potential effects of the Revised Forest Plan to listed, proposed, and candidate aquatic species and their DCH

Section 5.0 will programmatically assess the potential effects of the Revised Forest Plan to listed, proposed, and candidate wildlife and plant species and their DCH. Additionally, the conservation value of the Revised Forest Plan will be addressed by assessing the Plan's contribution to the conservation and recovery of listed, proposed, and candidate species.

Section 6.0 concludes with summaries of effects determination calls to the species and designated critical habitats.

Consultation History

Discussions between NMFS, USFWS and the Forest Services' level 1 and level 2 teams have been ongoing since early 2006 regarding the Plans revision consultation. However, the early meetings with the services teams were more informational and did not necessarily include discussion on specific aspects of the Plans' proposed action. The most recent and substantial level 1 team informal consultation discussions are documented in Table 3. These recent level 1 discussions fulfill the "increased up-front coordination" guidance identified in the Programmatic Consultation MOA (2000). Of special note are the numerous meetings and discussions that have occurred with the level 1 and 2 teams about the contents of the Forests' Aquatic and Riparian Conservation Strategy (ARCS), which comprises the most substantial portion of the Forests' contribution to the conservation and recovery of listed, proposed, and candidate fish species. The Forests have addressed the suggested changes to the ARCS provided by the NMFS and the USFWS, and the ARCS provided herein represents the Forests' substantial contribution (per the USFS' 7(a)(1) responsibilities) to contribute to the conservation of listed species. Additionally, after other conversations, the Forests have addressed other guidance from the USFWS for listed, proposed, and candidate wildlife and plant species.

Table 3. Recent history of Forests' level 1 and level 2 teams' informal consultation and coordination with NMFS and USFWS for the Revised Forest Plan.

Meeting Date	Participating Agencies	Issues Covered/Addressed
December 17, 2015	NMFS & USFWS	LRMP process and timeline, responsibilities, next steps, meeting schedule
January 26, 2016	NMFS & USFWS	Timeline, Plan components, programmatic consultation expectations, next steps
February 11, 2016	NMFS & USFWS	Listed Aquatic DC, Plan components
February 25, 2016	NMFS & USFWS	Plan components, expected timeline for ARCS, listed Aquatic DC, reviewed other DCs
March 7, 2016	NMFS & USFWS	Mixed consultation vs. programmatic consultation, ARCS timeline, DC prioritization, models for ASQ and TSPQ, RMAs
March 15, 2016	USFWS	TE Plant standards and guidelines
March 22, 2016	NMFS & USFWS	CH, key watersheds
March 29, 2016	NMFS	Listed Aquatic DC, reviewed other DCs
April 19, 2016	NMFS & USFWS	ARCS components, PACFISH/INFISH crosswalk, elevation process, timelines
April 26, 2016	NMFS & USFWS	Road density, hydrologically connected roads, RMAs

Meeting Date	Participating Agencies	Issues Covered/Addressed
May 17, 2016	NMFS & USFWS	ARCS components, standards and guidelines, PACFISH/INFISH crosswalk, species list, timelines
June 1, 2016	NMFS & USFWS	Proposed action overview, ARCS crosswalk, expectations for level of detail in Plan-level consultation, timeline
July 6, 2016	NMFS & USFWS	ARCS crosswalk, aquatic species viability, species covered in BA
July 18, 2016	NMFS & USFWS	ARCS, listed species DC
July 27, 2016	NMFS & USFWS	DC prioritization. Listed species DC, Key Watersheds, WAS, Grazing, protection of ESA species
August 4, 2016	NMFS & USFWS	Listed species DC, Key Watersheds, DCs, management focus, WAS
August 26, 2016	NMFS & USFWS	Progress on addressing Service comments, Plan-level consultation and anticipated outcomes, process concerns raised by Level 1
September 12, 2016	NMFS & USFWS	Transition language, GM-3, MSRA, WM-1, Attachment B, WAS, Implementation Plan
September 14, 2016	NMFS & USFWS	Progress on addressing Service comments
September 27, 2016	NMFS & USFWS	Transition language, GM-3, MSRA, WM-1, Attachment B, WAS, Implementation Plan, timeline
September 29, 2016	NMFS & USFWS	WM-1, Attachment B, Natural range of variability
November 14, 2016	NMFS & USFWS	Elevation process to Level 2 for unresolved issues, ARCS, timeline for final documents
November 28, 2016	Communication from NMFS	Confirmation of elevated issues resolution, expectations for next Level 1 meeting
December 21, 2016	Documents transmitted to NMFS & USFWS	Blues ARCS with summaries of how Services' comments were addressed, Attachment B, PAC/INFISH Crosswalk with Blues Plan
February 8, 2017	NMFS & USFWS	Discuss NMFS and USFWS responses to how USFS addressed Services' comments on ARCS, identification of remaining issues, draft Proposed Action, timeframes and drafting the Biological Assessment
February 15, 2017	NMFS & USFWS	Level 2 discussion on process to draft BA, providing key watersheds maps, ensuring BA's analysis has a clear ARCS components, important standards and guidelines, step-down process on how S&Gs applies at project scale, Attachment B, and concerns with GM-3
March 7, 2017	NMFS & USFWS	Level 2 discussion of BA status, changes to Attachment B, development of an implementation strategy when consultation completed, needing a better understanding of short-term adverse effects that are allowed by Plan
March 22, 2017	NMFS & USFWS	Level 2 reached agreement on Attachment B and retard attainment language in Plan, reviewed items that should be in implementation Plan, GM-3 in relation to 4-6 inches stubble height when late serial conditions occur, and how to include HCNRA CMP in consultation.
March 30, 2017	NMFS & USFWS	Level 2 discussion on Framework versus mixed programmatic consultation, status of BA
June 21, 2017	NMFS & USFWS	Level 1 - USFS gave NMFS and USFWS the Draft of the BA, reviewed format and discussed future timelines.

Meeting Date	Participating Agencies	Issues Covered/Addressed
August 9, 2017	NMFS &USFWS	Level 1, 2 discussed comments from NMFS and USFWS to the Draft BA

Table 4. Consultation history

Administrative Unit	Amendment/ Consultation	Consultation Date	Species Addressed
Wallowa-Whitman, Umatilla national forests	LRMP Amendment Salmon Biological Opinion (BO)	3/1/95	Spring/summer Chinook, Fall Chinook
Wallowa-Whitman, Malheur national forests	Inland Native Fish Strategy (INFISH)	6/16/95	Bull Trout
Wallowa-Whitman, Malheur, and Umatilla national forests	PACFISH NMFS BO NMFS Amendment of 1995 BO	1/23/95 10/08/96	SNAKE RIVER Spring/summer Chinook, Fall Chinook, Snake River Sockeye Salmon
Wallowa-Whitman, Umatilla national forests	LRMP Amendment Steelhead BO	6/22/98	SNAKE RIVER Steelhead, Spring/summer Chinook, Fall Chinook
Wallowa-Whitman, Malheur, and Umatilla national forests	LRMP Amendment Bull Trout BO	8/14/98	Bull Trout
Wallowa-Whitman National Forest	HCNRA CMP	4/16/2003 5/28/2003	SNAKE RIVER Spring/summer Chinook and Fall Chinook, SNAKE RIVER steelhead, SNAKE RIVER Sockeye Salmon, bull trout, Bliss Rapids Snail, McFarlane's four o'clock, Spaulding's catchfly, grey wolf, yellow bill cuckoo, Canada lynx, thelopody, Ute's ladies tresses, water howelli
Malheur, Wallowa-Whitman, Umatilla national forests	Invasive Plants, R6 - BO	2005	McFarlane's four o'clock, Spaulding's catchfly
Malheur, Umatilla national forests	Gray Wolf, Programmatic Informal Consultation LOC	2/26/2017	Gray Wolf

A common theme throughout the past programmatic consultations beginning with the advent of PACFISH was the recognition that a long term, ecosystem-based aquatic restoration strategy was needed. Previous Biological Opinion (BOs) reached a conclusion of “no jeopardy” in large part because of the anticipation that such a strategy would be forthcoming in new landscape-level projects (i.e., ICBEMP), or Forest level plans. Each round of consultation added elements intended to supplement PACFISH and INFISH as it continued to be extended, address deficiencies due to it being extended, and identify areas needing special management consideration.

The outcome of all of the past programmatic consultation plays a role in the Revised Forest Plan. The Revised Forest Plan does not repeat verbatim PACFISH, INFISH, nor the direction in the BOs, but should

demonstrate that management actions on National Forest System (NFS) lands carried out within the framework of the Revised Forest Plan, meets the intent of this previous direction. Interagency regional executives determined the Revised Forest Plan direction would replace current direction contained in PACFISH, INFISH, and the BOs for salmon, steelhead and bull trout. The Regional executives also agreed that the long-term ACS (Blues ARCS) developed through the revised Malheur, Umatilla, and Wallowa-Whitman Forest Plans would be sufficient to replace the previous interim strategies and consultations (USDA Forest Service, USDC NMFS, and USDI Fish and Wildlife Service 2002).

The Proposed Action

Description of the Plan

The Revised Forest Plan Final Environmental Impact Statement is incorporated by reference herein as the Proposed Action. The Revised Forest Plan directs how projects and activities will be implemented in the future for the land and resource programs managed by the Blue Mountains Forests. Direction for managing National Forest System lands comes from a variety of sources, including the Code of Federal Regulations and the Forest Service Directive System, which consists of Forest Service Manuals and the Forest Service Handbooks. Laws, regulations, and other agency policies and directives are generally not repeated in Forest Plans. For example, threatened and endangered species have very specific direction in law, regulation, policy, agency directives, and other sources, such as recovery plans. Therefore, standards and guidelines for threatened and endangered species that specifically rearticulate endangered species law, regulation, policy, agency directives, and recovery plans are not generally provided in the Forest Plans. However, based on substantial coordination with the level 1 and level 2 team members from USFWS and NMFS, certain endangered species conservation actions were identified and have been incorporated within the Revised Forest Plan. It is important to note that, if a particular endangered species recovery action is not addressed specifically in the Revised Forest Plan, it does not mean the Forests will not contribute to those individual recovery actions, where appropriate, during the life of the Revised Forest Plan.

The HCNRA CMP will be rolled over into the Revised Forest Plan, as applicable to Wallowa –Whitman NF, as will existing PACFISH, INFISH, and Eastside Screens direction. Consultation to update the CMP consultation record will include designated critical habitat for bull trout and Snake River steelhead, as well as proposed wolverine, and candidate whitebark pine. We are also updating our past determination for effects to bull trout, Snake River spring/summer Chinook and Snake River steelhead to ensure consistency with the new effects determination for their Designated Critical Habitat.

Below are brief descriptions of the Revised Forest Plan’s organization and contents. Plan components (desired conditions, standards, guidelines, and objectives) most applicable to the conservation and recovery of listed, proposed, and candidate species and their critical habitats, or that have most importance in the planning and design of future resource management activities and projects that may affect listed, proposed, and candidate species and their critical habitats, are identified below. The description is a summary of the most relevant Plan content, but is not exhaustive. Additional Plan elements may pertain. The reader is referred to the entire Plan which is hereby incorporated by reference, for full content that may be relevant to this consultation. The key plan components addressing individual species or groups of species (e.g., fish) are provided in different subsections. Note that, because the 1982 Planning Rule did not provide definitions of desired conditions, standards, guidelines, and objectives, we have therefore chosen for this BA to follow the definitions of desired conditions, standards, guidelines, and objectives as defined in the 2012 Planning Rule (36 CFR 219.7(e)).

Many additional plan components that may indirectly benefit listed, proposed, and candidate species are included in the Revised Forest Plan (e.g., direction to address aquatic and terrestrial invasive species, timber harvest, and silviculture direction). These plan components will be discussed, as appropriate, for listed, proposed, and candidate species and critical habitat in the Effects Analysis section of the BA.

As noted above, the Revised Forest Plan includes plan components that will guide design of future resource management projects and activities during the life of the Revised Forest Plan. These plan components are desired conditions, objectives, standards and guidelines, and suitability.

Desired Conditions

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

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

Future project documentation will explain how a project is consistent with desired conditions and describe any short-term or negligible long-term adverse effects the project may have concerning the maintenance or attainment of any desired condition. This inclusion of desired conditions for the Forests fulfills the requirement of section 36 CFR 219.11(b) of the 1982 Planning Rule.

Objectives

Objectives are concise, measurable, and time-specific statements of a desired rate of progress toward a desired condition or conditions. Objectives are the means of measuring progress toward achieving or maintaining desired conditions. The objectives represent just some of the expected outcomes or actions required to accomplish movement toward desired conditions. The objectives section provides a description of the potential outcomes or results that may be expected to be provided during the planning period, as required in 36 CFR 219.11 (b) of the 1982 Planning Rule.

Variation in achieving objectives may occur during the life of the Revised Forest Plan because of changes in environmental conditions, available budgets, and other factors. Objectives are strongly influenced by recent trends, past experiences, anticipated staffing levels, and short-term budgets.

A project or activity is consistent with the objectives of the Revised Forest Plan if it contributes to or does not prevent the attainment of any applicable objectives. The project documentation will identify any applicable objective(s) to which the project contributes and document that the project does not prevent the attainment of any objectives. If there are no applicable objectives, the project must be consistent with the objectives of the Revised Forest Plan, and the project document will state that fact.

Standards

Standards are mandatory constraints upon project and activity decision making. Standards are established to help achieve or maintain the desired condition or conditions and objectives, and to ensure project activities on National Forest System (NFS) lands comply with applicable laws, regulations, Executive orders, and agency directives, and to avoid or mitigate undesirable effects.

A project or activity must be consistent with all standards applicable to the type of project or activity and its location in the planning area. A project or activity is consistent with a standard when its design is in exact accord with the standard; variance from a standard is not allowed except by Forest Plan amendment.

Guidelines

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

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

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

When a project varies from the exact words of the guideline, the project documentation must specifically explain how the project design is as effective in contributing to the maintenance or attainment of relevant desired conditions and objectives.

Management Areas

Management areas are spatially distinct areas with a unique set of plan components. The management areas range along a continuum from little development by humans (e.g., MA 1A) to extensive human development (e.g., MA 6).

Special Areas

Special areas are lands that have designations by Congress or another delegated authority. Special areas are designated because of their unique or special characteristics. Special area establishment may occur at the national level either through legislation (Congressional designation) or at the regional or local level through administrative action (administrative designation). A Forest Plan may recommend the establishment of new special areas. This Revised Forest Plan provides direction for the following special areas: scenic byways and All-American roads, national designated trails, eligible and suitable wild and scenic rivers, scenic areas, botanical areas, geological areas, historical areas, experimental forests and rangelands, research natural areas, and recommended and designated wilderness and wilderness study areas.

Where the Revised Forest Plan provides direction specific to a special area, a project or activity must be consistent with those area-specific decisions. The project documentation should describe how the project or activity is consistent with the area-specific decisions of the Revised Forest Plan.

Suitability of Areas

Suitability describes the appropriateness of applying certain resource management practices (uses) to a particular area of land. An area may be identified as suitable for uses that are compatible with desired conditions and objectives for that area. An area may be suitable for a variety of individual or combined uses.

A project with the purpose of timber production may only occur in an area identified as suitable for timber production (16 U.S.C. 1604(k)). The documentation for the project should confirm the project area meets the suitability requirements.

Except for projects with a purpose of timber production, a project or activity can be consistent with Revised Forest Plan suitability determinations in either of two ways:

- The project or activity is a use identified in the Revised Forest Plan as suitable for the location where the project or activity is to occur; or
- The project or activity is not a use identified in the Revised Forest Plan as suitable for the location (i.e., the Forest Plan is silent on the use or the Forest Plan identifies the use as not suitable), but the responsible official determines that the use is appropriate for that location's desired conditions and objectives.

Plan Components

Goals and Desired Conditions

Goal statements set forth a broad framework and theme for the Revised Forest Plan and form the basis for desired conditions. For each goal, there are several desired condition statements which more specifically describe what conditions are needed for attaining goals. Desired conditions are at the heart of Forest Plans. They describe the visions of what the planning area (or portions thereof) should look like in the future. Desired conditions essentially set forth the desired landscape of the future. They also provide the foundation and drive the development of most other Forest Plan components. For example, the Revised Forest Plan includes objectives, standards, and guidelines that are designed to achieve or maintain desired conditions.

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

The project documentation should explain how the project is consistent with desired conditions and describe any short-term or negligible long-term adverse effects the project may have on the maintenance or attainment of any desired condition.

Achieving desired conditions will vary in both time and space. Some desired conditions may be achievable over a long timeframe (in some cases, several hundred years); whereas, in other cases the desired condition already matches the current condition, and the desire is to maintain it. In addition, each desired condition

has a scale. Some desired conditions apply at the Forest-wide scale, while others apply at a subbasin, watershed, subwatershed, or management area scales.

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

Where a project or activity is proposed that is not consistent with the Revised Forest Plan, the responsible official has the following options:

1. Modify the proposal so that the project or activity will be consistent
2. Reject the proposal

The following desired conditions identify the Forests' broad statements of support for conservation and recovery of listed, proposed and candidate species and their critical habitats. These Forest-wide desired conditions pertain to all of the Forests. Additional desired conditions are provided for individual management areas (section 2.3).

Forest-Wide Desired Conditions for Listed, Proposed, and Candidate Species and Their Critical Habitats

The broad Forest-wide desired conditions pertaining to listed species, fish, wildlife and Plants are described below. These will be implemented on the three national forests.

Federally Listed and Sensitive Species

Desired Condition (Unnumbered)

Federally listed species (aquatic and terrestrial) trend towards recovery or are delisted. Management activities improve the conservation status of listed species and designated critical habitat. Habitats are managed in accordance with conservation planning documents, recovery plans, best available scientific information, and local knowledge. Critical habitat components (i.e., physical and biological features) are protected and restored to achieve species recovery.

Aquatic

For listed aquatic species on NFS lands, spawning, rearing, and migratory habitat is widely available and inhabited. Listed aquatic species have access to historical habitat and appropriate life history strategies (i.e., resident, fluvial, adfluvial, and anadromous) are supported. Recovery is promoted through cooperation and coordination with Tribal, State, and Federal agencies, and other interested groups.

Terrestrial Wildlife

For listed terrestrial species, habitat that adequately provides ample resources for all life stages is available and inhabited. Recovery is promoted through cooperation and coordination with Tribal, State, and Federal agencies, and other interested groups.

Plants

For listed plant species, threats such as invasions by aggressive nonnative plants, adverse livestock grazing management, and changes in fire frequency and seasonality are addressed. Populations achieve recovery through cooperation and coordination with Tribal, State, and Federal agencies, and other interested groups.

Scale

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

Other Forest-Wide Desired Conditions that Benefit Listed, Proposed, and Candidate Species and Their Critical Habitats

The following Forest-wide desired conditions will benefit the conservation of listed, proposed, and candidate species and their critical habitats. These desired conditions apply at larger (e.g., watershed) scales, not at particular sites. The national hydrologic unit (HU) is the basis for defining the specific scales at which the general Forest-wide desired conditions apply. The three watershed scales most relevant to implementation of the Revised Forest Plan are: subbasin (8-digit HU), watershed (10-digit HU), and subwatershed (12-digit HU). Individual project assessments often use data collected at finer scales such as the subwatershed, drainage, valley segment, site, stream reach, or scale.

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

All Watersheds

Desired Condition: Watershed Function DC-1

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

Desired Condition: Watershed Function DC-2

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

Desired Condition: Watershed Function DC-3

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

Desired Condition: Watershed Function DC-4

Aquatic and riparian ecosystems resilient to the effects of climate change and other major disturbances. Scale: subbasin for Forest planning and watershed scale for project planning.

Hydrologic Function

Desired Condition: Hydrologic Function DC-1

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

Desired Condition: Hydrologic Function DC-1

The timing, duration, and variability of floodplain inundation, water table elevation in wetlands, seeps, springs, and subsurface water connectivity are within the natural range of variability. Scale: subwatershed to watershed.

Wetland Function and Groundwater-dependent Ecosystem Function

Desired Condition: Wetland DC-1

The extent and diversity of wetland types is maintained or increased. Scale: subbasin.

Desired Condition: Wetland DC-2

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

Desired Condition: Ground-Water Dependent Ecosystem DC-1

The ecological structure and function of springs, peatlands, and groundwater fed wetlands are maintained or restored. Scale: subwatershed.

Desired Condition: Ground-Water Dependent Ecosystem DC-2

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

Desired Condition: Ground-Water Dependent Ecosystem DC-3

Vegetation is composed of the anticipated cover of plant species associated with the site environment; hydric species are present and are not replaced by upland species. Livestock herbivory and trampling are not adversely affecting sites. Scale: subwatershed.

Stream Channel Function

Desired Condition: Stream Channel Function DC-1

The sediment regime under which aquatic ecosystems evolved is maintained, including the timing, volume, rate and character of input, storage, and transport. Scale: watershed.

Desired Condition: Stream Channel Function DC-2

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

Desired Condition: Stream Channel Function DC-3

Channel morphology, structure, complexity, and diversity are in ranges that are characteristic of the local geology, climate, and geologic processes. Scale: watershed.

Desired Condition: Stream Channel Function DC-4

Channel-floodplain connections are intact. Channel bed and bank erosion rates are within natural ranges and do not result in degraded aquatic, riparian habitats or channel alteration. Scale: subwatershed to subbasin.

Desired Condition: Stream Channel Function DC-5

Measures of channel stability and morphology, including width-to-depth ratio, bank stability, and bank angle are within reference ranges and match the frequency distribution of reference sites for a given channel type and channel size. Scale: subwatershed to subbasin.

Desired Condition: Stream Channel Function DC-6

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

Desired Condition: Stream Channel Function DC-7

In forested watersheds, the distribution and frequency of wood forced channel morphology (forced step pool and forced pool riffle streams), in which the majority of pools are formed by individual pieces or accumulations of large wood, and wood-rich pool riffle streams (Montgomery and Dietrich 1995) is comparable to the distribution in reference watersheds. Scale: watershed.

Desired Condition: Stream Channel Function DC-8

The frequency distribution of stream channel and habitat conditions for any given attribute approaches the frequency distribution of reference conditions for the same attribute in similar channel types. Scale: watershed to subbasin.

Desired Condition: Stream Channel Function DC-9

Pool frequency, size, depth, and volume are within ranges expected of given channel and valley types. Scale: subwatershed to watershed.

Desired Condition: Stream Channel Function DC-10

Bank erosion is within a range that does not degrade aquatic or riparian habitats or that leads to channel alteration. Scale: subwatershed to subbasin.

Aquatic Habitat Function

Desired Condition: Aquatic Function DC-1

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

Desired Condition: Aquatic Function DC-2

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

Desired Condition: Aquatic Function DC-3

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

Desired Condition: Aquatic Function DC-4

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

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

Scale: subwatershed to subbasin.

Desired Condition: Aquatic Function DC-5

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

Desired Condition: Aquatic Function DC-6

The potential for large wood recruitment to streams from within forested riparian areas, and from low-order streams to higher-order streams, is similar to the potential in reference watersheds containing the same (riparian) forest vegetation types. Scale: watershed.

Desired Condition: Aquatic Function DC-7

Aquatic habitats in which the distribution of conditions (e.g., bank stability; substrate size; pool depths, size, and frequencies; channel morphology; and large woody debris size and frequency) in the population of watersheds on the Forests are similar to the distribution of conditions in the population of similar, reference watersheds. The distribution of conditions in individual streams varies depending on valley, riparian, and channel characteristics. Scale: reference conditions can be drawn from the Forest(s) or Provincial scales. Conditions assessed at the subbasin scale for Forest planning and watershed scale for project planning.

Desired Condition: Aquatic Function DC-8

Aquatic and riparian ecosystems are resilient to the effects of climate change and other major disturbances. Scale: subbasin scale for Forest planning and watershed scale for project planning.

Species Diversity

Desired Condition – Biodiversity: Species Diversity DC-1

The natural range of habitats for native and desired nonnative fish, wildlife, and native plant species, including threatened and endangered species, species identified on the Regional Forester's sensitive species list, and surrogate species, is of adequate quality, distribution, and abundance to contribute toward maintaining native and desired nonnative species diversity. This includes the ability of species and individuals to interact, disperse, and find security within habitats in the planning area. These habitat conditions are resilient and sustainable considering the range of possible climate change scenarios.

Desired Condition – Fish Surrogate Species: Species Diversity DC-2

Population strongholds for the fish surrogate species provide high quality habitat and support expansion and recolonization of species to adjacent unoccupied habitats. These areas conserve key demographic processes likely to influence the sustainability of aquatic species.

Desired Condition – Fish: Species Diversity DC-3

An abundant food base for fish, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish exist. Low levels of occurrence of nonnative predatory, interbreeding, or competing species exist, and if present, they are temporally and spatially isolated from federally listed species.

Desired Condition – Special Habitats: Species Diversity DC-4

Specialized habitat components, such as caves, standing dead trees, seeps, and springs, are found across the landscape in amounts and types commensurate with the natural communities in which they occur.

Desired Condition – Conservation Status: Species Diversity DC-5

Management activities improve the conservation status of species identified as being surrogate species or of local or regional conservation concern. Habitats and populations are managed in accordance with

conservation planning documents, recovery plans, best available scientific information, and local knowledge.

Desired Condition – Terrestrial Surrogate Species (unnumbered)

Risk factors (e.g., roads, uncharacteristic wildfire, unregulated livestock use, introduced species, invasive species, etc.) for all surrogate species are reduced to contribute to the viability of surrogate species.

Desired Condition – Sage Grouse (unnumbered)

Management activities will maintain or improve greater sage-grouse priority habitat management areas and general habitat management areas.

Scale for all the above Desired Conditions

Federally listed species trend towards recovery or are delisted. The desired condition for species diversity can be applied at a variety of scales (i.e., national forest, watershed, and subwatershed). During project analysis and implementation, this desired condition should be used concurrently with information outlined in the strategy and design criteria part of this Forest Plan and with consideration of the best available climate change projections.

Invasive Species

Desired Condition: Invasive Species DC-1

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

Water Use

Desired Condition: Water Use DC-1

Water is available in sufficient quantity and quality, within and downstream of the Forests, to meet human needs (including management actions) as well as the needs of aquatic species considering the range of possible climate change scenarios. Scale: watershed to subbasin.

Desired Condition: Water Use DC-2

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

Water Quality

Desired Condition: Water Quality DC-1

Water quality (e.g., temperature, turbidity, and dissolved oxygen) of surface and groundwater is sufficient to support healthy riparian, aquatic, and wetland ecosystems. It is within the range that maintains the biological, physical, and chemical integrity of the system and benefits the survival, growth, reproduction, and mobility of individuals composing aquatic and riparian communities.

Desired Condition: Water Quality DC-2

The quality of water emanating from the Forests is sufficient to provide for state-designated beneficial uses, including human uses.

Water quality in streams within the Forests is sufficient to meet applicable state, local, and tribal water quality criteria. Scale: Forest-wide.

Riparian Function

Desired Condition: Riparian Management Area DC-1

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

Desired Condition: Riparian Management Area DC-2

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

Desired Condition: Riparian Management Area DC-3

Key riparian processes and conditions (including slope stability and associated vegetative root strength, bank stability, wood delivery to streams, and within the riparian management areas, input of leafy and organic matter to aquatic and terrestrial systems, solar shading, microclimate, and water quality) are operating consistent with local disturbance regimes. Scale: subwatershed.

Desired Condition: Riparian Management Area DC-4

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

Desired Condition: Riparian Management Area DC-5

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

Desired Condition: Riparian Management Area DC-6

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

Desired Condition: Riparian Management Area DC-7

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

Whitebark Pine

Desired Condition (unnumbered)

The distribution and abundance of whitebark pine structural stages, age classes and density classes are consistent with their natural range of variability. Whitebark pine habitats are ecologically resilient, sustainable, and compatible with natural disturbance processes. Whitebark populations and the threats to those populations exist at levels that do not warrant protection under the Endangered Species Act. Whitebark pine is unaffected by invasive pests or diseases.

Rocky Mountain Elk

Desired Condition (unnumbered)

The desired conditions for Watershed Function (Section 2.2.4) and Species Diversity (Section 2.2.9) provide sustainable and resilient habitat for elk throughout their seasonal ranges. Elk habitat is spatially and temporally diverse and provides a mosaic of forage, hiding cover, and security areas across the landscape. The landscape pattern of these attributes provide elk habitat that contributes to improved distribution, abundance, and social acceptability of elk on National Forest System lands.

Hiding cover is available and enhances elk security. Hiding cover and forage patches are distributed to provide adequate biomass and quality forage such that elk remain on National Forest System (NFS) lands to provide year-round recreational and cultural opportunities and minimize damage to crops and pastures on private lands. Browse and herbaceous plants are available to elk as forage to maintain body condition or animal performance, per the animal's seasonal requirements (e.g., lactation, overwinter survival, etc.). The pattern and amount of forage and cover may vary depending on site potential and potential vegetation group desired conditions.

Consistent with other desired conditions and management area direction, 30-100 percent of a subwatershed provides effective security for elk as defined by Hillis (1991). Lands that provide elk security are distributed across all seasonal ranges providing safety when disturbance in their usual range

is intensified by motorized use and other human activities. Larger landscapes that provide elk security exist in appropriate spatial distribution and are connected or are nearby other smaller areas of elk security to allow for seasonal movement of elk across their range and to retain elk on NFS lands at all times of the year.

Elk are broadly distributed on spring/summer/fall habitat generally from April through November. Elk habitat provides a balanced juxtaposition of adequate nutritional resources for elk during summer and winter, minimizing human disturbance effects year-round, and providing sufficient vegetative cover (Rowland et al. 2000, Long et al. 2008, Toweill and Thomas 2002). Effective elk security (minimal or no motorized use) within flat, high visibility landscapes encourages elk to remain on public lands. In steeper lands with increased topographic relief and/or vegetative cover, effective elk security encourages elk to remain on public lands. Effective security allows elk to utilize available forage and cover during calving season in the spring.

Winter ranges typically exist at lower elevations on smaller portions of the landscape. Elk use winter habitat generally from December through March and often into mid-April. Effective elk security within winter ranges helps maintain body condition and encourages elk to remain on public lands.

Damage to crops and fences on neighboring private lands decrease with improved seasonal distribution of elk on National Forest System lands. Elk populations are distributed across seasonal habitats to fulfil their ecological roles and contribute to societal goals for recreation, and are available to tribal hunters exercising their tribal hunting rights.

Roads and Trails

Desired Condition (Unnumbered)

Road systems are safe and responsive to public needs and desires, are affordable and effectively managed, have minimal effect on aquatic and terrestrial systems, and are in balance with available funding. Administrative use supports USFS management objectives.

Roads needed for the long-term are identified and investments are made to minimize negative impacts on the ecosystem. Roads identified for long-term use, but not currently funded for adequate maintenance are put in a stored condition, where they remain on the system but are not actively used. Access requirements anticipated in the future are met by using travel analysis reports to inform travel management decisions.

A system of roads, trails, and areas for non-motorized and motor vehicle use is identified and available for public use. Motor vehicle use occurs only on approved and designated roads, trails, and areas open to motor vehicle use are in compliance with Travel Management Rule (36 CFR 212). Trails for motor vehicle use provide a variety of recreational experiences, including various difficulty levels and trail lengths, access to scenic areas, and routes through assorted ecosystems, while minimizing impacts to natural resources and user conflicts. Loop trails and trailhead developments meet the needs of increased recreation use. Snowmobile use is managed to provide varying challenges and distances while respecting ecological systems and other users.

Opportunities for trails where motor vehicle use is prohibited are emphasized in backcountry, recommended wilderness, and wilderness areas, and provide a range of difficulty for a variety of recreational experiences, including mechanized transportation (bicycles - except in wilderness areas), foot travel, and pack or riding stock. Trails are located to provide experiences in different ecosystem types and scenic settings and do not contribute to natural resource damage.

Rights-of-way and easements provide adequate and legal access to NFS lands. Cooperative road agreements with States and counties are utilized to provide a seamless public road system to access private, state, and public lands. Jurisdiction of county, state, and local access roads is appropriate to ensure management objectives are met for both private and state lands.

Where feasible, Forest Service recreation sites are connected to each other and to adjacent communities through pathways, trails, bike lanes, and waterways providing opportunities for both motorized and/or non-motorized modes of travel, and providing for loop-riding opportunities.

The need for tribal access to traditional sites is acknowledged and supported.

Objectives

The objectives represent some of the expected outcomes for the Forests to maintain or make progress towards the desired conditions, above. Those objectives that support the conservation and recovery of listed, proposed, and candidate species and their critical habitats are provided in Table 5 below.

Objectives are projections of Forest Service activities and program outcomes that are measurable and time specific. Like goals and desired conditions, objectives are not commitments or final decisions approving projects or activities. They are an effort by the Forest Service to share with the public the way progress toward achieving or maintaining the desired conditions during the life of the Revised Forest Plan will be measured. The objectives stated are only a partial list of the management activities expected to be accomplished to contribute to maintaining or achieving desired conditions.

Objectives are based on ecological needs, community capacity, and expected funding, including budgets, partnerships, and cooperative agreements. The actual accomplishments will be dependent on actual funding, staffing levels, and local infrastructure. The objectives are not intended to limit or guarantee the amount of work that will be accomplished. More work may be accomplished if additional infrastructure or funding, such as increased budget allocations, partnerships, or other external sources, becomes available. Less work could occur if funding is less than expected, additional infrastructure is not constructed, or existing infrastructure declines and becomes unusable.

Objectives are expected to be accomplished during the first decade of the Revised Forest Plan period, unless otherwise indicated within the objective statement. Objectives for 1.1 Watershed Function are identified for priority watersheds.

Table 5. Plan objectives for listed, proposed, and candidate species and their critical habitats

Objective	Malheur	Umatilla	Wallowa-Whitman
1.1 Watershed Function			
Increase the number of watersheds in condition class 1 (from CC2) and 2 (from CC3) through active restoration. Measure: number of subwatersheds (HUC6) with improved condition class.	16 subwatersheds	14 subwatersheds	24 subwatersheds
Improve hydrologic function by: Improving forest vegetative conditions (acres)	5,500 acres (annually)	3,200 acres (annually)	5,000 acres (annually)

Objective	Malheur	Umatilla	Wallowa-Whitman
Improving soil hydrologic function in areas of detrimental soil disturbance (acres)	600 acres	750 acres	950 acres
Reducing road-related sedimentation and reducing hydrologic connectivity of the road system by: considering designating routes for other uses, or closing or decommissioning roads where open motor vehicle routes are negatively affecting riparian conditions.	30-35 miles road surface treated (annually)	30-35 miles road surface treated (annually)	30-35 miles road surface treated (annually)
Improve riparian and wetland function by: Restoring floodplain connections, channel morphology, channel structure, and flow regime (flood flows and low flows) (stream miles)	80 miles	90 miles	90 miles
Restoring riparian/wetland species composition (riparian acres) by increasing natural seedling establishment, Planting, fencing, or modifying riparian management (riparian acres)	300 acres	165 acres	225 acres
Increasing effective stream shade (WQ objective 1) by increasing amount and extent of woody riparian species and increasing age-class structure of terrestrial vegetation in MA 4 (stream miles)	450 miles	225 miles	375 miles
Improve riparian and wetland function by: Increasing extent and vegetative species diversity of off-channel and isolated wetlands by restoring hydrologic pathways, modifying existing water diversions, or fencing (number of sites)	30 sites	40 sites	40 sites
Increasing the number and extent of beaver-created wetlands (sites)	12 sites	10 sites	12 sites

Objective	Malheur	Umatilla	Wallowa-Whitman
Improve stream channel and aquatic habitat function by: Improving riparian habitat conditions (riparian acres)	600 acres (annually)	525 acres (annually)	675 acres (annually)
Restoring channel morphology to reflect natural conditions (miles)	38 miles	45 miles	60 miles
Increasing habitat complexity through channel reconstruction, placement of large wood or other structures, habitat enhancement (miles)	75 miles	90 miles	113 miles
Increasing aquatic habitat connectivity through culvert replacement (number of culverts)	90 culverts, 143 stream miles	75 culverts, 68 stream miles	90 culverts, 135 stream miles
1.2 Species Diversity			
In cooperation with state wildlife agencies, expand bull trout occurrence within 10 years into unoccupied suitable stream segments within its natural range.	1 segment	1 segment	1 segment
Increase the amount and quality of source habitat (open, OFSS in the dry upland forest PVG) for white headed woodpecker (per decade).	64,000 acres	12,000 acres	11,000 acres
Increase the amount and quality of source habitat (open canopy dry/moist upland forest PVG) for western bluebird and Cassin's finch (per decade).	49,000 acres (finch)	78,000 acres (bluebird)	66,000 acres (bluebird), 12,000 acres (finch)
Restore habitat quality and connectivity within and between stronghold watersheds for aquatic species, with emphasis on strongholds for ESA-listed aquatic species.	4-6 subwatersheds or 80-120 stream miles	3-5 subwatersheds or 60-100 stream miles	6-9 subwatersheds or 120-180 stream miles
Reduce juniper canopy cover to less than 10 percent in sagebrush steppe habitat mahogany, meadows, springs, seeps, riparian.	800 acres	-	-

Objective	Malheur	Umatilla	Wallowa-Whitman
Reduce sagebrush density to less than 10 percent canopy cover in sagebrush steppe habitats where sagebrush canopy cover is greater than 25 percent.	700 acres	-	-
Develop and implement habitat management Plans for Spalding's catchfly key conservation areas.	-	Lick Creek key conservation area (also called Blue Mtn. Foothills)	Lower Imnaha, Crow Creek, and Clear Lake Ridge key conservation areas
In nesting habitat, retrofit existing tall structures (e.g., power poles, communication tower sites) with perch deterrents or other anti-perching devices within 2 years of signing the ROD.	All tall structures.	-	-
1.5 Invasive Species			
Reduce current infestations of invasive Plant species.	1,500 acres	7,000 acres	7,000 acres
1.7 Plant Species Composition			
Over the next ten years, reduce the proportion of shade tolerant species within in the dry upland forest PVG.	237,000 acres	123,000 acres	154,000 acres
Manage rangeland vegetation to improve phases C and D to phase A or B.	20,560 acres	8,790 acres	12,405 acres
1.10 Soil Quality			
Implement erosion control and stabilization measures on unstable hillslopes. Possible activities include road realignment and improving forest vegetation conditions.	200-400 acres	200-400 acres	150-250 acres
Restore soil function (also see objectives for 1.1 Watershed Function).	175-350 acres	175-350 acres	75-150 acres
1.11 Water Quality			
Improve water quality through implementation of water quality restoration Plans.	4-6 watersheds, 160-240 stream miles	5-7 watersheds, 200-280 stream miles	5-7 watersheds, 200-280 stream miles
2.3.1 Rocky Mountain Elk			
Increase instances of elk occupancy and use of NFS lands by: moving towards vegetative desired conditions and objectives to promote a mosaic patchwork of hiding cover and forage; and	Within 7 years of Plan approval, improve elk security to within Desired Condition range (30-100%) throughout 50% of the priority subwatershed.	Within 7 years of Plan approval, improve elk security to within Desired Condition range (30-100%) throughout 50% of the priority subwatershed.	Within 7 years of Plan approval, improve elk security to within Desired Condition range (30-100%) throughout 50% of the priority subwatershed.

Objective	Malheur	Umatilla	Wallowa-Whitman
providing a continuum of effective elk security in strategic locations. See objectives for vegetation (1.1, 1.4-1.8, and 1.12). See objectives for 2.7.	Within 15 years of Plan approval, improve elk security to within Desired Condition range (30-100%) throughout 100% of the priority subwatershed. Within the life of the Plan, improve elk security to within Desired Condition range (30-100%) throughout 50% of General Forest MA – 4A	Within 15 years of Plan approval, improve elk security to within Desired Condition range (30-100%) throughout 100% of the priority subwatershed. Within the life of the Plan, improve elk security to within Desired Condition range (30-100%) throughout 50% of General Forest MA – 4A	Within 15 years of Plan approval, improve elk security to within Desired Condition range (30-100%) throughout 100% of the priority subwatershed. Within the life of the Plan, improve elk security to within Desired Condition range (30-100%) throughout 50% of General Forest MA – 4A

Standards and Guidelines

The following standards and guidelines were designed to conserve and recover listed, proposed, and candidate species and their critical habitats on the Forests, and be applied Forest-wide. This section includes standards and guidelines that apply to all species, as well as separate subsections identifying standards and guidelines for each listed, proposed, and candidate species. Additional standards and guidelines associated with listed, proposed, and candidate fish species are provided in section 2.3, under Fish. These standards and guidelines apply to all future management projects and activities on the Forests.

All Species

- RE-5S Minimize adverse effects to ESA listed, proposed, and candidate species and their designated and proposed critical habitat in accordance with Forest Service authorities. Management activities shall not retard recovery² of listed, and proposed, and candidate species and their designated and proposed critical habitat in the long-term, in accordance with Forest Service authorities. Federally listed, proposed, and candidate species and their designated and proposed critical habitats shall be managed in accordance with their recovery or other conservation plans, in accordance with Forest Service authorities.
- LH-4G Land exchanges should avoid the disposition of occupied habitat of threatened, endangered, candidate, proposed, or sensitive species.
- FLS-14G Leasable minerals: consent to mineral leases should be given with stipulations to minimize adverse effects to threatened and endangered species.
Active minerals leases should be mitigated to minimize impacts that exploration and production operations may have on threatened and endangered species. Where exploration or mineral production activities cannot avoid or minimize the effects of operations, utilize

² Retard recovery - management action effects that, individually or in combination with other management actions or natural disturbances, measurably slow the natural rate of recovery.

compensatory mitigation to enhance off-site habitats and to support no net loss or, if possible, a net benefit for threatened or endangered species.

Gray Wolf

- SD-6G Management activities within one mile of a known active (during same calendar year that use is documented) wolf den and rendezvous sites should implement appropriate seasonal restrictions, based on site specific consideration and potential activity effects, to reduce disturbance to denning wolves.
- SD-7G Do not authorize turnout of sick or injured livestock to reduce risk of attracting wolves.
- SD-8G Remove or otherwise dispose of livestock carcasses such that the carcass will not attract wolves. If, due to location of the carcass, this is not possible, develop other remedies.
- SD-9G Do not authorize salt or other livestock attractants near known active (during same calendar year that use is documented) wolf dens or rendezvous sites to minimize livestock use of these sites. If a new wolf den or rendezvous site is discovered, relocate any previously established salt or attractant location, as necessary, to minimize livestock use of those sites.

Malheur and Umatilla NFs Only - West of Hwy 395

- FLS-16S Domestic sheep grazing shall not be authorized (during same calendar year that use is documented) in an allotment that contains a known active wolf den or rendezvous site unless a herder is with the sheep at all times and retrieves known strays within 24 hours.

Wolverine

- FLS-1G Management activities should avoid adverse impacts to wolverine and its habitat to maintain population viability and avoid a trend towards federal listing.

Plants

- FLS-2G Livestock grazing should not be authorized in the peatlands sensitive plant habitat group to protect the fragile habitat from trampling.
- FLS-3S Maximum utilization of key forage species shall not exceed 30 percent in occupied habitat of threatened, endangered, proposed or candidate plant species, except where an approved conservation strategy, conservation agreement, or recovery plan recommends an alternate use level.
- FLS-4G Maximum utilization of key forage species should not exceed 30 percent in occupied habitat of sensitive plant species, except where an approved conservation strategy or conservation agreement recommends an alternate use level.
- FLS-5G New water developments and salting should not be authorized within one-quarter mile of occupied habitat of threatened, endangered, candidate, or sensitive plant species to reduce concentrated livestock use and its associated impacts (e.g., excessive trampling, soil compaction and herbivory).
- FLS-6S Timber harvest and associated vegetation management activities shall avoid adverse effects to the occupied habitat of threatened, endangered, proposed, candidate, and sensitive plant species unless the silvicultural prescription would benefit the species or its habitat.

FLS-7G	Slash piles and other fuels should be managed to avoid the occupied habitat of threatened, endangered, proposed or candidate plant species unless the burn plan or prescription would benefit the species or its habitat.
FLS-8G	Construct fire control lines to avoid the occupied habitat of threatened, endangered, proposed, candidate, and sensitive plant species to minimize adverse effects and impacts to these categories of plant species, except where needed to provide for the protection of human life and public safety.
FLS-9S	Road maintenance and new road construction shall be designed to minimize adverse effects to the occupied habitat of threatened, endangered, proposed, or candidate plant species.
FLS-10G	New road construction should be designed to minimize adverse impacts to the occupied habitat of sensitive plant species, to avoid a trend towards federal listing.
FLS-11S	Trail maintenance and new trail construction shall be designed to avoid adverse effects to the occupied habitat of threatened, endangered, and proposed plant species.
FLS-12S	Recreation areas (e.g., ski areas) and other recreational activities shall minimize adverse impact to whitebark pine and its habitat.
FLS-13G	Trail maintenance and new trail construction should be designed to avoid adverse impacts to the occupied habitat of sensitive plant species to avoid a trend towards federal listing.
FLS-14G	Locatable minerals: locatable mineral operations should be mitigated within the context of the USFS regulations at 36 CFR 228 to protect threatened and endangered plant species from the effects of exploration and mining activities.
IS – 3G	Determine appropriate range of treatments necessary to meet objectives for invasive species and native pests, while minimizing negative effects of treatments. Methods including prevention, manual, cultural, mechanical, regionally approved chemicals, and biological agents may be considered within all management areas.
IS-4G	Plan and conduct activities to minimize or prevent the potential spread or establishment of invasive species.
DP-2G	Manage unplanned ignitions as appropriate to achieve desired conditions.
OF-1G	Management activities should retain and generally emphasize recruitment of old ³ trees, large ⁴ trees and legacy ⁵ trees. Exceptions where individual old, large, or legacy trees may be removed or destroyed include situations where:

³ For the purpose of this guideline, the definition for the terms are as follows: “old” trees are live trees with distinct features indicating ages of generally equal to or greater than 150 years (see guidelines outlined in Van Pelt 2008).

⁴ “Large” trees are live grand fir over 30-inch diameter at breast height or live trees of any other species over 21 inches diameter at breast height.

⁵ “Legacy” trees are old trees that have been spared during past harvest or have survived stand-replacing natural disturbances and are thus significantly older than the average trees in the general area. This distinguishes them from other ‘residual’ trees, which may also have been spared from harvest but are not always significantly older than the average trees in the area (Mazurek and Zielinski 2004; Franklin 1990). Legacy trees of particular value to wildlife include those that are also large, rough-boled with dead horizontal limbs, have witch’s broom deformities, are hollow, have heart rot, pockets of decay, dead or broken tops, cavities and/or substantial wounds (Bull et al. 1997).

- Trees need to be removed to meet or maintain desired conditions for species composition on the landscape by removing shade tolerant species in favor of shade-intolerant species. (see Desired Conditions)
- Trees need to be removed from high density forest to meet or maintain desired conditions for low density stand conditions on the landscape where removal of smaller trees alone cannot achieve desired conditions.
- Trees need to be removed to control or limit the spread of insect or disease infestation.
- Trees need to be removed to reduce danger/hazard trees along roads or in developed sites.
- Trees need to be removed where strategically critical to reinforce, facilitate, or improve effectiveness of fuel reduction in wildland-urban interfaces.

Additional exception applies only to large trees that do not also meet the definition of old trees:

- Trees need to be removed to favor aspen, cottonwood, whitebark pine or other special plant habitats.
- Trees needed to be removed to form key pieces in complex instream large wood structures.

Umatilla and Wallowa-Whitman NFs only

FLS-15S Livestock grazing of occupied *Silene spaldingii* habitat shall not be authorized between July 1 and September 30 (flowering-fruiting period).

Rocky Mountain Elk

- RME-1S There shall be no net loss of elk security measured within watersheds (5th field HUC) through building of new motorized routes or re-opening of closed motorized routes for public travel.
- RME-2G Motor vehicle use on designated routes and open areas should not be authorized within elk winter range between December 1 and April 14. Federal and State highways and major National Forest System roads (such as arterials) are exempt to provide reasonable public access. These dates may be modified by as much as, but not exceed two weeks (e.g., March 31st, April 30th) as appropriate in consultation with State wildlife agencies. The intent is to minimize disturbance to elk while occupying winter range, and encourage elk use of public land. Oregon Department of Wildlife (ODFW) and Washington Department of Wildlife (WDFW) winter range maps should be used as the basis for identifying winter range.
- RME-3G Encourage elk use of Forest Service lands. Management activities that fall within identified elk priority areas should increase security by a minimum of 15 percent, to reach 30 percent or greater at the subwatershed (6th Field HUC) scale. This guideline applies to projects that affect security and/or treat greater than 500 acres of forested vegetation (prescribed fire is exempt).

The intent is to improve distribution of elk across all seasonal ranges on Forest Service lands by moving toward and/or within the desired condition range of 30-100 percent elk security. Project effect analyses should identify and consider elk security, elk forage and nutrition, elk hiding cover, and elk habitat selection and distribution across all National Forest System lands.

Fish

In addition to the Forest-wide standards and guidelines above that have general benefit to listed, proposed, and candidate fish species, specific standards and guidelines related to fish species are identified for riparian management areas within the long term aquatic and riparian conservation strategy (Blues ARCS, attached as Appendix A). The listed, proposed, and candidate fish species standards and guidelines contained in the Blues ARCS are considered plan components and are described in further detail in section 2.5, below.

Management Areas

Management areas are spatially distinct areas with a unique set of plan components. The management areas range along a continuum from little development by humans in MA 1A, to extensive human development in MA 5. The types of uses and desired settings define the land use that would occur under the Revised Forest Plan. Management Areas occur across districts, mountain ranges, and ecosystems but have commonalities that make their overarching land uses similar.

All management areas are displayed in Table 6 and desired conditions for each management area are identified following the table. Only those standards or guidelines that specifically apply to each management area and that help conserve listed, proposed, and candidate species are identified. For many management areas, there are no management area-specific standards and guidelines that pertain to listed, proposed, and candidate species. However, Forest-wide standards and guidelines that apply to listed, proposed, and candidate species also apply in each individual management area. Overlap occurs between many management areas but is not accounted for in Table 6. The overlapping management areas result in the total acreage of all management areas being greater than the official National Forest System acreages. For example, several research natural areas (MA 2B) and wild and scenic rivers (MA 2A) overlap into congressionally designated wilderness areas (MA 1A). The figures in the table are rounded to the nearest 100 (acres) and to the nearest whole mile.

Table 6. Management area designation, name, and acreage for each national forest (2F and 2G show miles).

Management Area Designation and Name	Malheur	Umatilla	Wallowa-Whitman
1A – Congressionally Designated Wilderness Areas	82,600	304,200	372,900
1B – Recommended Wilderness Areas	26,600	31,900	12,000
1C – Wilderness Study Area	0	0	2,400
2A – Wild and Scenic River (Includes Designated, Eligible, and Suitable Rivers)	12,100	44,400	52,900
2B – Research Natural Areas	11,100	11,000	8,000
2C – Botanical Areas	100	900	1,000
2D – Geological Areas	200	400	0
2E – Historical Areas	34,000	1,200	2,300
2F – Scenic Byways and All-American Roads	13 miles	51 miles	85 miles
2G – Nationally Designated Trails	9 miles	30 miles	25 miles
2H – Scenic Areas	14,400	31,100	0
2I – Starkey Experimental Forest and Range	0	0	30,500
2J – Municipal Watersheds	500	20,200	24,500
3A – Backcountry (nonmotorized use)	47,200	49,700	31,700
3B – Backcountry (motorized use)	118,000	169,200	209,400

Management Area Designation and Name	Malheur	Umatilla	Wallowa-Whitman
4A – General Forest	1,250,200	648,000	861,400
4B – Riparian Management Areas (300/150/100 foot buffer)	192,900	237,500	362,500*
4B – Riparian Management Areas (within 4A)	149,500	119,900	190,100
5 – Developed Sites and Administrative Areas	2,200	7,500	7,700

*The 300/150/100 foot buffer encompasses all RMA acres both inside and outside of RMA 4b. When located in more restrictive allocations, example Wilderness, the most restrictive management direction applies.

MA 1A Congressionally Designated Wilderness Areas

Description

As defined by the 1964 Wilderness Act, a wilderness area is undeveloped federal land retaining its primitive character without permanent improvements or human habitation, and is managed to preserve its natural conditions.

There are six designated wilderness areas within the Blue Mountains National Forests that were established through several legislative acts, including the Oregon Wilderness Act (1984) and the Washington Wilderness Act (1984). These areas are displayed in Table 7. Management plans for individual wilderness areas remain in place, and if management plan components conflict with Forest Plan components, the more restrictive will apply.

Table 7. Designated wilderness areas for each of the Forests.

Wilderness Area Name	Acres ¹
Malheur National Forest Designated Wilderness Areas	
Strawberry Mountain	69,509
Monument Rock	13,047
Total	82,556
Umatilla National Forest Designated Wilderness Areas	
Wenaha-Tucannon	176,753
North Fork John Day	107,158
North Fork Umatilla	20,255
Total	304,166
Wallowa-Whitman National Forest Designated Wilderness Areas²	
Eagle Cap	351,859
Monument Rock	7,188
North Fork John Day	13,897
Total	372,944
Total All	759,666

1. The management area acres displayed are taken from the 1990 forest Plans and have not been recalculated using the most current GIS technology.

2. Wilderness area acres within the HCNRA are not included in this table.

Desired Condition

Designated wilderness areas exhibit primitive qualities. Opportunities for research, exploration, solitude, risk, challenge, and primitive recreation are widespread. On the trail system, opportunities for solitude are moderate to high, with few human encounters expected. Opportunities for solitude are high when traveling cross-country with almost no human encounters expected. Campsites may be visible at popular destinations along water features and at major trail junctions. These sites accommodate moderate use. Directional and regulatory signs are primarily found at trailheads outside of this management area but some signs may be present within these areas along trails and junctions. Buildings are rare within this management area; however, the preservation of historical features or retention of facilities for administrative use may occur. Ecosystems are influenced by natural processes with little or no human intervention. Geological and ecological processes, such as wildfire and insects and disease, operate relatively free from the influence of humans. Any influences upon these processes by humans is intended to protect human life; protect adjacent private property or private in-holdings; and reduce impacts to federal facilities, historical or cultural structures, and threatened and endangered plant or animal species or species included in the Regional Forester's sensitive species list. Predominantly diverse, native vegetation results from natural succession and disturbance processes, while nonnative vegetation is rare. The recreation opportunity spectrum is primitive.

MA 1A Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

MA1A-2S Wheeled vehicles, such as wagons and game carts, shall not be authorized in wilderness areas.

MA 1B Preliminary Administratively Recommended Wilderness Areas

Description

The areas in MA 1B have been determined to meet the criteria established to qualify for designation as wilderness areas. These areas are recommended for designation and inclusion in the National Wilderness Preservation System. Regulations at 36 CFR 219.7(a)(2)(v) require units undergoing new Forest Plan development or Forest Plan revision to "identify and evaluate lands that may be suitable for inclusion in the National Wilderness Preservation System and determine whether to recommend any such lands for wilderness designation." Until a decision is made by Congress, these areas will be managed to protect the wilderness characteristics that meet the criteria for designation of these lands as designated wilderness areas.

Desired Condition

Recommended wilderness areas exhibit primitive qualities. Opportunities for research, exploration, solitude, risk, challenge, and primitive recreation are widespread. On the trail system, opportunities for solitude are moderate to high, with few human encounters expected. Opportunities for solitude are high when traveling cross-country with almost no human encounters expected. Ecosystems are influenced by natural processes with little or no human intervention. Geological and ecological processes, such as wildfire, and insects and disease disturbances, operate relatively free from the influence of humans. Predominantly diverse, native vegetation results from natural succession and disturbance processes, while nonnative vegetation is rare. Uses are conducive to maintaining the wilderness characteristics of the areas. The recreation opportunity spectrum is primitive.

MA 1B Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

- MA1B-1S Proposed uses that could compromise wilderness area eligibility prior to congressional designation shall not be authorized.

MA 1C Wilderness Study Area

Description

The Homestead Wilderness Study Area, including the neighboring federal lands managed by the Bureau of Land Management (BLM), contains about 14,000 acres of public land.

Inventoried roadless areas were reviewed, and the portion of this roadless area managed by the Wallowa-Whitman National Forest increased from about 5,700 acres to about 9,000 acres. Most of the area is within the HCNRA, and the remainder of the roadless area is within the Whitman Ranger District. The 1991 BLM wilderness study process included the National Forest System acres and did not propose to recommend this roadless area for wilderness designation. Congress has not yet accepted the study, so these acres remain in the wilderness study area category. Wilderness values and resources will be protected until Congress either designates the area as part of the National Wilderness Preservation System or releases the area from consideration.

Desired Condition

The Homestead Wilderness Study Area provides opportunities for primitive recreation where natural processes dominate the landscape. The recreation opportunity spectrum is primitive.

MA 1C Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

- MA1C-1G Management activities should not reduce or impair the wilderness characteristics and qualities for which the area was designated.

MA 2A Wild and Scenic Rivers (Includes Designated, Eligible, and Suitable Rivers)

Description

This management area applies to river segments that have been designated as part of the Wild and Scenic Rivers System under the authority of the Wild and Scenic Rivers Act, as amended (1968) and the Oregon Omnibus River Act (1988) (see Table 8). Depending on the alternative, it also applies to rivers identified as eligible or suitable for designation (Table 9 and Table 10). The Act requires that a detailed study report be prepared for all rivers mandated for study under Section 5(a) of the Wild and Scenic Rivers Act, as amended, and for all other rivers identified by the USFS as eligible for inclusion in the National Wild and Scenic Rivers System (Sec. 5(d)(1) of the Act). Study rivers found eligible are to be protected pending a suitability determination (Section 5(d)(1)). Land management agencies must protect section 5(d)(1) study rivers found suitable for inclusion in the National Wild and Scenic Rivers System for their free-flowing condition, water quality, and outstandingly remarkable values. The existence of low dams, diversion works, or other minor structures at the time any river is proposed for inclusion in the National System does not automatically disqualify it for designation, but future construction of such structures is not allowed.

Across the Blue Mountains national forests, 11 rivers have been designated by Congress as wild and scenic. Among these rivers, about 142 miles are classified as wild, 68 miles as scenic, and 35 miles as recreational (see Table 8). Management plans for individual designated rivers remain in place, and if management plan components conflict with Forest Plan components, the more restrictive will apply.

Desired Condition

Eligible, suitable, and designated wild and scenic rivers are free flowing, without impoundment, diversion, straightening, rip-rap or other modification of the waterways. Water quality and outstandingly remarkable values are protected and enhanced. Development and access levels are consistent with the classification of the stream or stream segment as designated (or deemed suitable or eligible in the case of river segments that are not designated).

Table 8. Miles of designated wild and scenic rivers for each National Forest

River Name	Wild	Scenic	Recreational
Malheur National Forest			
Malheur River	6.0	6.0	0.0
North Fork Malheur River	0.0	25.5	0.0
Totals	6.0	31.5	0.0
Umatilla National Forest			
Wenaha River	18.7	2.7	0.2
Grande Ronde River ¹	17.4	0.0	1.5
North Fork John Day River ¹	24.3	10.5	8.9
Totals	60.4	13.2	10.6
Wallowa-Whitman National Forest²			
Eagle Creek	4.0	6.0	17.0
Grande Ronde River ¹	17.4	0.0	1.5
Joseph Creek	8.6	0.0	0.0
Imnaha River	15.0	0.0	0.0
Lostine River	5.0	11.0	0.0
Minam River	39.0	0.0	0.0
North Fork John Day River ¹	3.5	0.0	6.9
North Powder River	0.0	6.0	0.0
Totals	92.5	23.0	25.4
Total All¹	141.5¹	67.7	34.5¹

1. The Grande Ronde and North Fork John Day rivers are listed above for both the Umatilla and Wallowa-Whitman national forests as administration is shared. Mileage for the North Fork John Day River is divided within the table to reflect the mileage within and administered by each national forest. The Grande Ronde River is part of the administrative boundary between the Umatilla and Wallowa-Whitman national forests, and the mileage is displayed equally for each of the national forests and is only counted once in the overall total.

2. The miles listed for the Imnaha River do not include miles within the HCNRA.

Table 9. Miles of eligible wild and scenic rivers for each National Forest

River Name	Wild	Scenic	Recreational	Potential Outstandingly Remarkable Values
Malheur National Forest				
Lake Creek	3.3	0.0	0.0	Scenery
Umatilla National Forest				

River Name	Wild	Scenic	Recreational	Potential Outstandingly Remarkable Values
Bear Creek	4.6	0.0	0.0	Fisheries
Butte-West Fork Creek	13.9	0.0	0.0	Scenery, fisheries
Desolation Creek	0.0	0.0	21.5	Recreation, botanical
Lookingglass Creek	0.0	7.9	0.0	Fisheries, hydrological
North Fork Desolation Creek	0.0	0.0	6.8	Botanical
North and South Fork Wenaha River	26.3	0.0	0.0	Scenery, fisheries, botanical
Sheep Creek (in Washington)	0.0	0.0	0.5	Scenery, fisheries, botanical
South Fork Desolation Creek	0.0	8.9	0.0	Fisheries, botanical
Tucannon River	9.1	4.6	8.7	Recreation, fisheries, cultural, botanical
Totals	57.2	21.4	37.5	
Wallowa-Whitman National Forest				
Big Sheep Creek	10.0	0.0	39.1	Recreation, fisheries, cultural
Dutch Flat Creek/Van Patton Creek	5.3	0.0	0.0	Scenery, recreation, geological, hydrological, botanical
East Eagle Creek	9.0	2.1	4.5	Scenery, recreation, fisheries, hydrological, geological, cultural
Five Points Creek	0.0	12.1	0.0	Scenery, fisheries, wildlife
Killamacue/Rock Creek	10.2	8.6	0.0	Scenery, recreation, geologic, botanical
North Fork Catherine Creek	11.1	0.0	2.6	Scenery, recreation, fisheries, wildlife
Swamp Creek	7.6	0.0	9.2	Fisheries, wildlife, cultural
Upper Grande Ronde River	11.7	0.0	18.0	Recreation, fisheries, wildlife, cultural
Totals	64.9	22.8	73.4	
Total All	125.4	44.2	110.9	

Wild Rivers

Wild river segments are free flowing and are generally inaccessible except by trail or water; the shorelines are essentially natural appearing. Signs of human activity, including structures or evidence of resource use, are minimal. Visitors can interact in a natural environment with minimal sights and sounds of other people. Wild rivers within designated wilderness areas meet the desired condition for MA 1A. The recreation opportunity spectrum is primitive to semiprimitive nonmotorized.

Scenic Rivers

Scenic river segments are free flowing. Shorelines and viewing areas are largely natural appearing but are accessible by roads in some places. Some recreation structures, evidence of timber harvest roads, and other evidence of human activity may be present but do not detract from the near natural appearance and scenic qualities of the immediate environment. A variety of water related recreational opportunities are

available. The recreation opportunity spectrum is semiprimitive nonmotorized to semiprimitive motorized.

Recreational Rivers

Recreational river segments are free flowing and are readily accessible from roads. Some major public use facilities, such as developed campgrounds, administrative buildings, bridges, private residences, and commercial businesses, may be within the corridor. Considerable development and silvicultural treatments may have occurred and may be evident near the river. A range of recreational opportunities is available in settings where visitors are likely to share their recreational experience with other individuals or groups. The recreation opportunity spectrum is semiprimitive motorized to roaded natural.

Table 10. Miles of suitable wild and scenic rivers for the Wallowa-Whitman National Forest¹

River Name	Wild	Scenic	Recreational	Outstanding Remarkable Values
Dutch Flat Creek	5.3	0.0	0.0	Scenery, recreation, geological, hydrological, botanical
East Eagle Creek	9.0	0.0	6.6	Scenery, recreation, fisheries, hydrological, geological, cultural
Five Points Creek	0.0	12.1	0.0	Scenery, fisheries, wildlife
Totals	14.3	12.1	6.6	

1. These rivers were determined suitable. Analysis is documented in the Dutch Flat Creek, Killamacue Creek, and Rock Creek Wild and Scenic River Study Report (1996) and Wild and Scenic River Study Report and Final Legislative EIS for Eight Rivers (1997).

MA 2A Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

MA2A-3S New roads and motorized trails shall not be authorized within wild classifications of Wild and Scenic River management allocations.

MA2A-5S Mining of common minerals shall not be authorized.

MA 2B Research Natural Areas

Description

Research natural areas (RNAs) form a network of ecological reserves established for research and education purposes and for the maintenance of biodiversity. They are established to conserve unique ecological communities and are intended to promote and protect natural diversity. Research natural areas typify important vegetative, aquatic, and geological types, as well as other natural situations that have special and unique characteristics of scientific interest and importance.

Research, study, observation, monitoring, and educational activities that are nondestructive and non-manipulative are generally allowed within RNAs. While research natural areas are generally not suitable for livestock grazing, some incidental use by livestock could occur within these areas as administrative boundaries are typically not fenced. The network of established or proposed RNAs within the forests of the Blue Mountains are displayed in Table 11.

Table 11. Research natural areas for each National Forest

Area Name	Acres	Status
Malheur National Forest		
Baldy Mountain	3,861	Proposed
Canyon Creek	736	Established
Dixie Butte	335	Proposed
Dry Mountain	2,260	Established
Dugout Creek ¹	911	Established
Shaketable	385	Established
Silver Creek	802	Proposed
Stinger Creek	1,664	Proposed
Strawberry Mountain	107	Proposed
Total	11,061	
Umatilla National Forest		
Birch Creek Cove	411	Proposed
Kahler Creek Butte (formerly Kelly Creek Butte)	84	Proposed
Mill Creek ²	7,424	Proposed
Pataha Bunchgrass	67	Established
Rainbow Creek	570	Established
Vinegar Hill	424	Proposed
Wenaha Breaks (formerly Elk Flats-Wenaha Breaks)	1,971	Established
Total	10,951	
Wallowa-Whitman National Forest		
Clear Creek Ridge	637	Proposed
Craig Mountain Lake	172	Proposed
Glacier Lake	102	Proposed
Haystack Rock	418	Established
Horse Pasture Ridge	338	Established
Indian Creek	1,003	Established
Johnson (formerly Cougar Meadow)	130	Proposed
Lake Fork ¹	224	Proposed
Mount Joseph	705	Proposed
Nebo ¹	1,697	Proposed
Point Prominence	365	Proposed
Standley	742	Proposed
Gerald S. Strickler (formerly Government Meadow)	190	Established
Sturgill	139	Proposed
Tenderfoot Basin	891	Proposed
Vance Knoll	189	Established
West Razz Lake	47	Proposed
Total	7,989	

1. Acres within the HCNRA are not included in this table.

2. This research natural area is also a designated municipal watershed.

Desired Condition

Research natural areas and proposed research natural areas exhibit unmodified examples of natural ecosystems with minimal human intervention where ecological processes prevail. Under some circumstances (i.e., when there is an approved establishment record that includes a management plan), deliberate manipulation may occur, except in wilderness areas, to maintain the ecosystem or the unique feature for which the research natural area was established. Recreational uses do not threaten or interfere with the purposes for which the research natural area is established. The recreation opportunity spectrum depends on the surrounding management areas.

MA 2B Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

MA2B-1S Management activities shall not be authorized that inhibit the purpose for the research natural area establishment.

MA 2C Botanical Areas

Description

Botanical areas have special values and unique natural characteristics. Botanical areas contain specimens, groups of plant colonies, or plant communities that are significant because of form, color occurrence, habitat location, life history, ecology, variety, or other features. While botanical areas are generally not suitable for livestock grazing, some incidental use by livestock could occur within these areas as administrative boundaries typically are not fenced. The network of established or proposed botanical areas within the national forests of the Blue Mountains is displayed in Table 12.

Botanical areas may include National Natural Landmarks (NNL). The NNL program was established in 1962 and is part of the U.S. Department of Interior. The program is administered by the National Park Service and includes areas that have been designated by the Secretary of the Interior that represent unique examples of ecological and geological features that comprise our Nation's natural history.

The purpose of the NNL program is to identify and encourage the preservation of exceptional examples of the nation's geological and ecological features. NNL represent nationally significant examples of the Nation's natural heritage. The program serves to enhance the scientific and educational values of the designated sites, to strengthen public appreciation of natural history, and to foster conservation of the Nation's natural heritage. Table 12 displays acreage of NNL the Blue Mountains national forests.

Desired Condition

Botanical areas exhibit the natural composition, structure, and function of each area's unique ecosystem. National Natural Landmarks exhibit natural conditions where ecological processes predominate. NNLs also provide scenic and recreational opportunities while protecting the ecological and geologic values for which the NNL was designated.

Table 12. Botanical areas for each National Forest

Area Name	Proposed Acres
Malheur National Forest	
Fergy Spruce Grove	29
Cedar Grove	116
Totals	145
Umatilla National Forest	
Charley Creek	41
Ruckel Junction	9
Karl Urban	499
Shimmiehorn Canyon	197
Henry Creek	34
Farr Meadows	12
Elk Flats Meadow	97
Totals	889
Wallowa Whitman National Forest	
Mount Howard-East Peak ¹	1,012
Total	1,012

1. Mount Howard-East Peak is a National Natural Landmark

MA 2C Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

- MA2C-1G Visitor activities should be managed to avoid degradation to botanical areas.
- MA2C-2G Interpretive facilities should not conflict with the overall purpose of establishing botanical areas.
- MA2C-3G Silvicultural treatments should not degrade the special features of botanical areas.
- MA2C-5G Mineral exploration and development activities should be managed to minimize impacts to botanical areas.
- MA2C-6G Removal of common mineral material should not be authorized within botanical areas unless doing so will not adversely modify special features.
- MA2C-7G Utility corridors should not be authorized within botanical areas, unless doing so will not adversely modify special botanical features.

MA 2D Geological Areas

Description

Geological areas have outstanding formations or unique geological features of the earth's development, such as caves, fossils, dikes, cliffs, or faults. These areas are protected or enhanced, and where appropriate, public use and enjoyment is fostered. The network of established geological areas within the Malheur, Umatilla, and Wallowa-Whitman national forests is displayed in Table 13.

Desired Condition

Geological areas display unusual formations and significant events. Developments provide public enjoyment and interpretation opportunities with high scenic, recreational, and historical value.

Table 13. Geological areas for the Malheur, Umatilla, and Wallowa-Whitman national forests

Area Name	Acres
Malheur National Forest	
Magone Lake	185
Tex Bridge	1
Total	186
Umatilla National Forest	
Big Sink	416
Wallowa-Whitman National Forest	
Ichthyosaur Site	5
Total All	793

MA 2D Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

MA2D-1G Management Activities should not reduce or impair the natural and ecological values and qualities for which the area was designated.

MA 2E Historical Areas

Description

These areas are protected or enhanced, and, where appropriate, public use and enjoyment is fostered. These areas are usually small (generally less than 1,000 acres). Historical areas have historic sites, buildings, or objects of significance. The network of established historical areas within the Malheur and Umatilla national forests is displayed in Table 14.

Desired Condition

Historical areas demonstrate legacies unique to the area. Developments exist to enhance public enjoyment and interpretation. Their high historical value is maintained.

Table 14. Historical areas for the Malheur, Umatilla and Wallowa-Whitman national forests

Area Name	Acres
Malheur National Forest	
Sumpter Valley Railroad	13
Depression ERA CCC Buildings	11
Early and Intermediate Period Buildings	4
Historic Lookouts	7
Malheur Headwaters National Register District	4,950
Camas Oven Site	10
Pre-Mazama Site	10
Arch Rock Site	2

Area Name	Acres
Historic Mining Districts	598
Obsidian Source Archaeological Complex	28,000
Total	33,605
Umatilla National Forest	
Greenhorn	90
Olive Lake-Fremont Powerhouse	1,000
Target Meadows	83
Total	1,173
Wallowa-Whitman National Forest	
Starvation Archaeological Area	260
Camp Carson	117
Ah Hee Diggings (Granite Chinese Walls)	40
Dooley Mountain Obsidian Sources	616
Reds Horse Ranch/Millard Ranger Station	44
Total	2,308
Total All	37,086

MA 2F Scenic Byways and All-American Roads

Description

The National Scenic Byways Program is a part of the U.S. Department of Transportation. The program is a grassroots, collaborative effort established to help recognize, preserve, and enhance selected roads throughout the U.S. The U.S. Secretary of Transportation recognizes certain roads as All-American roads or national scenic byways based on one or more of the following characteristics: archeological, cultural, historical, natural, recreational, or scenic quality.

The purpose of the scenic byways program is to create a distinctive collection of designated roads, their stories, and treasured places by creating a unique travel experience and enhanced local quality of life through efforts to preserve, protect, interpret, and promote the intrinsic qualities of designated byways. Table 15 displays the miles of designated national and state scenic byways within the Blue Mountains national forests. Each of the scenic byways has additional mileage outside of National Forest System boundaries.

Desired Condition

The scenic integrity of scenic byways is high. Scenic byways connect communities with the surrounding natural environment. Constructed features contribute to the attractiveness of the landscape and/or theme. The recreation opportunity spectrum depends on the surrounding management areas.

Table 15. Scenic byways within each National Forest

Scenic Byway Name	Length (miles)	Designation
Malheur National Forest		
Journey Through Time Scenic Byway	13	State
Umatilla National Forest		
Blue Mountains Scenic Byway	48	State

Scenic Byway Name	Length (miles)	Designation
Elkhorn Scenic Byway	3	State
Total	51	
Wallowa-Whitman National Forest		
Blue Mountains Scenic Byway	2	State
Hells Canyon Scenic Byway ¹	10	National
Journey Through Time Scenic Byway	21	State
Elkhorn Scenic Byway	52	State
Total	85	
Total All	149	

1. A portion of the Hells Canyon Scenic Byway, an All-American Road, is within the HCNRA and is not included in this table.

MA 2G Nationally Designated Trails

Description

The National Trail System Act (1968) authorized the creation of a national trail system comprised of National Recreation Trails, National Scenic Trails, and National Historic Trails. These trails are included in the listing of specially designated areas because of their scenic, recreational, and historical value. Table 16 displays trails designated within the Malheur, Umatilla, and Wallowa-Whitman national forests.

Table 16. Nationally designated trails within each National Forest

Trail Name	Length (miles)
Malheur National Forest	
Arch Rock National Recreation Trail	0.3
Cedar Grove National Recreation Trail	1.0
Malheur River National Recreation Trail	8.0
Total	9.3
Umatilla National Forest	
Jubilee Lake National Recreation Trail	3.0
North Fork John Day National Recreation Trail	22.9
South Winom Creek National Recreation Trail	4.0
Total	29.9
Wallowa-Whitman National Forest¹	
Elkhorn Crest National Recreation Trail	23.0
High Wallowa National Recreation Trail	2.0
Oregon Trail National Historic Trail	8.3
Total	33.3
Total All	72.5

1. The following designated trails are within the HCNRA and are not included in this table: Nez Perce-Nee Me Poo National Historic Trail and the Western Rim/Summit Ridge, Heaven's Gate, and Snake River National Recreation Trails.

Desired Condition

Nationally designated trails are managed according to the direction in their respective trail management plans. Nationally designated trails meet standards commensurate with the significance of each trail, and the values for which the trails were designated are protected. The trails and associated resources are

identified, documented, and interpreted for the public where appropriate. Nationally designated trails are well maintained and are upgraded where necessary to minimize resource damage while providing a safe, consistent surface. Signage is adequate or is improved. Their high scenic, recreational, and historical value is evident. The recreation opportunity spectrum depends on the surrounding management areas.

MA 2H Scenic Areas

Description

Scenic areas are places of natural variety where unique physical characteristics provide pleasing views and dispersed recreational opportunities. Scenic areas are designated to protect or enhance, and, where appropriate, foster public use and enjoyment of areas with special landscapes noted for their natural beauty. There are three designated scenic areas within the Forests of the Blue Mountains. The network of established scenic areas within the Malheur and Umatilla national forests is displayed in Table 17

Desired Condition

Scenic areas provide a variety of recreational opportunities for public use and enjoyment while remaining mostly natural in appearance. Although roads provide motor vehicle access to the unique natural beauty and sense of vastness of these areas, the supply and visibility of existing roads is subordinate to the overall scenic character of the landscape. The scenic integrity of these areas is high to very high. The recreation opportunity spectrum may vary from semiprimitive motorized to roaded natural.

Table 17. Scenic areas within the Malheur and Umatilla national forests

Name	Acres	Establishment
Malheur national forests		
Vinegar Hill-Indian Rock Scenic Area	12,835	Established in 1966 by Regional Forester
Silver Creek Scenic Area	1,572	Proposed
Total	14,407	
Umatilla national forests		
Vinegar Hill-Indian Rock Scenic Area	21,956	Established in 1966 by Regional Forester and amended in 1978 by adding the Desolation Unit
Grande Ronde Scenic Area	9,158	Established in 1979 by Regional Forester
Total	31,114	
Total All	45,521	

MA 2H Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

MA2H-1G Management activities should not reduce or impair the natural, ecological, and scenic values and qualities for which the area was designated.

MA 2I Starkey Experimental Forest and Range

Description

The Starkey Experimental Forest and Range (Starkey) was established in 1940. It is managed to support existing research projects and to provide for future research needs. Experimental forests and ranges were established explicitly to conduct research benefitting and supporting National Forest System management. Management treatments on experimental forests and ranges generally are integrated with and support research projects. The national network of experimental forests and ranges, a land base authorized by

Congress and designated by the Chiefs of the USFS over the last 100 years, provides sites where long-term ecological research can be maintained. Experimental forests and ranges are living laboratories where scientists not only make discoveries but also demonstrate relevant research results for cooperators and stakeholders. They provide opportunities to conduct the innovative research that will be required for sound management of future landscapes.

Starkey is a world-class research facility and a primary field location for long-term, operational scale scientific studies of the effects of management activities on ungulates and wildlife, as well as effects of deer, elk, and cattle on ecosystem process and function. Scientists conducting research at Starkey have generated many publications that have been instrumental in providing managers with defensible options and best management practices for managing roads and traffic, including off-road recreation, livestock grazing, and fuel treatments in relation to ungulates. Significant, long-term research on interactions between livestock and wild ungulates began in 1989, through a joint wildlife research project conducted by the Oregon Department of Fish and Wildlife, Oregon State University, and the USFS.

The Station Director will review and concur with management activities proposed within this Experimental Forest and Range.

Desired Condition

The Starkey Experimental Forest and Range provides opportunities to study deer, elk, cattle, and other wildlife, as well as other aspects of intensive forest and rangeland management, including disturbance ecology (e.g., fire, insects and disease, and grazing by large mammals). A wide variety of land uses and human activities will continue to be included in Starkey research including: active silviculture, fuels reduction, biofuel management, fire suppression, cattle grazing, public access, public uses of motorized and nonmotorized roads and trails, firewood cutting, camping and other non-consumptive recreation, and protection of all research facilities. Public access and activities are managed to protect the facilities and meet research needs.

Depending on research objectives, studies vary from non-manipulative studies at small scales, to experiments involving commercial timber harvesting across multiple stands. Typical forest practices, such as fuels reduction, prescribed fire, and timber harvest, are conducted as part of research direction and may result in a higher level of uncertainty of effects than is expected in other management areas, because research within experimental areas can include testing of novel prescriptions and management approaches. Timber harvest is allowed to meet specific resource objectives for Starkey. Timber harvest is not scheduled and does not contribute towards the allowable sale quantity.

Enclosures, exclosures, and long-term vegetation plots are maintained and protected to provide a continuous data stream to meet research objectives. However, future research may dictate treatment within these areas. Livestock management systems include (1) use of novel cattle grazing systems to facilitate habitat recovery in riparian systems, (2) manipulative ungulate treatments to evaluate cattle versus elk and deer herbivory effects on vegetation development, and (3) evaluation of effects of ungulates on a wide variety of other resources (e.g., water quality, hydrology, nutrient cycling, forest productivity, and wildlife). The number of animals, as well as the allocation of this number between cattle, deer and elk, may be manipulated as part of the research conducted on the Starkey Experimental Forest and Range.

The recreation opportunity spectrum is roaded natural.

MA 2I Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

MA2I-1S	Vehicle access shall only be allowed on designated routes, unless necessary to meet research needs or objectives
MA2I-2S	Starkey Experimental Forest and Range shall be closed to public access from fall until spring to protect deer and elk from harassment and stress during winter, with specific dates established periodically as consistent with research objectives.
MA2I-3G	Existing old forest stands should be retained and additional stands that are the closest to old forest structure should be retained at a rate of 20 percent of the land area.
MA2I-4S	Special forest product collection and firewood cutting shall only be allowed when and where compatible with research objectives.
MA2I-5G	Planned ignitions should occur when and where compatible with research needs or objectives.
MA2I-6G	To protect valuable infrastructure and assure compatibility with research needs and objectives, unplanned ignitions should be suppressed with a high level of management response. Suppression activities are coordinated with the Station director, research project leader, or designee.
MA2I-7S	Plans of operation for locatable, leasable, and saleable mineral operations shall be reviewed and modified, to the extent practicable, to be compatible with existing or planned research.

MA 2J Municipal Watersheds

Description

A municipal watershed is an area that serves a public water system as defined by the Safe Drinking Water Act (1974). The act applies to systems that provide water for human consumption, have at least 15 service connections, or regularly provide water to at least 25 people. The act was amended in 1996 to require source water protection zones for groundwater wells that provide water for public use. The Act regulates both community and non-community water systems.

Six communities in the Blue Mountains national forests have water systems that derive water supplies directly from NFS lands (see Table 18).

The definition of municipal watershed in current Forest Service regulations does not include communities served by a well or confined groundwater unaffected by USFS activities. However, the Safe Drinking Water Act of 1974 was amended in 1996 to require source water protection zones for groundwater wells that provide water for municipal use. Designation of municipal watersheds recognizes the need to protect public water supplies. Municipal watersheds may be managed for multiple uses so long as management activities do not degrade water quality.

Management of some municipal water supply watersheds is subject to the terms of existing agreements between the Secretary of Agriculture and the respective cities.

In general, management of the municipal watersheds displayed in Table 18 is guided by existing agreements between the individual cities and either the Secretary of Agriculture or the USFS. Actions that could degrade water quality are either prohibited or are subject to approval by the respective city. For

some communities, wells outside the forests are the primary water source, but well-head protection zones may extend onto NFS lands.

Table 18. Designated municipal watersheds for each National Forest

Watershed	Acres	City	Establishment
Malheur National Forest			
Long Creek Municipal Watershed	256	Long Creek, OR	1937 Special Use Permit
Byram Gulch Municipal Watershed	279	Canyon City, OR	1926 Special Use Permit
Total	535		
Umatilla National Forest			
Mill Creek Municipal Watershed	20,300	Walla Walla, WA	1918 Agreement between Secretary of Agriculture and City of Walla Walla
Total	20,300		
Wallowa-Whitman National Forest			
Baker City Municipal Watershed (multiple streams)	9,322	Baker City, OR	1912 Agreement with Department of Agriculture
La Grande City Municipal Watershed (Beaver Creek)	15,161	La Grande, OR	1935 Agreement with Department of Agriculture
Total	24,483		
Total All	45,318		

In addition to the municipal watersheds listed in Table 18, nine communities in Oregon have watersheds or water sources located on or adjacent to NFS lands that should be protected to meet state source-water protection guidelines.

Within the Malheur National Forest

The town of Seneca uses two groundwater wells for its public water supply. The well-head protection zones for these wells may include NFS lands and require protection under the Safe Drinking Water Act. Prairie City obtains its water supply from Dixie Creek, which originates on NFS lands.

Twelve additional sites, including campgrounds and administrative sites and one privately owned site, provide water for public use and are regulated by provisions of the Safe Drinking Water Act as non-community water systems.

Within the Umatilla National Forest

The North Fork Umatilla River was designated as the municipal water supply for the city of Pendleton by the Oregon State Legislature in 1941. In 1984, the area was designated as a wilderness area and the city has since transferred its water intake to a point on the Umatilla River near the city of Pendleton.

Within the Wallowa-Whitman National Forest

The town of Granite has a water intake on NFS lands operating under special use permit. A wellhead protection zone for a groundwater well extends onto NFS lands.

The town of Halfway has municipal water rights on NFS lands but has converted the water system to groundwater sources on city-owned lands.

The upper Wallowa River, including Wallowa Lake, is designated by the Oregon Department of Environmental Quality as the municipal water supply for the city of Joseph. The city water intake is located near the outlet of Wallowa Lake and is not on NFS lands.

The city of Sumpter has a water intake operating under special use permit on NFS lands. The watershed is designated by Oregon Department of Environmental Quality as a municipal water supply.

The city of Wallowa owns municipal water rights on NFS lands (Bear Creek), but has converted its water system to groundwater sources on city-owned lands.

The communities of Richland and Greenhorn obtain their water from surface sources originating on NFS lands.

Fifteen additional sites within the Wallowa-Whitman National Forest, primarily campgrounds and administrative sites, provide water for human consumption and are regulated under the authority of the Safe Drinking Water Act as non-community water systems.

Desired Condition

With appropriate treatment, the quality of water used for human consumption meets or exceeds all associated state water quality criteria.

MA 2J Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

MA2J-1S All management activities shall be designed to protect water quality at the intake in public water supply watersheds. Activities that could influence drinking water sources will be conducted in accordance to Oregon Drinking Water Rules and regulations.

MA 3A Backcountry (Non-motorized Use)

Description

Backcountry non-motorized areas are generally areas where recreation opportunities are primitive non-motorized and semi-primitive, and motorized transportation is not established or suitable. Boundaries are aligned closely with the boundaries of inventoried roadless areas. The prohibitions stated in the 2001 Roadless Area Conservation Rule for timber harvest and road building apply to MA 3A backcountry non-motorized areas that overlap with inventoried roadless areas. Use is non-motorized year-round and essentially primitive. Lands in this management area often have high quality or undisturbed soil, water, and air; sources of public drinking water; diversity of plant and animal communities; habitat for species listed under the Endangered Species Act and other species that depend on large, undisturbed areas of land; primitive and semi-primitive non-motorized dispersed recreation opportunities; natural appearing landscapes with high scenic quality, natural integrity, apparent naturalness, solitude and remoteness; and traditional cultural properties and/or sacred sites. Backcountry areas that do not overlap with inventoried roadless areas are not subject to the Roadless Area Conservation Rule prohibitions.

Desired Condition

Generally, natural ecological processes predominate.

The social setting is one of moderate to high challenge and risk, where people using these areas experience some isolation from the sights and sounds of others. Mechanized uses, such as bicycles, and motorized equipment for trail maintenance, such as chainsaws and generators, are allowed. Trail systems

are constructed and maintained for use by hikers, equestrians, and cyclists. The scenic integrity of these areas is high. The recreation opportunity spectrum in MA 3A is semiprimitive or primitive nonmotorized.

MA 3A Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

MA3A-1S Backcountry Management Areas within inventoried roadless areas shall be managed consistently with the guidance in the 2001 Roadless Area Conservation Rule (36 CFR 294) (USDA Forest Service 2001b).

MA 3B Backcountry (Motorized Use)

Description

Backcountry motorized areas are generally areas where recreation opportunities are essentially primitive and motorized use is established and suitable. Boundaries are aligned closely with the boundaries of inventoried roadless areas. The prohibitions stated in the 2001 Roadless Area Conservation Rule for timber harvest and road building apply to MA 3A backcountry motorized areas that overlap with inventoried roadless areas. Use in MA 3B Backcountry motorized use includes both motor vehicle use and nonmotorized use. These areas are relatively remote but may show signs of past activities. Motor vehicle access to these areas may be restricted seasonally, by route designations, or by area restrictions. These areas are characterized by semi-primitive non-motorized and motorized dispersed recreation opportunities and modified appearing landscapes with moderate scenic quality. Backcountry areas that do not overlap with inventoried roadless areas are not subject to the Roadless Area Conservation Rule prohibitions.

Desired Condition

Generally, natural ecological processes predominate.

The social setting is one of moderate challenge and risk, where people using these areas experience some isolation from the sights and sounds of others. Motorized and mechanized uses, such as motorcycles, off-highway vehicles (OHVs), snowmobiles, and bicycles, and motorized equipment such as chainsaws and generators are allowed. Trails and primitive developments are constructed and maintained for both motor vehicle and non-motorized users. The recreation opportunity spectrum in MA 3B is semiprimitive or motorized.

MA 3B Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

MA3B-1S Backcountry management areas within inventoried roadless areas shall be managed consistently with the guidance in the 2001 Roadless Area Conservation Rule (36 CFR 294) (USDA Forest Service 2001b).

MA 4A General Forest

Description

General forest areas are managed to meet a variety of ecological and human needs. A wide variety of vegetative structure and composition is present, with some showing the effects of past management activities and others showing the effects of predominantly natural forces, such as wildfire, insects, and disease. These lands often display high levels of management activity and associated roads. Visitors expect to see other people and evidence of human activities.

Desired Condition

General forest contributes to the variety of native plant communities and the composition, structure, and patterns defined in the Forest-wide desired conditions. While the landscape is predominantly natural in appearance, there are some locations where the vegetation composition, structure, density and/or pattern is altered to meet short- or long-term management objectives that move the landscape towards the Forest-wide desired conditions. The area is maintained through ecological processes, as well as management activities. This management area contributes important habitat for aquatic, plant and wildlife species that benefit from functional habitat. Additionally, the area supplies a variety of dispersed or developed summer and winter recreational activities. Recreational use is generally dispersed and/or located at recreation developments, such as campgrounds with higher use levels. Facilities (whether USFS or permitted) are those necessary to provide public or resource benefit, or provide for safety. This area has USFS system and other authorized routes. A wide spectrum of travel way types are present, ranging from maintenance level 1 through 5 roads (closed roads to highways) to trails that serve as recreational features. The recreation opportunity spectrum in MA 4A is roaded natural.

MA 4A Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

- MA4A-1S As directed by the NFMA, when trees are harvested from lands identified as suitable for timber production, the harvests shall be made in such a way as to reasonably assure that the technology and knowledge exists to adequately restock the lands within five years of final regeneration harvest. Research and experience shall be the basis for determining whether the harvest and regeneration practices planned can be expected to result in adequate restocking. The adequate level of restocking shall be prescribed in a site-specific silviculture prescription for a project which will specify the minimum number, size, distribution and species composition of regeneration needed based on the objectives and desired conditions for the planning area and project.
- MA4A-2G As directed by the NFMA, even-aged regeneration harvests of stands on lands suitable for timber production should not occur until the stands have generally reached or surpassed the culmination of the mean annual increment, measured in cubic feet. This does not preclude the use of thinning or other intermediate stand improvement treatments or salvage/sanitation harvesting of timber stands that are substantially damaged by fire, windthrow, or other catastrophic event or that are in imminent danger of insect or disease outbreaks. Exceptions may be made after consideration of overall multiple uses other than timber production including:
- Cutting related to research or experimental purposes, or
 - Removing particular species of trees, or
 - Improving wildlife habitat, range or recreation resources.

MA 4B Riparian Management Areas

Description

Riparian management areas (RMAs) are areas that include portions of watersheds where aquatic and riparian-dependent resources receive primary emphasis and where special management direction applies. Riparian management areas encompass lands adjacent to permanently flowing streams, ponds, lakes, wetlands, seeps, springs, and intermittent streams, including geologically unstable sites that may influence these lands. Riparian management areas will generally have minimum widths but are designed to extend to the outer edge of riparian vegetation, or to the outer extent of the 100-year floodplain,

whichever is greater. Riparian management areas are managed to maintain and restore the riparian structure and function of intermittent and perennial streams, confer benefits to riparian-dependent plant and animal species, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, and provide for greater connectivity within and between watersheds for both riparian and upland species. Management areas 4B overlay all other management areas and therefore are not mapped nor are their acreages calculated.

However, the desired conditions and standards and guidelines that apply to MA 4B apply to all riparian management areas (Table 19).

Table 19. Riparian management area widths.

Category	Minimum Riparian Management Area Width
Fish-bearing streams	300 feet slope distance on either side of stream or to outer edge of 100-year floodplain, whichever is greatest
Permanently-flowing non-fish-bearing streams	150 feet slope distance on either side of stream or to outer edge of 100-year floodplain, whichever is greatest
Constructed ponds, reservoirs and wetlands greater than 1 acre	150 feet slope distance from the outer edge of wetland or from the maximum pool elevation, whichever is greatest
Lakes and natural ponds	300 feet slope distance
Seasonally-flowing, intermittent and ephemeral streams, wetlands smaller than 1 acre, and unstable areas	See pages 59-60 of the ARCS (Description of RMAs with characteristics as described): At a minimum, the RMAs will include: ▪ The extent of unstable and potentially unstable areas (including earthflows). ▪ The stream channel and extend to the top of the inner gorge, or in incised streams, to the edge of the former floodplain. ▪ The stream channel or wetland and the area from the edges of the stream channel or wetland to the outer edges of the riparian vegetation, extending from the edges of the stream channel to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest. A site-potential tree height is the average maximum height of the tallest dominant trees for a given site class.

Riparian vegetation performs numerous key functions for stream ecosystems, including the provision of shade, bank stability, nutrient transfer, retention of organic material, and the supply of woody material.

Because riparian plant species vary in their establishment mechanisms, water requirements, and tolerance to flooding, differences in channel and floodplain morphology result in high spatial and temporal variability in species composition and age class structure within and along riparian zones. This makes riparian areas among the most biologically diverse and productive habitats on the landscape.

Healthy riparian areas are important for the protection of the water quality upon which aquatic species depend, and are also used by approximately 75 percent of terrestrial vertebrate species in the Blue Mountains (Raedeke 1988, Thomas 1979). In addition, riparian areas provide critical habitat for numerous sensitive, rare, or uncommon plant and lichen species. Management activities within riparian management areas are designed to maintain, enhance, or restore, as applicable, the ecological processes responsible for the diversity, productivity, and sustainability of riparian habitats.

Management of riparian management areas focuses on the ecological processes and conditions within the riparian management areas and contributes to the value of the aquatic and riparian habitats they contain.

Riparian and wetland areas are the interface between terrestrial and aquatic ecosystems and are an integral part of the watersheds. Consequently, the health of these areas is closely interrelated to the condition of the surrounding watershed (Debano and Schmidt 1989, Hornbeck and Kochenderfer 2000). The health of riparian corridors is dependent on the storage and movement of sediment through the channel system, and on the movement of sediment and water from surrounding hillslopes into the channel system. Human-induced and natural disturbances can alter these processes either indirectly to the watershed or directly to riparian areas themselves by management related activities (i.e., recreation, livestock grazing, road construction, mining, irrigation diversion, and channel modification), natural events (i.e., flooding and wildfire), and similar disturbances (Baker et al. 2004, NRC 2002). One good measure of riparian and wetland health is the ecological condition of riparian vegetation relative to reference conditions.

Riparian Management Area DC-1 (ARCS)

Riparian management areas (RMAs) within any given watershed reflect a natural composition of native and desired nonnative plant and animal species and a distribution of physical and vegetative conditions appropriate to natural disturbance regimes affecting the area. Scale: subwatershed.

Riparian Management Area DC-2 (ARCS)

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

Riparian Management Area DC-3 (ARCS)

Key riparian processes and conditions (including slope stability and associated vegetative root strength, bank stability, wood delivery to streams; and, within the riparian management areas: input of leafy and other organic matter to aquatic and terrestrial systems, solar shading, microclimate, and water quality) are operating consistent within natural disturbance regimes. Scale: subwatershed.

Riparian Management Area DC- (Unnumbered from the Plan)

Native vegetation is functioning properly throughout the stream corridor or along wetlands and water bodies. Native mid- to late-seral vegetation appropriate to the site's potential dominates the plant communities and is vigorous, healthy, and diverse in age, structure, cover, and composition on more than 80 percent of the riparian or wetland areas in the watershed. Sufficient reproduction of native species appropriate to the site is occurring to ensure sustainability. Mesic herbaceous plant communities occupy most of their site potential. Vegetation is in a dynamic equilibrium appropriate to the stream or wetland system. Scale: subwatershed.

Riparian Management Area DC-4 (ARCS)

Riparian vegetation has the species composition, structural diversity, age class diversity, and extent that is characteristic of the setting in which it occurs and the hydrologic and disturbance regimes in which it developed. The condition and composition of small habitat patches may change over small temporal and spatial scales in response to local disturbances but remains relatively constant at larger scales. Plant communities are similar in species composition, age class structure, canopy density, and ground cover to

plant associations (Crowe and Clausnitzer 1997) that are representative of a particular setting. Scale: Subwatershed to subbasin.

Riparian Management Area DC-5 (ARCS)

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

Riparian Management Area DC-6 (ARCS)

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

Riparian Management Area DC-7 (ARCS)

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

Desired Condition (Unnumbered from Plan)

The Wetland/Riparian Vegetation Condition indicator from the Watershed Condition Framework assessment from 2011 provides a basis for addressing the impacts to soil and water relative to the vegetative health of rangelands. (Watershed Condition Classification Technical Guide FS-278, July 2008). Rangelands reflect native or desired nonnative plant composition and cover at near-natural levels as defined by the site potential. Vegetation contributes to soil condition, nutrient cycling, and hydrologic regimes at near-natural levels; functional/structural groups, number of species, plant mortality and decadence closely match that expected for the site average annual plant production equals or exceeds 70 percent of production potential; litter amount is approximately what is expected for the site potential and weather; the reproductive capacity of native or naturalized perennial plants to produce seeds or vegetative tillers is sustainable over the long-term; and introduced plant species are being managed to facilitate long-term replacement by site-adapted native species. Scale: subwatershed.

Note: Riparian management area widths may only be adjusted based on a watershed analysis

MA 4B Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

Standards and guidelines that pertain to MA 4B fall into several categories; general riparian management, timber management in riparian areas, roads management in riparian areas, grazing management in riparian areas, recreation in riparian areas, minerals management in riparian areas, wildfire and fuels management in riparian areas, and lands and special uses in riparian areas. The standards and guidelines applicable to MA 4B and that address listed, proposed, and candidate species are identified in section 2.5 (ARCS), below.

MA 5 Developed Sites and Administrative Areas

Description

Developed sites, administrative areas, and permitted uses such as ski areas, developed campgrounds, recreation residences, administrative and communication sites, and utility corridors are generally limited in extent to meet their designated purpose and occur as a place or feature on the landscape. Ecological values are conserved while protecting the health and safety of humans. Livestock grazing within developed and administrative sites is generally unsuitable, although some administrative sites are used to pasture USFS administrative stock. Transportation and motor vehicle access varies. Roads and trails are typically limited and provide access to main site features such as buildings, permit areas, and campsites. Some of these areas are used for administrative purposes such as employee housing, storage, long-term condition and trend studies, and conifer seed orchards. Though small, these areas are important data collection sites that assist with knowledge of ecosystem function and resilience.

Desired Condition

Infrastructure design promotes employee, permit holder, visitor safety, and accessibility for all users. Facilities are maintained to standard to provide safe and suitable work and visitor environment. Grounds, landscaping, and natural vegetation are maintained in a safe condition free of hazards. The appearance is neat, orderly, and complementary to the surrounding landscape setting.

Facilities, structures, and other built elements blend with the natural landscape where possible. The scenic integrity of these areas is commensurate with the inventoried scenic class. Snags and down wood levels are generally less than in other management areas or are absent due to safety concerns. Administrative studies and seed orchards are maintained. The level of development of buildings and ancillary structures, such as water and power systems, support the developed site, permit area, or administrative area.

Vegetation treatments may include consideration of wildfire protection objectives, which may override ecological desired conditions. In these instances, vegetative structure would result in fire intensity that allows for safe and effective suppression actions.

The recreation opportunity spectrum in MA5 is roaded natural to rural. The following descriptions further explain the desired conditions for specific facility types within the forests.

Communication Sites

Desired Condition

Communication facilities and ancillary features are designed to be consistent with the designated purpose while maintaining human health and safety values and inventoried scenic class. New facilities are designed to minimize impairing scenic, natural, and cultural resource values and to blend with the natural appearing landscape, repeating the form, line, color, and texture of the surrounding valued landscape character. Existing sites and facilities are improved to mitigate affects to on-site values and visual appearance, and to be consistent with the inventoried scenic class. Wherever feasible, communication sites, towers, buildings and other improvements are shared between users to minimize the improvements placed on the forests.

Utility Corridors

Desired Condition

Utility corridors and ancillary features are designed to be consistent with the designated purpose of providing power and telecommunication services to communities. Human health and safety values are maintained. Proposed new facilities are evaluated for compatibility with existing corridors and scenic, natural, and cultural resource values. Horizontal lines are softened through feathering and scalloping the edges of the corridors commensurate with vegetative and other resource needs. Proposals for new corridors are designed to minimize the visibility of the corridors and repeat the form, line, color and texture of the surrounding valued landscape character.

Developed Recreation Sites and Facilities

Desired Condition

Developed public facilities are operated by USFS personnel or permit holders. Sites such as campgrounds, picnic areas, trailheads, snow-parks, and boating and interpretive sites, are maintained to standards, fully functional, provide for visitor safety, and are accessible to people with disabilities. Grounds, landscaping, and natural vegetation are maintained in a safe condition and free of hazards. Potable water and sanitary systems are limited yet are provided at some sites and meet required health standards. Areas of highly concentrated use provide a full suite of amenities that provide for diversity of users. The facilities are fully utilized with occupancy rates approaching full capacity during peak use periods and moderate occupancy rates during nonpeak summer and fall periods. Facilities provide some comfort for the user as well as site protection. New construction and reconstruction projects utilize a contemporary/rustic design based on the use of native or durable materials. Impacts to natural resources from concentrated visitor use are minimal. Partnerships with permit holders are encouraged and sustained at high-end public developed areas, such as concessionaire-operated campgrounds.

Permitted Recreation Facilities

Desired Condition

Special use permit holders operate private facilities within the terms and conditions of the permit. Public uses are allowed at permitted sites such as lodges, organization camps, and trams. Public use facilities are maintained at a safe and functional use level and provide for universal accessibility. Grounds, landscaping, and natural vegetation at public use sites are maintained in a safe condition free of hazards. Private users are permitted at facilities such as recreation residences. No new recreation residence tracts or unoccupied lots are permitted. The recreation opportunity spectrum in MA 5 is rural. The following descriptions further explain the desired conditions for specific facility types within the forests.

Ski Areas

Desired Condition

Facilities and structures are designed to blend with the natural environment, using the principles in the Built Environment Image Guide for the national forests and Grasslands (USDA Forest Service 2001a). Facilities are maintained at a safe and functional use level and provide for universal accessibility. Removal of vegetation for ski runs is designed to blend with the natural patterns of the surrounding valued landscape character. Activities are consistent with the approved master development plan.

Administrative Sites

Desired Condition

Administrative facilities include guard stations, administrative sites, pastures and airstrips. Administrative facilities are safe, efficient, cost-effective, and are maintained at a function and use level that meets management needs and provides for universal accessibility. Facilities meet all applicable health and safety standards and impacts to natural resources are minimal. Grounds, landscaping, and natural vegetation are maintained in a safe condition free of hazards. Administrative facilities complement natural settings. The form of structures is derived by the function and form of the landscape setting. For example, structures in mountainous, timbered landscapes have steep rooflines, broad eaves, and use durable indigenous materials (i.e., stone and heavy timbers) with the appearance derived from the local environment. Structures, signage, and other environmental elements designed reflect the style and character inherent in the local environment (USDA Forest Service 2001a).

Suitability of Management Areas

A management area may be identified as suitable for uses or activities that are compatible with that management area's desired conditions and objectives. A management area may also be identified as not suitable for uses or activities that are not compatible with that management area's desired conditions and objectives. Table 20 identifies whether each management area is suitable or not suitable for a comprehensive list of uses and activities. The suitability determination identified in Table 20 is guidance for project and activity decision making and is not a commitment nor a final decision approving projects and activities. Uses of specific areas are approved through project and activity decision making.

Table 20. Suitability of Management Areas for a Variety of Uses and Activities. See Table 6 for management area designations.

Use or Activity	Management Area																	
	1A	1B	1C	2A ²	2B	2C	2D	2E	2F	2G ⁵	2H	2I	2J ⁴	3A	3B	4A	4B	5
Timber production	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	S	U	U
Timber harvest ³	U	U	U	S	U	S	S	S	S	S	S	S	S	S	S	S	S	S
Grazing (cattle and sheep)	S	S	S	S	U	U	S	S	S	S	S	S	U	S	S	S	S	U
Motor vehicle use (summer) ¹	U	U	U	U	U	S	S	S	S	U	S	S	U	U	S	S	S	S
Motor vehicle use (winter)	U	U	U	U	U	S	S	S	S	S	S	S	U	U	S	S	S	S
New Road construction	U	U	U	U	U	U	S	S	S	U	S	S	U	U	U	S	U	S
New Trail construction (for motor vehicle use)	U	U	U	U	U	U	S	S	S	U	S	S	U	U	S	S	U	S
Mechanical fuel treatment	U	U	U	U	U	U	S	S	S	S	S	S	S	S	S	S	S	S

Use or Activity	Management Area																	
	1A	1B	1C	2A ²	2B	2C	2D	2E	2F	2G ⁵	2H	2I	2J ⁴	3A	3B	4A	4B	5
Energy development (wind farms, utility corridors, pipelines, etc.)	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	S	U	S ⁶

S designates use or activity as suitable. Refer to desired conditions and standards and guidelines for each management area and/or use for specific guidance.

U designates use or activity as unsuitable. Refer to desired conditions and standards and guidelines for each management area and/or use for specific guidance.

1. Indicates suitable applies only to use or activity on roads, trails, and areas open to motor vehicle use that are in compliance with the Travel Management Rule (36 CFR 212).

2. Indicates not suitable for river segments classified as wild rivers, suitable for river segments classified as scenic and recreational rivers.

3. Vegetation in areas suitable for timber harvest shall not be subject to regularly scheduled timber production (regularly schedule timber harvest on suitable lands); since they are not part of our timber suitability landbase.

4. All activities in municipal watersheds are dependent on the agreement for management of the watershed between the Forest Service and the municipality.

5. Establishing legislation may influence whether motorized use is allowed.

6. Energy development is only suitable in designated utility corridors.

Blue Mountains Aquatic and Riparian Conservation Strategy

The Blue Mountains Aquatic and Riparian Conservation Strategy (ARCS) is a broad-scale strategy to maintain and restore the ecological health of watersheds and aquatic and riparian ecosystems on the Umatilla, Wallowa-Whitman and Malheur national forests, as well as the portion of the Ochoco administrated by the Malheur. The Blue Mountains national forests developed the ARCS using both the 2008 and 2016 Region 6 ARCS framework which integrates and refines existing strategies {Pacific Northwest Forest Plan (NWFP)-Aquatic Conservation Strategy (ACS) (USDA Forest Service 2005a); Interim Strategies for Managing Anadromous Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, and portions of California (PACFISH, USDA Forest Service 1995a and 1995b); and the Inland Native Fish Strategy (INFISH, USDA Forest Service 1995c and 1995d)} into a single, unified strategy.

The ARCS is intended to build upon prior successes, incorporate lessons learned, and address new information available since the earlier strategies were developed. The strategy is founded on the premise that the existing PACFISH, INFISH, and NWFP ACS strategies are fundamentally sound, are generally understood by Forest Service personnel, and have significantly improved the management of aquatic resources on NFS lands in the Pacific Northwest (Heller et al. 2004, Reeves 2006). Further, monitoring of aquatic habitats within Forests managed under PACFISH and INFISH reflects improving habitat conditions at broad scales, indicating that the strategies have been successful at halting habitat degradation at watershed and larger scales and that at least some elements of riparian and aquatic habitat condition are improving (Archer et al. 2009, Meredith et al. 2012, 2013, Archer et al. 2016). Similarly, monitoring of within the area of the Northwest Forest Plan have also shown upward trends in aquatic and riparian habitat conditions (Gallo et al. 2005, Reeves et al. 2006, Miller et al. 2015).

The ARCS focuses broad-scale aquatic resource protection, coupled with strategically-focused active restoration in priority areas (USDA Forest Service 2005a). The ARCS includes desired conditions, objectives, riparian management areas, standards and guidelines, a key watershed network, watershed

analysis, watershed protection and restoration, and monitoring and adaptive management. The ARCS and other Revised Forest Plan components are intended to:

- Protect and maintain the ecological integrity of terrestrial and aquatic ecosystems and watersheds, riparian areas, water quality, and water resources,
- Restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds, riparian areas, water quality, and water resources,
- Contribute to the recovery of federally listed species, conserve proposed or candidate species, and maintain viable populations of species of conservation concern, and
- Identify watershed(s) that are a priority for protection, maintenance or restoration.

The ARCS replaces the interim PACFISH and INFISH strategies and represents the long-term aquatic and riparian habitat conservation strategy for the Blue Mountains national forests (see Appendix A for a full ARCS description and Appendix B for crosswalk between PACFISH/INFISH and ARCS). The Blues ARCS reflects the Forest Service' strong commitment to the protection and restoration of aquatic ecosystems that will conserve and recover aquatic and riparian-dependent species, water quality, and water resources.

The protection of riparian ecosystems is central to all salmonid conservation efforts (FEMAT 1993, Spence et al. 1996, and Quigley and Arbelbide 1997). As national Forest Plans and Bureau of Land Management resource management plans were about to be revised, the Interior Columbia Deputy Team⁶ issued in 2003, the *Interior Columbia Strategy, A Strategy For Applying The Knowledge Gained By The Interior Columbia Ecosystem Management Project To The Revision Of Forest and Resource Management Plans And Project Implementation*. Direction for using the *Strategy* was clarified in August 21, 2008, when the Deputy Team issued further direction through a memo titled *A Framework for Incorporating the Aquatic and Riparian Component of the Interior Columbia Basin Strategy into BLM and Forest Service Plan Revisions* (hereafter referred to as *Framework*) (USDI Fish and Wildlife Service 1998). The *Strategy* and *Framework* were updated in 2014.⁷ The intent of the *Framework* is to include the information generated in the Interior Columbia Basin Ecosystem Management Project (Quigley and Arbelbide 1997) to facilitate consistency among plans in terms of the structure of riparian and aquatic components, while providing for a high level of agency decision discretion in the substance of individual plan revisions.

The recognition of the role of natural disturbance and the dynamic nature of aquatic and riparian ecosystems in the Pacific Northwest (Reeves et al. 1995) are a key differences between the ARCS and past management direction. As stated in both the 2008 and 2016 ARCS documents, natural disturbances maintain ecologically healthy watersheds that create spatial heterogeneity and temporal variability in the physical components of the system watersheds and aquatic habitat. Natural disturbances have resulted in a mosaic of habitat conditions over time, and native fish populations have adapted to this dynamic environment (Naiman et al. 1995, Reeves et al. 1995 as cited in ARCS 2008:2016). Aquatic and riparian ecosystems are most resilient⁸ to the types of disturbances under which they have developed.

⁶ The Interior Columbia Deputy Team includes the Assistant Regional Director for the USFWS, the EPA Deputy Regional Administrator, the Deputy Regional Foresters for FS Regions 1, 4, 6, the BLM Idaho Deputy State Director for Resource Services, the BLM Oregon/Washington Deputy State Director for Resource Planning, Use and Protection, the NMFS Assistant Regional Administrator, and the PNW and RMRS Deputy Station Director.

⁷ USDI Bureau of Land Management 2014

⁸ Resiliency of an ecosystem is the degree to which the system can be disturbed and recover to a state where processes and interactions function as before (Holling 1973, Reeves et al. 1995 as cited in USDA Forest Service 2008a; 2016).

The ARCS recognizes that streams are dynamic, with periodic events such as wildfire, large storms and subsequent floods, hillslope failures, landslides, debris flows, and channel migration resulting in changing conditions in space and time. Another important consideration in the development of the ARCS is that streams and aquatic ecosystems are linked to the dynamics of both the riparian and upland communities, and the watershed and physical processes that shape them.

The ARCS recognizes the importance of small streams (also called headwater, intermittent, ephemeral, seasonal, low-order, and upper network streams) as critical source areas for high quality water. Small streams make up most of the total catchment area in a watershed. Because the spatial extent of headwater streams makes up a major portion of the total catchment area, these and adjacent upland ecosystems are important sources of sediment, water, nutrients, energy, and organic matter for downstream systems (Sidle et al. 2000, Meyer and Wallace 2001 as cited in USDA Forest Service 2016).

The ARCS is designed to maintain and restore the ecological health of watersheds, and aquatic and riparian ecosystems on national forest lands. Naiman et al. (1992) define the components of ecologically healthy watersheds as the basin geomorphology, hydrologic pattern, water quality, riparian vegetation characteristics, and habitat characteristics. The management of ecologically healthy watersheds requires the preservation of the interactions between these components and accounting for spatial and temporal variability (Naiman et al. 1992). Another purpose of the ARCS is to develop networks of properly functioning watersheds that support populations of fish and other aquatic and riparian-dependent resources across the Pacific Northwest Region. The intent of the ARCS is to maintain and restore the dynamic ecological processes responsible for creating and sustaining habitats over broad landscapes, as opposed to just at the individual project or small watershed scale. The Blues ARCS is intended to provide a core set of desired conditions, suitability, objectives, standards and guidelines for aquatic and riparian management for national forests to design Forest Plan direction.

The Blues ARCS is comprised of five elements: (1) riparian management areas (RMAs), (2) key watersheds, (3) watershed analysis, (4) watershed protection and restoration, and (5) monitoring and adaptive management. Interaction of all five elements at the watershed and landscape-scales provides the basis for watershed, aquatic, and riparian ecosystem management and restoration. These components work together and complement each other to achieve the goal of a distribution of watershed conditions that are resilient to disturbance and that protect, maintain, restore, and enhance water quality for multiple beneficial uses and habitat for inland and anadromous fish, other aquatic organisms, and a variety of wildlife and other riparian-dependent resources (FSM 2526) on NFS lands in the region. They will not achieve desired results if implemented alone or in limited combination (FEMAT 1993). As such, the Blues ARCS elements and other Revised Forest Plan content are designed to work together to guide and constrain management to achieve the desired conditions.

The following describes the Blues ARCS in detail. These plan components are designed to be implemented in an integrated manner to achieve the goal of a distribution of watershed conditions that are resilient to natural disturbance, thus maintaining, restoring, and enhancing habitat for fish, other aquatic organisms, and a variety of wildlife and other riparian dependent resources on the forests.

Desired Conditions

As described previously in section 2.2, desired conditions describe visions of what the planning area (or portions thereof) should look like in the future. The project documentation should explain how the project is consistent with desired conditions and describe any short-term or negligible long-term adverse effects the project may have on the maintenance or attainment of any desired condition. Achieving desired conditions will also vary in both time and space. Some desired conditions may be achievable over a long timeframe (e.g., several hundred years); whereas, in other cases the desired condition already matches the

current condition, and the desire is to maintain it. In addition, each desired condition has a scale. Some desired conditions apply at the Forest-wide scale, while others apply at a subbasin, watershed, subwatershed, or management area scales.

The desired conditions for the Blues ARCS pertaining to riparian areas, water, water quality and quantity, were described in section 2.2. The crosswalk to PACFISH and INFISH goals is found in Appendix B.

Objectives

As noted above, the Revised Forest Plan contains objectives to identify and track a desired rate of progress towards a desired condition. The objectives and associated desired conditions for the Blue Mountains national forests specifically related to the watershed restoration component of the Blues ARCS are found in Table 5 in section 2.2. The key and priority watersheds are the primary areas where restoration will take place under the objectives for each Forest. It is anticipated that with the implementation of these objectives within the watersheds identified, movement toward desired conditions will take place over the life of the Revised Forest Plan.

Forest Wide Standards and Guidelines

Watershed

- WM-1S When watershed function⁹ desired conditions are being achieved and watersheds are functioning properly¹⁰, projects shall maintain¹¹ those conditions. When watershed function desired conditions are not yet achieved or watersheds have impaired function or are functioning-at-risk, and to the degree that project activities would contribute to those conditions, projects shall restore¹² or not retard attainment¹³ of desired conditions. Short-term¹⁴ adverse effects from project activities may occur when they support or do not diminish long-term¹⁵ recovery of watershed function desired conditions and federally listed species. Exceptions to this standard include situations where Forest Service authorities are limited (Alaska National Interest Lands Conservation Act {ANILCA}, the General Mining Act of 1872, valid State water rights, etc.). In those cases, project effects shall be minimized and not retard attainment of desired conditions for watershed function, to the extent possible within Forest Service authorities. Use ARCS Attachment B (Appendix B of this BA) to assist in determining compliance with this standard.
- WM-2S All projects shall be implemented in accordance with Best Management Practices, as described in national and regional technical guides.

⁹ Per Revised Land Management Plan Watershed Function desired conditions (watershed function, hydrologic, riparian, wetland, stream channel, groundwater dependent ecosystem, and aquatic habitat).

² Per Watershed Condition Framework Technical Guide (USDA Forest Service, 2011b), subsequent versions and/or comparable methods. Other broad-scale or local inventory, assessment and monitoring data and analysis can be used to refine initial classifications made per WCF. The Watershed Condition Framework categories of terminology for “functioning properly”, “functioning-at-risk”, and impaired function are equivalent to the “functioning appropriately” “functioning-at-risk” and “functioning at unacceptable risk” categories within the matrix of pathways and indicators (USFWS 1998), and to the respectively equivalent to “properly functioning” or “at risk” or “not properly functioning” categories within the matrix of pathways and indicators used by NMFS (1996).

¹¹ See glossary for definitions of “maintain” and “degrade”.

¹² See glossary for definitions of “restore”.

¹³ See glossary for definitions of “retard attainment”.

¹⁴ See glossary for definition of “short-term adverse effects.”

¹⁵ See glossary for definition of “long-term recovery.”

Watershed Restoration

- RE-1G Watershed restoration projects should be designed to utilize or emulate natural ecological processes to the extent practicable, for meeting and maintaining restoration objectives.
- RE-2G Watershed restoration projects should be designed to minimize the need for long-term maintenance.
- RE-3S Except where Forest Service authorities are limited, mitigation or planned restoration shall not be used as a substitute for preventing long-term watershed or habitat degradation.
- RE-4S Minimize water and sediment delivery from roads and trails to streams. This includes roads, or road segments, whether inside and outside of riparian management areas (RMAs), that deliver sediment to streams.

MA 4B Riparian Management Areas Standards and Guidelines

Overall, the Blues ARCS standards and guidelines are quite similar to those in PACFISH and INFISH, although, there are some differences (Appendix B). Many of those differences result from the process of integrating and synthesizing direction from three strategies into one. In addition, consistent with recent direction for standards and guidelines (USDA Forest Service 2015a), those standards and guidelines associated with procedural requirements (e.g., watershed analysis and interagency coordination) were omitted as plan components in the Blues ARCS, as were standards or guidelines that were already addressed by comparable ones.

Protection and restoration of riparian areas is particularly important to achieving the Blues ARCS goals and objectives. Riparian management strategies differ substantially across the United States and within the Pacific Coastal region (Lee et al. 2004, Everest and Reeves 2007). Key differences include the type and size of riparian areas identified for protection or restoration (e.g., RMA widths), management goals for them (e.g., desired conditions), the kinds and timing of activities that are or are not permissible (e.g., suitability), and the nature of management direction used to guide or constrain those activities (e.g., standards and guidelines).

The Blues ARCS approach to riparian area management involves designation of relatively large default RMAs to protect and restore water quality, habitat for a wide range of aquatic and terrestrial species, and critical ecological processes. Watershed analysis can be used to adjust these default RMA widths in particular watersheds. The scientific basis for this approach was originally provided in FEMAT (1993) and later supported by a review by Everest and Reeves (2007), who concluded that there was no scientific evidence that either the default prescriptions or the options for watershed analysis in the Northwest Forest Plan (NWFP) provide more protection than necessary to meet stated riparian management goals.

RMAs are not intended as exclusion zones or reserves. Instead, management activities designed to benefit aquatic and riparian-dependent resources and move the landscape towards desired conditions are allowed and encouraged within them. Furthermore, while the Blues ARCS default RMA widths are uniform, the management of them is not intended to be. Instead, a wide range of management activities, involving highly-varied prescriptions, are expected to occur within them. These activities are to be planned and implemented based on watershed analysis that leads to project-specific designs that prescribe the types, locations, spatial extent, and timing of the activities. These designs must meet applicable standards and guidelines. This approach recognizes that effective project designs, including identification of both treated and untreated areas, depends on objectives and on local landscape context (Richardson et al. 2012).

Evolving science continues to provide new insights to help inform project-level plans for activities in RMAs. For example, recent scientific syntheses related to ESA-consultation in western Oregon (USDA

Forest Service et al. 2013) provide information about the potential effects of forest thinning on stream temperature, large woody debris, and terrestrial wildlife species. Other recent work (e.g., Benda et al. 2015, Olson et al. 2014, and Olson and Burton 2014) provide additional science that can be used to plan and implement management activities in RMAs to help achieve desired conditions.

The management approach adopted in the Blues ARCS differs substantially from other strategies that often have different management goals, specify smaller riparian areas, and/or contain more prescriptive and uniform regulatory standards across broad, diverse areas. However, it is consistent with recent trends away from simple, uniform standards, towards more complex guidelines that are planned and implemented at larger, watershed scales (Lee et al. 2004).

MA 4B Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species and Their Critical Habitats

- | | |
|--------|--|
| RMA-1S | Riparian Management Areas include portions of watersheds where aquatic and riparian-dependent resources receive primary management emphasis. When riparian management area desired conditions are functioning properly, projects shall protect or maintain those conditions. When riparian management area desired conditions are not yet achieved or riparian management areas have impaired function or are functioning-at-risk and to the degree that project activities would contribute to those conditions, projects or permitted activities shall restore or not retard attainment of desired conditions ¹⁶ . Short-term adverse effects from project activities may occur when they support long-term recovery of riparian management area desired conditions ¹⁷ . Exceptions to this standard include situations where Forest Service authorities are limited (Alaska National Interest Lands Conservation Act {ANILCA}, the General Mining Act of 1872, valid State water rights, etc.). In those cases, project effects shall be minimized and not retard attainment of desired conditions to the extent possible within Forest Service authorities. Use ARCS Attachment B (Appendix B of this BA) (diagnostic indicators and RMA ecological process and function descriptions) to assist in determining compliance with this standard. |
| RMA-2S | Herbicides, insecticides, pesticides, toxicants, and other chemicals shall be applied only to maintain, protect, or enhance aquatic and riparian resources or to restore native plant communities in a manner that does not harm aquatic or riparian resources. |
| RMA-3S | Trees felled for safety shall be retained onsite unless in excess of what is needed to achieve aquatic and riparian desired conditions. If the desired quantity and size distribution of large wood has been met on site, the wood can be transported to other aquatic and riparian restoration projects. |
| RMA-4G | Water drafting sites should be located and managed to minimize adverse effects on stream channel stability, sedimentation, and in-stream flows needed to maintain riparian resources, |

¹⁶ Per Watershed Condition Framework Technical Guide, USDA Forest Service (2011b), subsequent versions of this guide and/or other comparable methods. Other broad-scale or local inventory, assessment and monitoring data and analysis can be used to refine initial classifications made per WCF. The Watershed Condition Class terminology for functioning properly, “functioning-at-risk”, and impaired function are equivalent to “functioning appropriately” or “functioning-at-risk” and “functioning at unacceptable risk” functioning categories within the matrix of pathways and indicators (USFWS 1998, and respectively equivalent to “Properly Functioning” or “At Risk” or “Not Properly Functioning” categories within the matrix of pathways and indicators used by NMFS (1996).

¹⁷ The definitions and rationale for the terms maintain, restore, degrade, retard attainment, short-term, and long-term are included in Forest Plan standard WM-1S.

channel conditions, and fish habitat. To prevent the spread of invasive species, water should not be discharged into other water bodies.

- RMA-5S Pumps shall be screened at drafting sites to prevent entrainment of fish and shall have one-way valves to prevent back-flow into streams.
- RMA-6G Fish habitat and water quality should be protected when withdrawing water for administrative purposes.
- RMA-7S Refueling shall occur with appropriate containment equipment and a spill response plan in place. Wherever possible, storage of petroleum products and refueling will occur outside of RMAs. The use of containment devices, absorbent pads, and a developed spill plan will help reduce the risk of fuel and petroleum products from getting into streams and other waterways if an accident were to occur. If refueling or storage of petroleum products is necessary within RMAs, these operations will be conducted no closer than 100 feet from waterways.

MA 4B Fuels Management and Wildland (Unplanned) Fire Activities

- FM-1G Locate temporary firefighting facilities (e.g., incident bases, camps, helibases, staging areas, helispots, and other centers) for incident activities outside RMAs. When no practical alternative exists, all appropriate measures to protect, maintain, restore, or enhance aquatic and riparian dependent resources should be used. If the only suitable location for such activities is within a RMA, use may be granted following review by a resource advisor and discussion with the agency administrator. The resource advisor will work with the incident management team to prescribe the location, use conditions, and rehabilitation requirements. Use an interdisciplinary team to predetermine suitable incident base and helibase locations.
- FM-2G Aerial application of chemical retardant, foam, or other fire chemicals is prohibited within 300 feet (slope distance) of perennial and intermittent waterways. Waterways are defined as any body of water (including lakes, rivers, streams, and ponds) whether or not it contains aquatic life, except in cases where human life or public safety is threatened and chemical use could be reasonably expected to alleviate that threat. This includes open water that may not be mapped as such on avoidance area maps and intermittent streams that are running or holding surface water at the time of retardant use.
- FM-3S Portable pump set-ups shall include containment provisions for fuel spills, and fuel containers shall have appropriate containment provisions. Vehicles shall be parked in locations that avoid entry of spilled fuel into streams. When drafting, pumps shall be screened at drafting sites to prevent entrainment of aquatic species, screen area shall be sized to prevent impingement on the screens, and shall have one-way valves to prevent back-flow into streams. Use NMFS-approved screening criteria where listed fish or critical habitat are present.
- FM-4G Locate and configure firelines to minimize sedimentation to waterbodies, capture of overland and streamflows, and development of unauthorized roads and trails. Restore firelines following suppression or prescribed fire activities.
- FM-5S To minimize soil damage when chipping fuels within riparian management areas, chip bed depths on dry soils shall be limited to 7.5 centimeters or less (Busse et al. 2006).

- FM-6G Disturbed areas, such as firelines, drop-points, camps, roads, and trails, should be restored by actions such as scattering slash piles, replacing logs and boulders, scarifying soils, recontouring terrain, and reseeding with native species.
- FM-7G Pumping directly from a stream channel should be avoided if chemical products are to be injected directly into the system. When chemicals are used, pumping should be conducted from a fold-a-tank that is located outside the riparian area.
- FM-8G Minimum impact suppression tactics (MIST) should be utilized in sensitive areas, such as designated wilderness areas, designated wild and scenic river corridors, research natural areas, botanical areas, riparian management areas, cultural, and historical sites, developed recreation areas, special use permit areas that have structures, and historical and recreational trails. MIST techniques should also be used for post fire restoration activities.
- FM-9G Prescribed burn direct ignition in RMAs should not be used unless site/project scale effects analysis demonstrates that it would not retard attaining aquatic and riparian desired conditions.
- FM-10S Ensure prescribed burn projects contribute to and do not retard the attainment of the aquatic and riparian desired conditions.
- FM-11G Chemicals or retardant should not be used for suppression or mop-up within riparian areas.
- FM-12S Pumps and charged hoses shall not be back flushed into stream channels, wetlands, or surface water.

MA 4B Silviculture and Timber Management

- TM-1S Silvicultural treatments shall occur in riparian management areas only as necessary to maintain, enhance, or restore desired conditions for aquatic and riparian resources. When conducted, these activities shall avoid or minimize adverse effects to aquatic and riparian resources. Vegetation in riparian management areas shall not be subject to regularly scheduled timber harvest because they are not part of the timber suitability landbase.
- TM-2S Fuelwood cutting shall not be authorized in RMAs unless specifically designed to attain aquatic and riparian desired conditions.
- TM-3G Use of existing or construction of new landings, designated skid trails, staging, and decking should not occur in riparian management areas, unless they are associated with projects designed to improve riparian management areas conditions.
- TM-4G Yarding activities should achieve full suspension over the active channel; unless other alternatives will have less damage to riparian areas and stream channels¹⁸.
- TM-5S Silvicultural practices shall include provisions, as appropriate, to avoid detrimental changes in water temperatures, blockages of water courses; including protection for streams, stream banks, shorelines, lakes, wetlands, and other bodies of water, and deposits of sediment.
- TM-6S Silvicultural practices shall include provisions (e.g., BMPs) for the maintenance or restoration of soil resources.

¹⁸ Active channel is the bankfull width of flowing perennial or intermittent streams.

- TM-7S Timber harvest on lands not suitable for timber production shall occur only to meet desired conditions for each management area other than timber production.
- TM-8G In watersheds in which stream channels and aquatic habitats are in properly functioning condition, forest vegetation within RMAs should be managed to maintain or increase large wood recruitment and delivery to streams.
- TM-9S In watersheds in which stream channels and aquatic habitats are not in properly functioning condition, and where instream wood frequency and volume are below reference conditions and/or site potential, manage forest vegetation within RMAs to maintain or increase large wood recruitment and delivery to streams.
- TM-10S As directed by the NFMA, timber harvest shall only occur when a site specific finding has determined that it will not cause irreversible damage to soil, slope, or other watershed conditions.

MA 4B Livestock Grazing and Grazing Land Vegetation

- GM-1S Manage livestock grazing to attain aquatic and riparian desired conditions. Where livestock grazing is found to prevent or retard attaining aquatic and riparian desired conditions, modify grazing practices (such as number of livestock, timing, and physical structures). If adjusting practices is not effective, remove livestock from that area using appropriate administrative authorities and procedures.
- GM-2S New livestock handling and/or management facilities shall be located outside riparian management areas unless they do not prevent or retard attaining aquatic and riparian desired conditions.
- GM-3G The purpose of this guideline is to manage livestock grazing to help attain and maintain aquatic and riparian desired conditions over time. Specifically, it is intended to maintain or improve vegetative and stream conditions, help ensure the viability of aquatic species, provide important contributions to the recovery of ESA-listed species, and facilitate attainment of State water quality standards.

The annual livestock use and disturbance indicators described below should be applied to help achieve, over longer timeframes, conditions at site and watershed scales that enable attainment and maintenance of desired conditions. The values specified below are starting points for management. Only those indicators and numeric values that are appropriate to the site and necessary for maintaining or moving towards desired conditions should be applied.¹⁹ Specific indicators and indicator values should be prescribed and adjusted, if needed, in a manner that reflects existing and desired conditions and the natural potential of the specific geo-climatic, hydrologic and vegetative setting in which they are being applied²⁰. Indicators and indicator values should be adapted over time based on long-term

¹⁹ Not all indicators may apply to a particular site. For example, stubble height is a meaningful indicator for lower gradient streams where herbaceous vegetation plays an important role in stabilizing streambanks. It is generally less useful for steeper channels, where channel morphology is controlled by coarse substrates. Moreover, not all numeric values may apply to a particular site (e.g., sites with short graminoids).

²⁰ Indicator values for specific sites should be determined based on consideration of local conditions including, but not limited to, the degree of departure between existing and desired conditions, the current and desired rate of improvement, site sensitivity to grazing, grazing season, the presence of special status species (e.g., ESA-listed species, Regional

monitoring and evaluation of conditions and trends. Alternative use and disturbance indicators and values, including those in current ESA consultation documents or non-ESA allotment management plans or allotment NEPA decisions, may be used if they are based on best available science and monitoring data and meet the purpose of this guideline.

1. Where desired conditions for water quality, aquatic habitat, and riparian vegetation have been attained²¹ and riparian vegetation is in late-seral conditions²², protect or maintain those conditions by managing annual livestock grazing use and disturbance as follows²³:

- maintain a minimum of 4-inch residual stubble height²⁴ of key herbaceous species on the greenline;
- utilize no more than 30-45 percent of deep-rooted herbaceous vegetation in the active floodplain⁷ and, as needed, in other critical portions of the riparian management area;
- limit streambank alteration⁸ to no more than 20-25 percent; and
- limit use of woody species to no more than 30-40 percent of current year's leaders along streambanks and, as needed, in other critical portions of the riparian management area.

2. Where desired conditions for water quality, aquatic habitat, and/or riparian vegetation have not yet been attained, but conditions are moving towards those desired conditions³, enable continued recovery by managing annual livestock grazing use and disturbance as follows:

- maintain a minimum of 4-inch to 6-inch residual stubble height of key herbaceous species on the greenline²;
- follow the criteria for utilization of deep-rooted herbaceous vegetation, streambank alteration, and use of woody species described in (1).

3. Where desired conditions for water quality, aquatic habitat, and/or riparian vegetation have not been attained and conditions are not moving towards those desired conditions³, enable recovery by managing annual livestock grazing use and disturbance as follows:

- maintain a minimum of 6-inch residual stubble height of key herbaceous species on the greenline;

Forester's sensitive species) that are sensitive to grazing, whether or not water quality standards and related requirements (e.g., TMDLs for impaired waters) are being met, and the site's importance in maintaining or attaining those standards and requirements. Consideration of these conditions is especially important in prescribing specific stubble height values within the 4-inch to 6-inch range and streambank alteration values within the 15-20% range.

²¹ Assessment of conditions and trends should be based on best available information at a variety of spatial and temporal scales. Site-specific information is particularly important.

²² Late seral conditions means the existing riparian vegetation community is similar to the potential natural community composition (per Winward 2000).

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

²⁴ Stubble height criteria apply at the end of the grazing period, when that period ends after the growing season. When the grazing period ends before the growing season does, stubble height criteria can be applied at the end of the grazing period or the end of the growing season.

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

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

- utilize no more than 30-35 percent of deep-rooted herbaceous vegetation in the active floodplain and, as needed, in other critical portions of the riparian management area;
- limit streambank alteration to no more than 15-20 percent²; and
- limit use of woody species to no more than 20-30 percent of current year's leaders along streambanks and, as needed, in other critical portions of the riparian management area.

GM-4G	During allotment management planning, existing livestock handling or management facilities that prevent or retard attaining aquatic and riparian desired conditions should be removed, as appropriate.
GM-5G	Livestock trailing, watering, loading, and other handling in riparian management areas should be avoided or minimized.
GM-6S	Livestock grazing shall be managed and implemented to avoid trampling federally listed threatened or endangered fish redds.

MA 4B Roads Management

RF-1G	New roads and trails should not be constructed within riparian management areas unless no other feasible alternative exists.
RF-2G	Temporary roads, including stream crossings, in RMAs should be minimized. Temporary roads, if constructed, should be managed to protect and restore aquatic and riparian desired conditions.
RF-3S	Side-casting (placement of unconsolidated earthen waste materials resulting from road construction or maintenance) in riparian management areas shall be avoided.
RF-4S	Fill material shall not be placed on organic debris in riparian management areas.
RF-5S	Disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow shall be avoided when constructing or reconstructing roads or landings either inside or outside of riparian management areas.
RF-6G	Wetlands and unstable areas should be avoided when reconstructing existing roads or constructing new roads and landings. Minimize impacts where avoidance is not practical.
RF-7S	New or replaced permanent stream crossings shall be designed to allow for the 100-year flood and its bedload and debris. 100-year flood estimates will reflect the best available science regarding potential effects of climate change.
RF-8S	Where physically feasible, construction or reconstruction of stream crossings will avoid diversion of streamflow out of the channel and down the road in the event of crossing failure.
RF-9S	Construction or reconstruction of stream crossings shall provide and maintain passage for all life stages of all native and desired non-native aquatic and riparian-dependent organisms. Crossing designs shall reflect the best available science regarding potential effects of climate change on peak flows and low flows.
RF-10G	Fish passage barriers should be retained where they serve to restrict access by undesirable nonnative species and are consistent with restoration of habitat for native species.

- RF-11G Design roads to minimize delivery of water and sediment from roads to streams. Avoid or minimize disruption of hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow when constructing, reconstructing, and maintenance of roads or landing.
- RF-12G Road drainage should be routed away from potentially unstable channels, fills, and hillslopes to the extent practicable.
- RF-13S Road maintenance and new road construction shall be designed to minimize adverse effects to threatened, endangered, proposed, or candidate aquatic species and their habitat.

MA 4B Recreation Management

- RM-1G New facilities or infrastructure should not be placed within expected long-term channel migration zones if it has the potential to impact channel or floodplain function. If some facilities must occur in RMAs (e.g., road stream crossings, boat ramps, docks, and interpretive trails), locate and design them to minimize impacts on floodplains and other riparian dependent resource conditions (e.g., within geologically stable areas, avoiding major spawning sites).
- RM-2G Existing recreation facility components that are causing unacceptable impacts in riparian management areas should be removed or relocated. Site condition should be restored to improve riparian area function.

MA 4B Minerals Management

- MM-1G For operations in RMAs, ensure operators take all practicable measures to maintain, protect, and rehabilitate water quality and habitat for fish and wildlife and other riparian dependent resources that may be affected by the operations. Ensure operations do not retard or prevent attaining aquatic and riparian desired conditions. Exceptions to this guideline include situations where Forest Service has limited discretionary authorities. In those cases, project effects should be minimized and should not prevent or retard attaining aquatic and riparian desired conditions to the extent possible within those authorities.
- MM-2G To the maximum extent possible locate and manage structures, support facilities, and roads outside riparian management areas. Where none exist, locate and manage them to minimize effects upon aquatic and riparian-dependent desired conditions. Existing roads should be maintained to minimize damage to aquatic and riparian dependent resources. When structures, support facilities, and roads are no longer required for mineral activities, they should be restored or reclaimed to achieve aquatic and riparian desired conditions.
- MM-3S Mine waste with the potential to generate hazardous material (as defined by CERCLA) shall not be authorized within RMAs and/or areas where groundwater contamination is possible. The exception is temporary staging of waste during abandoned mine cleanup.
- MM-4G Mineral operations should minimize adverse effects to aquatic and riparian-dependent resources in RMAs. Require BMPs and other appropriate conservation measures to mitigate potential mine operation effects.
- MM-5S Mineral activities on NFS lands shall avoid or minimize adverse effects to aquatic threatened or endangered species/populations or their designated critical habitat.

- All suction dredge mining activities in habitat for aquatic threatened or endangered species/populations or in their designated critical habitat shall be evaluated by the District Ranger to determine if the mining activity is causing or “will likely cause significant disturbance of surface resources²⁵.” A likelihood of a threatened or endangered species “take” (defined in Section 3[18] of the ESA of 1973 as amended) incidental to the mining activity, is an example of a significant resource disturbance. Other significant disturbances that do not involve incidental take might involve effects on channel stability or stream hydraulics.
- If the District Ranger determines that placer mining operations are causing or will likely cause significant disturbance to surface resources, the District Ranger shall contact and inform the operator to seek voluntary compliance with 36 CFR 228 mining regulations and to cease operations until compliance.

MA 4B Uses and Hydropower

- LH-1S Authorizations for all new and existing special uses, including, but not limited to water diversion or transmission facilities (e.g., pipelines and ditches), energy transmission lines, roads, hydroelectric, and other surface water development proposals, shall result in the re-establishment, restoration, or mitigation of habitat conditions and ecological processes identified as being essential for the maintenance or improvement of habitat conditions for fish, water, and other riparian dependent species and resources. These processes include in-stream flow regimes, physical and biological connectivity, water quality, and integrity and complexity of riparian and aquatic habitat.
- LH-2S New support facilities shall be located outside of riparian management areas. Support facilities include any facilities or improvements (e.g., workshops, housing, switchyards, staging areas, and transmission lines) not directly integral to the production of hydroelectric power or necessary for the implementation of prescribed protection, mitigation, or enhancement measures.
- LH-3G If existing support facilities are located within the riparian management areas, they should be operated and maintained to restore or enhance aquatic and riparian dependent resources. At time of permit re-issuance, consider removing support facilities, where practical.

Key and Priority Watersheds

The Revised Forest Plan includes a network of key watersheds. The key watersheds represent the fine-filter strategy of the Blues ARCS. Key watersheds are intended as areas that either provide, or are expected to provide, high-quality habitat or water for rare aquatic and riparian species and/or provide high-quality drinking water to communities that depend upon USFS watersheds as their municipal water sources.

For the purpose of selecting key watersheds, rare species include threatened or endangered fish and wildlife species and species of conservation concern. Therefore, key watersheds may also be designated based upon the presence of high-quality habitat for these species. Key watersheds complement the management direction provided by other ARCS elements and plan components because they are

²⁵ The phrase “will likely cause significant disturbance of surface resources” means that, based on past experience, direct evidence, or sound scientific projection, the District Ranger reasonably expects that the proposed operations would result in impacts to NFS lands and resources which more probably than not need to be avoided or ameliorated by means such as reclamation, bonding, timing restrictions, and other mitigation measures to minimize adverse environmental impacts on NFS resources.

identified to support fish and water quality recovery plans, but also because they are selected based on a ranking system that is in turn based on an assessment of watershed conditions, habitat conditions, population status, and restoration potential.

Key watersheds provide a network of refugia at the evolutionary significant unit (ESU) , recovery unit, or population scale. A network of key watersheds, managed to serve as refugia, is crucial for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species (FEMAT 1993). Refugia include areas of high-quality habitat as well as areas of degraded habitat that have high potential to develop into productive habitat. The network is designed to provide species level conservation and restoration of habitat conditions to retain strong/anchor populations of fish species of interest and species of concern in the short term, and contribute to recovery in the long term. In the short term, key watersheds provide centers of fully functioning, high-quality, aquatic and riparian habitat, and a starting point for longer term expansion of such habitats. Key watersheds with high-quality habitat will serve as anchors for the potential, near-term recovery of depressed stocks. The relative contribution to long term conservation and recovery provided by the key watershed network will vary depending on species, habitat, and life history requirements, as well as the quality and extent of habitat existing within NFS lands. Watersheds containing lower quality habitat with high potential for restoration are expected to become future sources of high-quality habitat with the implementation of a comprehensive restoration.

Watersheds that act as sources of high quality water were considered in the selection of key watersheds. Among these are watersheds that are sources of cold water to downstream watersheds and watersheds that are sources of water for domestic use. In the Revised Forest Plan, municipal watersheds are designated as management areas in which the primary emphasis is on the protection of water quality for human use, and management actions are subject to the terms of the agreements that established each individual municipal watershed. Four cities in the Blue Mountains (Baker City, La Grande, Canyon City, and Walla Walla) have designated municipal watersheds. In addition, several cities (Richland, Long Creek, Sumpter, Joseph, and Pendleton, and Prairie City) have water sources within watersheds on the national forests designated as public source watersheds by the State of Oregon. Several more towns in the vicinity of the planning area have either surface or groundwater sources on NFS lands as their primary source of drinking water. Protection of all public water supplies is guided by both State and Federal law under the Safe Drinking Water and Clean Water Acts. While these watersheds generally have good water quality and watershed conditions, they may or may not possess the riparian and aquatic habitat, population criteria, or restoration potential that qualifies them as key watersheds. Table 21 displays municipal and public source watersheds identified in the forest Plans and those that have been identified as key watersheds.

Table 21. Municipal and public source watersheds on NFS lands in the Blue Mountains

City	Watershed	KWS (y/n)	Management
Baker City	Salmon Creek	N	Roadless
La Grande	Beaver Creek	N	Roadless
Canyon City	Byrum Gulch	N	Strawberry Wilderness
Walla Walla	Mill Creek	Y	Roadless
Pendleton	N. Fork Umatilla	Y	N.F. Umatilla Wilderness
Sumpter	McCully Creek	N	Public Source Watershed (OR)
Richland	Eagle Creek	N	Public Source Watershed (OR)
Joseph	Wallowa Lake	Y	Public Source Watershed (OR)
Long Creek	Upper Long Creek	N	Not designated
Prairie City	Dixie Meadows	N	Public Source Watershed (OR)

While key watersheds are designed primarily to provide high-quality habitat for aquatic species, other aquatic or riparian and upland species also benefit from the key watershed network. Management direction in key watersheds is intended to provide the highest relative level of protection and the lowest relative level of risk from activities threatening their integrity and resiliency. The location of key watersheds relative to one another is important. Key watersheds are intended to be positioned so they form the centers of broadly connected networks of high-quality watersheds and restore currently fragmented habitats and core conservation fish populations. However, because key watersheds are only identified on NFS lands, the ability to connect adjacent habitats and watersheds is also dependent on the location of ownership boundaries which were largely set at the time the national forests were established. In some cases, and depending on downstream land and water uses, this may result in limited ability to connect habitats for aquatic species, or that connection is still possible, but habitats downstream of the Forests may be in poor condition, and/or have limited restoration potential.

The present set of key and priority watersheds are displayed by Forest in Figure 1. Watershed boundaries, unit codes, and names are from the current national hydrologic data set (NHD). There are 170 watersheds identified as key watersheds in the three national forests. These key watersheds are located in 19 of the 22 subbasins that include NFS lands in the Blue Mountains. Key watersheds comprise 947,000 acres, or 57 percent of the area of the Malheur NF; 800,000 acres, or 57 percent of forest area in the Umatilla NF; and, 1,270,000 acres or 71 percent of forest area in the Wallowa-Whitman NF. From this set of key watersheds, 70 are identified as priorities for restoration, of which 27 are within the Malheur NF, 16 are within the Umatilla NF, and 27 are within the Wallowa-Whitman NF. Priority watersheds occupy 430,000 acres (25 percent) of the Malheur NF, 260,000 acres (19 percent) of the Umatilla NF, and 325,500 acres (18 percent) of the Wallowa-Whitman NF.

Key watersheds are complemented by other land conservation and restoration designations, such as wilderness, recommended wilderness areas, backcountry areas, inventoried roadless areas, and wild and scenic rivers, forming a network of areas with a passive management emphasis. Identifying key watersheds adjacent to or surrounding these areas often provides the most favorable opportunities for providing connected networks of high quality and/or restorable habitats. These networks can then provide for the resiliency of aquatic, terrestrial, and riparian-dependent species to the maximum extent practicable within the capability of the national forests.

Watershed Functions

KW-1S In key watersheds or subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species that are functioning properly²⁶ there shall be no net increase (1 mile of road-related risk reduction for every new mile of road construction); where they are functioning-at-risk, there shall be a net decrease (1.5 miles of road-related risk reduction for every new mile of road construction); and where they are impaired function, there shall be a net decrease (2.0 miles of road-related risk reduction for every new mile of road construction) in system roads that affect hydrologic function. Priority for road-related risk reduction shall be given to roads that pose the greatest relative ecological risks to riparian and aquatic ecosystems. Road-related risk reduction will occur prior to new road construction unless logistical restrictions require post-construction risk reduction. This standard shall apply to the affected subwatershed when new system road

²⁶ “Functioning properly,” “functioning-at-risk,” and “impaired function” for the roads and trails indicator of watershed condition framework (WCF) are defined in Watershed Condition Framework Technical Guide, USDA Forest Service, 2011b. Local inventory, assessment and monitoring data and information can be used to refine initial classifications made per WCF.

construction is proposed in that subwatershed, and shall not be offset by reductions in open-road densities in other subwatersheds.

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

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

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

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

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

Priority Watersheds for Restoration

Priority watersheds are a subset of the key watersheds with the intention of prioritizing restoration over the life of the Revised Forest Plan. There are 70 priority watersheds identified across the three forests within the range of listed fish. Priority watersheds identified here are either sites where watershed and habitat restoration is ongoing, where restoration work is planned, but has not yet commenced, or is expected to occur in the next 10-15 years.

For the most part, the key watershed network for the Blue Mountains national forests was developed using the protocol provided by Reiss et al. (2008). The principal difference is that habitat conditions received more consideration in the selection process in the Blue Mountains than is described in Reiss et al. (2008). The Key watershed network is expected to remain relatively unchanged for the life of the Revised Forest Plan. Future adjustments may be necessary based on substantial, new information (e.g., populations and trends, life history characteristics and needs, distribution, and use or non-use of habitats), or new listings of species. The final key watersheds for the Revised Forest Plan are displayed in Figure 1. Table 22, Table 23, and Table 24 below list the key and priority watersheds within the Blue Mountains national forests.

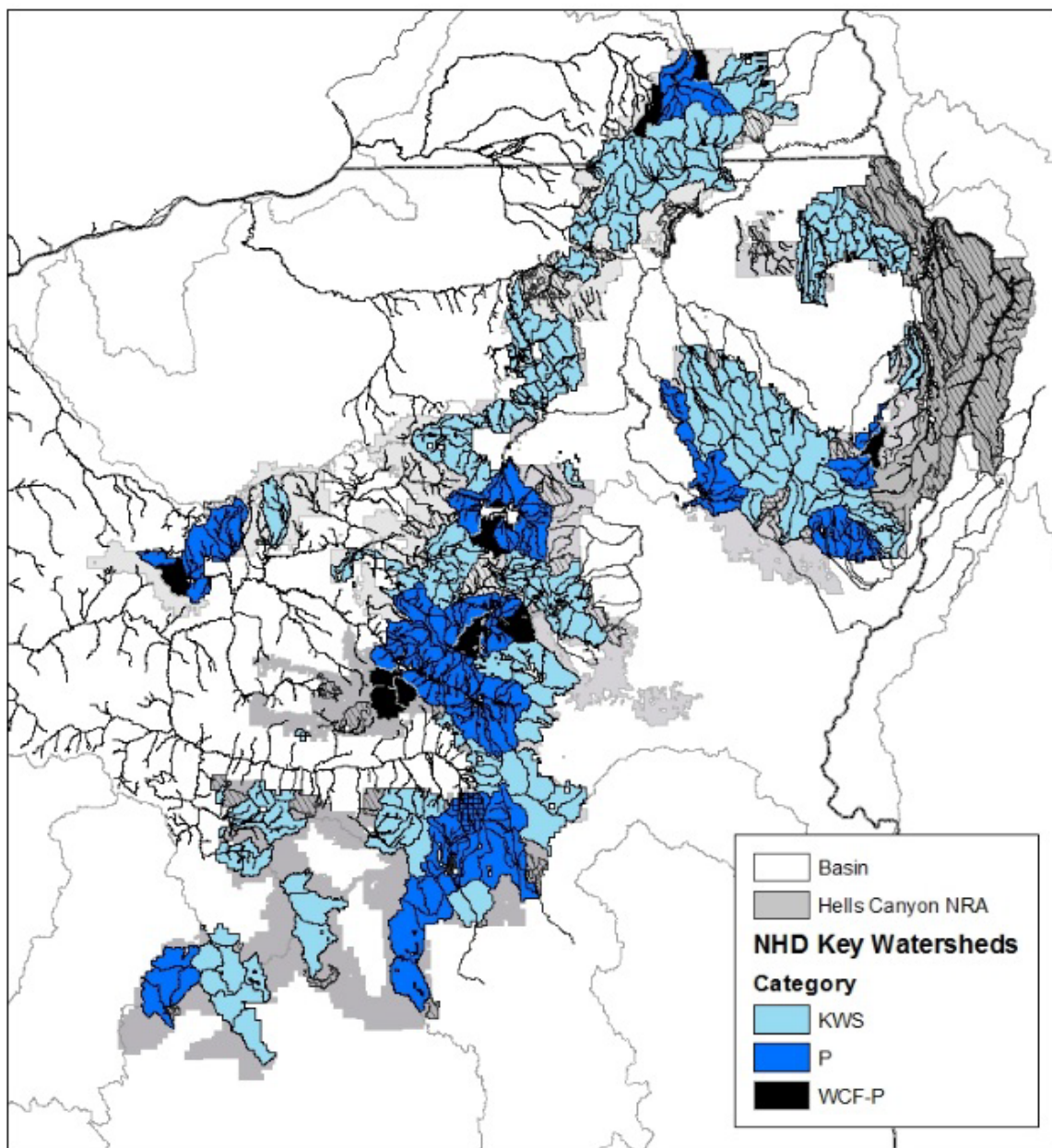


Figure 1. Map of Key Watersheds on national forests of the Blue Mountains. KWS = Key Watershed, P= Priority Watersheds, WCF-P= Watershed Condition Framework Priority Watersheds. Stream lines display critical habitat for Chinook salmon, steelhead, and bull trout

Table 22. Malheur National Forest key (KWS) and priority (P) watersheds by subbasin.

Subbasin	HUC6	Name	NFS Acres	Category
Upper Malheur	170501160101	Upper Big Creek	12,605	P
	170501160102	Lake Creek	19,861	P
	170501160103	Bosonberg Creek	14,894	P
	170501160104	Summit Creek	23,226	P
	170501160105	Cliff Creek	29,183	KWS

Subbasin	HUC6	Name	NFS Acres	Category
	170501160201	Upper Wolf Creek	11,444	P
	170501160202	East Fork Wolf Creek	12,549	P
	170501160203	Squaw Creek	11,560	P
	170501160204	Calamity Creek	31,366	P
	170501160301	Upper Pine Creek	26,496	P
	170501161101	Swamp Creek	25,589	P
	170501161102	Elk Creek	13,531	P
	170501161103	Crane Creek	28,670	P
	170501161105	Skagway Creek	10,986	P
	170501161201	Upper Little Malheur River	31,501	KWS
Upper John Day	170702010104	Utley Creek	9,270	KWS
	170702010305	Corral Creek	16,061	KWS
	170702010306	Lower Deer Creek	12,271	KWS
	170702010401	Tex Creek	29,024	KWS
	170702010405	Lower Murderers Creek	3,130	KWS
	170702010501	Rail Creek	15,333	P
	170702010502	Deardorff Creek	10,858	KWS
	170702010503	Reynolds Creek	16,365	KWS
	170702010505	Dads Creek	7,079	KWS
	170702010701	Upper Canyon Creek	22,746	KWS
	170702010702	East Fork Canyon Creek	15,424	KWS
	17070200601	Strawberry Creek	9,639	KWS
	170702010605	Indian Creek	12,240	KWS
	170702010606	Castle Creek	6,313	KWS
	170702011004	Dry Creek	6,336	KWS
	170702011102	Fields Creek	10,820	KWS
Middle Fork John Day	170702030101	Squaw Creek	11,150	P
	170702030102	Idaho Creek-Summit Creek	13,237	P
	170702030103	Dry Fork	11,224	P
	170702030104	Clear Creek	12,158	P
	170702030105	Bridge Creek	11,484	P
	170702030106	Mill Creek	16,647	P
	170702030201	Vinegar Creek	17,851	P
	170702030202	Little Boulder Creek-Deerhorn	17,789	P
	170702030203	Granite Boulder Creek	21,628	P
	170702030204	Big Boulder Creek	10,709	P
	170702030205	Coyote Creek-Balance Creek	11,196	P
	170702030206	Upper Camp Creek	18,817	P/WCF
	170702030207	Lick Creek	10,448	P/WCF
	170702030208	Lower Camp Creek	10,495	P/WCF

Subbasin	HUC6	Name	NFS Acres	Category
	170702030302	Big Creek	16,231	P
Silvies	171200020103	Upper Scotty Creek	10,182	KWS
	171200020201	Upper Bear Creek	19,187	KWS
	171200020302	Upper Camp Creek	24,578	KWS
	171200020503	Myrtle Creek	26,967	KWS
	171200020601	Crowsfoot Creek	13,718	KWS
	171200020602	Whiskey Creek	19,037	KWS
	171200020603	Bear Canyon Creek	11,396	KWS
	171200020604	Little Emigrant Creek	22,971	KWS
	171200020606	Sawtooth Creek	12,495	KWS
Silver	171200040101	Still Spring Creek	14,915	P
	171200040102	Delintment Creek	17,597	P
	171200040103	Dodson Creek	11,794	P
	171200040104	Sawmill Creek	14,376	P
Total Acres			1,000,662	
Total Key Watershed Acres and Total Key Watersheds			441,866	34 KWS
Total Priority Watershed Acres and Total Priority Watersheds			558,796	28 P

Table 23. Umatilla National Forest key (KWS) and priority (P) watersheds by subbasin.

Subbasin	HUC6	Name	NFS Acres	Category
Lower Snake-Asotin	170601030201	North Fork Asotin Creek	24,962	KWS
	170601030202	Lick Creek	8,261	KWS
	170601030203	South Fork Asotin Creek	11,931	KWS
	170601030204	Charley Creek	9,241	KWS
	170601030206	Upper George Creek	8,722	KWS
Upper Grande Ronde	170601041002	Little Lookingglass Creek	20,572	KWS
Lower Grande Ronde	170601060301	Upper South Fork Wenaha River	20,345	KWS
	170601060302	Lower South Fork Wenaha River	14,791	KWS
	170601060303	North Fork Wenaha River	17,579	KWS
	170601060304	Beaver Creek	9,458	KWS
	170601060305	Wenaha River-Rock Creek	17,442	KWS
	170601060306	Upper Butte Creek	16,850	KWS
	170601060307	Lower Butte Creek	11,804	KWS
	170601060308	Wenaha River-Cross Canyon	19,412	KWS
	170601060309	Upper Crooked Creek	18,941	KWS
	170601060310	First Creek	13,628	KWS
	170601060311	Lower Crooked Creek	16,577	KWS
	170601060312	Lower Wenaha River	6,141	KWS
Tucannon	170601070601	Headwaters Tucannon River	24,491	P
	170601070602	Panjab Creek	16,254	P

Subbasin	HUC6	Name	NFS Acres	Category
	170601070603	Little Tucannon River	16,319	P
	170601070604	Cummings Creek	8,691	PWCF
Walla Walla	170701020101	Upper South Fork Walla Walla River	17,886	KWS
	170701020102	Middle South Fork Walla Walla River	14,074	KWS
	170701020201	Upper Mill Creek	19,605	KWS
	170701020301	Upper North Fork Touchet River	15,560	KWS
Umatilla	170701030104	North Fork Umatilla River	17,491	KWS
	170701030202	East Meacham Creek	11,327	KWS
	170701030203	Butcher Creek	9,892	KWS
	170701030204	North Fork Meacham Creek	30,039	KWS
	170701030205	Camp Creek	15,774	KWS
	170701030206	Boston Canyon	8,086	KWS
North Fork John Day	170702020104	Trout Creek	6,483	KWS
	170702020105	North Fork John Day River-Crane Creek	18,857	KWS
	170702020204	Clear Creek	17,724	PWCF
	170702020205	Lake Creek	12,015	P
	170702020206	Lower Granite Creek	17,807	P
	170702020301	North Fork John Day-Dixon Bar	13,003	KWS
	170702020302	Meadow Creek	17,191	KWS
	170702020303	Big Creek	21,148	KWS
	170702020304	North Fork John Day-Corral Creek	18,338	KWS
	170702020401	North Fork Desolation	14,896	P
	170702020402	Upper Desolation Creek-Battle Creek	21,252	P
	170702020403	Desolation Creek-Kelsay Creek	13,120	KWS
	170702020404	Lower Desolation	6,780	KWS
	170702020702	Meadow Brook	8,518	KWS
	170702020706	Upper Potamus Creek	14,935	KWS
	170702020801	Swale Creek	13,127	P
	170702020802	Little Wall Creek	19,706	P
	170702020803	Little Wall Creek-Skookum Creek	20,529	P
	170702020804	Wilson Creek	14,849	P
	170702020805	Middle Big Wall	15,460	PWCF
	170702020806	Lower Big Wall Creek	11,663	P
Total Acres			801,446	
Total Key Watershed Acres and Total Key Watersheds			553,886	37 KWS
Total Priority Watershed Acres and Total Priority Watersheds			247,560	15 P

Table 24. Wallowa-Whitman National Forest key (KWS) and priority (P) watersheds by subbasin.

Subbasin	HUC6	Name	NFS Acres	Category
Brownlee	170502010601	Upper Pine Creek	17,996	P
	170502010603	Clear Creek	14,875	P
	170502010605	East Pine Creek	15,946	P
	170502010606	Pine Creek-Fish Creek	5,401	P
	170502010608	Lake Fork Creek	20,027	KWS
	170502010609	Lower North Pine Creek	13,886	KWS
Burnt	170502020101	Upper North Fork Burnt River	16,117	KWS
	170502020102	Camp Creek	16,941	KWS
	170502020103	North Fork Burnt River-Patrick Creek	8,215	KWS
	170502020104	Trout Creek	19,169	KWS
	170502020105	North Fork Burnt River-Petticoat Creek	12,710	KWS
	170502020106	West Fork Burnt River	8,706	KWS
	170502020107	Middle Fork Burnt River	11,373	KWS
	170502020201	Upper South Fork Burnt River	20,137	KWS
	170502020202	Middle South Fork Burnt River	19,753	KWS
	170502020301	West Camp Creek	11,978	KWS
	170502020302	East Camp Creek	10,054	KWS
Powder	170502030101	Cracker Creek	18,149	KWS
	170502030105	Deer Creek	19,347	KWS
	170502030402	Lower Salmon Creek	2,683	KWS
	170502030404	Rock Creek	12,077	KWS
	170502030501	Upper North Powder River	12,175	KWS
	170502031002	West Eagle Creek	12,542	KWS
	170502031004	East Fork Eagle Creek	26,352	KWS
Imnaha	170601020101	North Fork Imnaha River	13,308	KWS
	170601020102	South Fork Imnaha River	17,760	KWS
	170601020103	Imnaha River-Rock Creek	11,121	KWS
	170601020104	Imnaha River-Dry Creek	21,378	KWS
	170601020105	Gumboot Creek	12,113	KWS
	170601020106	Imnaha River-Crazyman Creek	14,558	KWS
	170601020204	Freezeout Creek	9,198	KWS
	170601020205	Imnaha River-Chalk Creek	6,222	KWS
	170601020301	Upper Big Sheep Creek	12,526	P
	170601020302	Lick Creek	10,229	P
	170601020303	Big Sheep Creek-Tyee Creek	12,918	P/WCF
	170601020304	Big Sheep Creek-Carrol Creek	8,522	P
	170601020306	Big Sheep Creek-Steer Creek	15,064	KWS
	170601020407	Big Sheep Creek-Lower Little Sheep Creek	4,372	KWS

Subbasin	HUC6	Name	NFS Acres	Category
	170601020502	Imnaha River-Fence Creek	7,594	KWS
	170601020503	Upper Horse Creek	21,589	KWS
	170601020504	Lower Horse Creek	11,175	KWS
	170601020505	Upper Lightning Creek	16,776	KWS
	170601020506	Sleepy Creek	11,705	KWS
	170601020507	Lower Lightning Creek	9,778	KWS
	170601020508	Upper Cow Creek	13,855	KWS
	170601020509	Lower Cow Creek	10,276	KWS
	170601020510	Imnaha River-Thorn Creek	15,650	KWS
North Fork John Day	170702020101	North Fork John Day River-Baldy Creek	16,945	KWS
	170702020102	Trail Creek	12,074	KWS
	170702020103	North Fork John Day River-Onion Creek	7,644	KWS
	170702020201	Upper Granite Creek	7,142	P
	170702020202	Bull Run Creek	18,759	P/WCF
	170702020203	Beaver Creek	12,119	P
Upper Grande Ronde	170601040101	Grande Ronde River-Tanner Gulch	15,278	P
	170601040102	Limber Jim Creek	11,929	P
	170601040103	Grande Ronde River-Meadowbrook Creek	12,779	P
	170601040104	Chicken Creek	10,967	P
	170601040105	Sheep Creek	18,979	P/WCF
	170601040106	Little Fly Creek	10,559	P
	170601040107	Upper Fly Creek	10,304	P
	170601040108	Lower Fly Creek	8,926	P
	170601040109	Grande Ronde River-Warm Springs Creek	17,096	P
	170601040201	Upper Meadow Creek	16,054	KWS
	170601040202	Middle Meadow Creek	21,357	KWS
	170601040203	Upper McCoy Creek	12,144	KWS
	170601040204	Lower McCoy Creek	5,570	KWS
	170601040205	Dark Canyon Creek	10,040	KWS
	170601040206	Lower Meadow Creek	18,155	KWS
	170601040304	Spring Creek	13,325	KWS
	170601040306	Rock Creek	5,830	KWS
	170601040401	Upper Five Points Creek	13,032	KWS
	170601040402	Pelican Creek	11,319	KWS
	170601040403	Lower Five Points Creek	11,741	KWS
	170601040501	North Fork Catherine Creek	21,603	P
	170601040502	South Fork Catherine Creek	15,173	P
	170601040503	Catherine Creek-Milk Creek	4,771	P

Subbasin	HUC6	Name	NFS Acres	Category
	170601040504	Little Catherine Creek	6,902	P
	170601040506	Little Creek	3,177	P
	170601040702	Mill Creek	5,662	P
Wallowa	170601050101	Upper Wallowa River	26,932	KWS
	170601050106	Hurricane Creek	18,613	KWS
	170601050108	Spring Creek	4,650	KWS
	170601050109	Wallowa River-Wallowa Lake	4,396	KWS
	170601050201	Upper Lostine River	11,214	KWS
	170601050202	Lostine River-Lake Creek	17,090	KWS
	170601050204	Lower Lostine River	1,614	KWS
	170601050401	Upper Bear Creek	21,661	KWS
	170601050402	Lower Bear Creek	14,795	KWS
	170601050501	Upper Minam River	22,557	KWS
	170601050502	Minam River-China Cap Creek	21,828	KWS
	170601050503	North Minam River	13,978	KWS
	170601050504	Minam River-Chaparral Creek	22,457	KWS
	170601050505	Little Minam River	29,043	KWS
	170601050506	Minam River-Trout Creek	22,840	KWS
	170601050507	Lower Minam River	4,246	KWS
Lower Grande Ronde	170601060401	Upper Chesnimnus Creek	14,837	KWS
	170601060402	Devils Run Creek	12,899	KWS
	170601060403	Middle Chesnimnus Creek	17,793	KWS
	170601060407	Peavine Creek	15,111	KWS
	170601060502	Elk Creek	9,727	KWS
	170601060504	Joseph Creek-Sumac Creek	9,641	KWS
	170601060506	Davis Creek	7,946	KWS
	170601060507	Lower Swamp Creek	14,904	KWS
	170601060508	Joseph Creek-Cougar Creek	12,970	KWS
	170601060601	Joseph Creek-Peavine Creek	11,240	KWS
	170601060602	Joseph Creek-Rush Creek	5,669	KWS
	170601060603	Upper Cottonwood Creek	12,185	KWS
	170601060604	Broady Creek	10,272	KWS
	170601060605	Horse Creek	5,857	KWS
	170601060606	Lower Cottonwood Creek	6,710	KWS
Total Acres			1,259,225	
Total Key Watershed Acres and Total Key Watersheds			946,517	69 KWS
Total Priority Watershed Acres and Total Priority Watersheds			312,708	26 P

Definition and Purpose of Watershed Condition Framework Priority Watersheds

Watershed condition framework (WCF) watersheds are subset of priority watersheds, wherein near-term (approximately 5 years) restoration actions are focused. In 2011, the WCF (USDA Forest Service 2011), was instituted to provide a nationally consistent approach to (1) assess watershed conditions, (2) prioritize watersheds for restoration, (3) develop restoration plans, (4) implement needed restoration, (5) track restoration accomplishments, and (6) monitor and verify the effectiveness completed restoration. The intent of the WCF is to accelerate the pace of needed watershed restoration while improving communications with partner agencies and providing a mechanism for tracking implementation and the effectiveness of completed work.

The responsible official will continue to select WCF priority watersheds based on an interdisciplinary analysis and evaluation. In addition, the responsible official will reach out to local, State, Tribal, other Federal agencies, and interest groups when identifying WCF priority watersheds (FSH 1909.12, Chapter 20, Section 22.31). Selection of these subwatersheds is based on the following criteria:

- The value of the watershed from a water/aquatic resource perspective;
- Existing watershed, water quality, and aquatic habitat conditions;
- Key watershed status;
- Alignment with other strategic objectives or priorities at national, regional, or local levels;
- Alignment with priorities of other agencies and potential partners;
- Estimated costs and unit work capacity; and
- Technical, financial, and social opportunities and constraints.

Priorities will generally focus on watersheds that are in good to fair condition, but still require some restoration. This approach, consistent with principals of conservation biology (FEMAT 1993, Roni et al. 2002), will enable watersheds to be restored with reasonable investments of time and funding. As with key watersheds, the potential effects of climate change and the efficacy of restoration treatments in ameliorating those and other effects (e.g., land use) should be considered in the selection of WCF Priority Watersheds and subsequent identification of the scope and scale of needed restoration work.

The number of WCF priority watersheds will vary by Forest, but is expected to range from one to five, given current funding levels. Watershed restoration action plans (WRAPs) would be developed as informed by watershed analysis within each of these drainages to ensure limiting factors and important areas are protected and restored.

Use of WCF and MPI to replace RMOs

The PACFISH and INFISH strategies adopted riparian management objectives (RMOs) for stream and streamside conditions to provide criteria against which attainment or progress toward attainment of the riparian goals would be measured. Interim RMOs provided conditions which land managers would strive to achieve as they conducted management activities across the landscape in the absence of ecosystem analysis. It was not expected that the objectives would be met instantaneously, but rather would be achieved over time. The intent of interim RMOs was also not to establish a ceiling for what constitutes good habitat conditions. However, measurable RMOs did provide a benchmark so management actions would not reduce habitat quality, and a way to gage inconsistency with the purpose of the interim direction.

The Revised Forest Plan builds upon the concepts of the interim aquatic strategies by developing a comprehensive Blues ARCS that replaces direction within existing Forest Plans, as amended by PACFISH and INFISH, and the 1995 and 1998 Biological Opinions (BOs) for listed fish species. The

Revised Forest Plan will use watershed condition indicators (WCIs) within the 1996 National Marine Fisheries Service (NMFS) and 1998 U.S. Fish and Wildlife Service (USFWS) matrix of pathways and indicators (MPIs) in drainages that support listed or proposed fish and/or their designated or proposed critical habitat. The Revised Forest Plan will also use either the 12 core indicators within the Forest Service watershed condition framework (WCF) and/or the MPIs within drainages that do not support listed or proposed fish species. The use of both approaches are intended to replace PACFISH and INFISH interim RMOs. This approach is consistent with the 2014 Interior Columbia Basin Strategy (USDI Bureau of Land Management 2014) that states, “Future conditions/objectives should be based on indicators that are reliably measurable and relevant to the conditions described.”

The WCI values within the MPIs were taken from the original matrices developed by NMFS (USCD NMFS 1996) and the USFWS (USDI Fish and Wildlife Service 1998). The analysis that led to development of default values involved managed and unmanaged watersheds in Oregon, Washington, and Idaho that included both inland native fish and anadromous fish. Like RMOs, WCIs do not establish a ceiling for what constitutes good watershed and aquatic conditions. However, they do provide the criteria against which attainment or progress toward attainment of multiple desired conditions, and key standards and guidelines can be directly, or indirectly, measured. A crosswalk between them is provided in Appendix B so it is clear how certain matrix and WCF indicators tie to specific Revised Forest Plan desired conditions. Measurable WCIs provide a benchmark by which changes to landscape conditions through management activities can be measured over time. It is not expected that WCIs would be met instantaneously, but rather that values would be moved toward, or achieved, over time. Achievement of WCIs is expected to result in diverse and complex habitats capable of providing the combination of habitat features important for the life-history requirements of the fish community in the watershed, and the de-listing of Clean Water Act (CWA) 303(d) listed waterbodies.

The use of WCIs is to provide a diagnostic tool to assist land managers and level 1 teams in assessing how well their management actions are designed to implement the Revised Forest Plan and move toward related resource goals and desired conditions. Specifically, WCIs will assist in:

- Identifying how management actions may potentially influence the condition and trend of water, riparian, and aquatic resources.
- Making ESA effects determinations to listed or proposed fish species and their designated or proposed critical habitat important to assessing ESA compliance.
- Identifying how management actions may potentially influence beneficial uses associated with native and desired non-native fish habitat and the importance of that influence to assessing the Clean Water Act (CWA) compliance.

Watershed Analysis

Watershed analysis is an essential component of the Blues ARCS. The content of this section is included in the Revised Forest Plan.

Through implementation of the existing aquatic strategies in the 1990s and early 2000s, watershed analyses have been completed for the majority of NFS lands within the Blues ARCS area. Consequently, future work will largely focus on efficiently updating, as needed, a portion of those existing analyses to better reflect current watershed conditions and trends, new issues (e.g., climate change or invasive species), latest science and policy, and current opportunities.

Watershed analysis is an interdisciplinary analysis of the status and trends of watershed and aquatic ecosystem conditions, including key State-designated beneficial uses of water (e.g., municipal water supply), and the hydrologic, geomorphic, and biological processes that strongly influence them. This

information serves as a foundation for Revised Forest Plan implementation through the development of strategic and integrated programs and projects that protect and restore aquatic resources, while enabling informed and sustainable resource use and management. These analyses combined with monitoring and evaluation, provide the context and foundation to adaptively execute the other components of the Blues ARCS, including management of RMAs and key watersheds, implementation of watershed restoration, and compliance with plan components.

Watershed analysis is intended to guide Revised Forest Plan implementation by providing decision-makers and others: (1) information to identify activities that would maintain watershed and aquatic and riparian ecological conditions or move them towards desired conditions; and (2) the context for developing projects and evaluating their consistency, via the NEPA process, with Revised Forest Plan direction (i.e., desired conditions, objectives, standards, and guidelines associated with watershed and aquatic resources). This includes ensuring that management activities in key watersheds and RMAs maintain, restore, or enhance aquatic and riparian resources.

Through identification of actions needed to avoid or minimize adverse effects and/or restore ecosystem conditions and processes, watershed analysis is also intended to enable protection and recovery of listed species and their habitats and to facilitate efficient project-level conferencing and consulting under Section 7 of the Endangered Species Act. Similarly, it should enable protection and restoration of water quality and the full range of beneficial uses of water identified by the States and Tribes under the Clean Water Act.

The Blue Mountains national forests estimated the number of new or updated watershed analyses expected to be completed during the life of the Revised Forest Plan and identified a set of potential watersheds for which this work will be a priority. Criteria for selecting potential watersheds for analysis included: (1) key watersheds; (2) watersheds that have been identified as priority watersheds during the life of the Revised Forest Plan; (3) watersheds that support listed species or contain designated critical habitat; and (4) watersheds wherein management activities are likely to occur that may substantially affect aquatic resources (e.g., due to their inherent nature, location, timing or scale).

Watershed analyses should generally be conducted or updated prior to developing and implementing watershed restoration action plans for priority watersheds.

In addition, watershed analyses shall be conducted or updated prior to:

- Proposing changes to RMA widths
- Timber salvage or construction of facilities in RMAs
- Construction of permanent system roads in RMAs

Watershed Protection and Restoration

Key watersheds are a priority for restoration, and specific restoration objectives have been identified for Key watersheds (section 2.5). Additionally, priority watersheds have been identified that are also expected to have restoration actions implemented. Through implementation of the regional Aquatic Restoration Strategy (ARS) developed by Pacific Northwest Regional staff in 2005 (USDA-FS 2005, updated 2007), the region prioritized river basins in the region for active restoration. The ARCS was subsequently developed in 2008 and updated in 2017, as land management direction complementary to the ARS, which was direction designed to aid in prioritizing regional funding using a spatial hierarchy for watershed restoration investments across the two-state region. The region through a modeling process described in the ARS, identified the John Day Basin (HUC6) as one of a select set of priority river basins for active restoration investment in the region, with the Tucannon River subbasin as a close runner up.

Pursuant to the ARS, Forests in the region each identified 2-4 focus watersheds at the 5th field watershed (HUC10) scale to be priorities for active whole-watershed, riparian, and aquatic restoration. Working with partners, the Blue Mountains national forests develop watershed action plans (WAP) that identify the needed restoration work that is technically and socially feasible within each focus watershed. Restoration is ongoing in priority river basins, and focus 5th field watersheds, as shown in a briefing paper created for the Washington Office of the Forest Service in 2012 (USDA-FS, 2012). Focus watersheds on the Umatilla National Forest include Granite Creek and Big Wall Creek in the John Day basin, and the Upper Tucannon watershed in the Tucannon River subbasin. On the Wallowa-Whitman National Forest, Upper Catherine Creek and the Upper Grande Ronde watersheds were selected as focus watersheds for active restoration per the ARS, while the Malheur National Forest staff selected the Bridge Creek and Camp Creek 5th-field watersheds as their focus for active restoration under the ARS.

As part of the Aquatic Sustainability Modeling process for key watersheds, priority watersheds were selected that when restored, would serve to create larger blocks of well-connected high-quality habitat in key watersheds. In 2010, the National Forests throughout the U.S. were mandated to assess the current condition of NFS subwatersheds (HUC12s) utilizing the national watershed condition framework (WCF; Potyondy and Geier 2010). A full description of the WCF is available at: https://www.fs.fed.us/biology/watershed/condition_framework.html. The results of the WCF were used to identify priority subwatersheds for each forest in the planning area where focused restoration over a 5- to 10-year period would improve impaired watershed condition. Most priority subwatersheds currently identified for active watershed restoration, are located within a focus watershed. Most are also located within regional priority river basins. Once essential projects in existing subwatersheds are completed, additional priority subwatersheds will be identified for implementation from among the larger list of priority subwatersheds identified through the Sustainability Model.

Watershed protection and restoration to benefit aquatic and riparian-dependent resources and water quality is an integral element of the Blues ARCS. Restoration, in concert with other ARCS elements, contributes to protection and recovery of those resources. Collectively, the goal of restoration and the ARCS as a whole is to provide for ecologically healthy watershed, riparian, and aquatic ecosystems, as defined by the aquatic and riparian desired conditions. The phrase “ecologically healthy” refers to functions affecting biodiversity, productivity, biochemical, and evolutionary processes that are adapted to the environmental conditions in a given region (Karr et al. 1986; Karr 1991).

Watershed protection and restoration is designed to facilitate the recovery of watershed functions and related physical, biological, and chemical processes to promote recovery of riparian and aquatic composition, structure, and ecosystem function. Restoring the health and resiliency of selected watersheds will help ensure that the network of key watersheds remains well-represented and distributed over time.

Watershed protection and restoration is a catalyst for initiating ecological recovery (FEMAT 1993). Restoration efforts will be comprehensive, addressing both protection of existing functioning aspects of a watershed and restoration of degraded or compromised aspects. It may not be possible to restore every watershed, and some restoration actions may only have limited success because of an extensive level of degradation. The effectiveness of restoration efforts is not likely to be extensive or immediately visible for some time. At the watershed scale, it may take an extended period (decades or longer) to observe the full effects of treatments. Even longer timeframes may be necessary to see changes at the regional scale.

Effective restoration at the watershed scale is a complex undertaking. Restoration programs require diagnosing watershed conditions and processes, identifying primary disturbance regimes (past, present, and future), and the ability to locate, design, and implement integrated treatments to achieve the desired watershed-scale response. To be effective, these programs need to: (1) target root causes of water quality, habitat and ecosystem change; (2) tailor restoration actions to local potential of the systems; (3) match the

scale of restoration to the scale of the problem; and (4) be explicit about expected outcomes (Beechie et al. 2010). The Pacific Northwest Region accomplishes restoration through a whole watershed approach, including internal and external partners; passive and active restoration; and prioritization, documentation of restoration needs, monitoring, and adaptive management.

Whole Watershed Approach and Partnerships

Water resources such as clean, cold water and healthy fish populations know no jurisdictional boundaries. To successfully fulfill Forest Service responsibilities to maintain and restore these resources, work should be implemented across boundaries with willing neighbors and other partners in restoration. Restoration should be designed and implemented at the watershed scale. Treatment objectives and activities on NFS lands should be coordinated with other resource programs or other ownerships. Watershed-scale restoration is an interdisciplinary effort requiring close coordination and working partnerships among multiple resource programs, other agencies, tribal governments, watershed councils, adjacent landowners, collaborative groups, and other stakeholders and partners. Interdisciplinary skills provide both operational and technical capacity for implementing comprehensive watershed protection and restoration programs. Coordination and partnerships are essential to effectively address community and watershed-scale restoration needs and opportunities. Coordination also enhances skill and funding sources needed to sustain multi-year programs.

Types of Restoration

Watershed restoration programs include passive and active approaches. Both are needed for a successful restoration program (Roni et al. 2002).

Passive restoration involves the protection and/or natural recovery of watersheds and aquatic and riparian ecosystems. It is applied at the landscape scale as intended to enable ecosystems to resist and recover from large-scale disturbances, such as fire, floods, and debris flows, as well as chronic disturbances. Passive restoration involves planning and implementing various resource management programs and activities (e.g., fuels and timber management, or recreation) in a way that maintains watershed and habitat conditions when they are in good condition, and facilitates their recovery when they are not. The passive restoration is embodied in the standards and guidelines, which are design criteria that constrain management activities in an effort to maintain or improve the desired conditions.

Active restoration is active intervention with integrated project activities. It focuses on re-establishment or modification of specific ecosystem processes. Active restoration is generally applied using integrated treatments (e.g., fish passage, road decommissioning and stabilization, riparian and upslope vegetation treatment, instream habitat improvement, and restoration of streamflows) that are strategically applied at multiple, priority sites within a watershed. It is focused and applied on a more limited scale (e.g., specific sites in key and priority watersheds) than passive restoration.

Active restoration should be prioritized to emphasize the protection and/or retention of existing high-quality habitat and water, and naturally functioning watersheds and ecosystems. This is accomplished by identifying and treating major risk factors (e.g., unstable roads or poorly located and/or drained roads, certain invasive plants and animals, or major obstructions to physical and biological connectivity) threatening ecosystem integrity and likely to adversely influence existing conditions. Identification, prioritization, and integrated treatment of watersheds with limited loss of function and condition are also a priority. These watersheds will likely serve as the next generation of refugia for fish and provide high-quality water in the future. Their selection should consider the extent of habitat degradation and the degree to which their natural diversity and ecological processes are retained (Reeves et al. 1995). Active restoration programs should consider and complement recovery plans for fish, water quality, and other riparian-dependent species. Watershed analyses will be critical to identifying key ecological processes

influencing watershed condition and function, and will be important in identifying specific protection or treatment objectives.

In cases where the full recovery of watershed functions and processes is not possible (e.g., mixed ownerships without coordinated restoration opportunities, major dams/diversions for hydropower, or other developments that influence large or important portions of the floodplain or stream channel), mitigation treatments may be needed. These should incorporate design features to benefit aquatic and riparian-dependent resources.

Restoration Accomplishments

Implementation of restoration actions will be tracked for individual essential restoration projects, as identified in a WRAPs for each WCF priority watershed. These will be recorded in corporate databases. In addition, once all essential projects are completed, per WCF, the watershed is considered to have been “improved” or “restored.” Similarly, this status is tracked in agency databases.

Restoration project areas not specified as WCF Priority Watersheds are also intended to be recorded in agency databases.

Monitoring and Adaptive Management

This section outlines a consistent monitoring framework for the Blue Mountains ARCS, at the broad-scale and Forest Plan level. This framework is focused on enabling managers to make informed, sound decisions by addressing key questions and reducing uncertainties at multiple scales. It is composed of an ongoing cycle of planning and implementing activities, monitoring through collection of data by observation or measurement, evaluation of those data, and subsequent adjustments in the overall process. Some components of broad-scale monitoring will be implemented by the Pacific Northwest Regional Office, whereas others will involve both Regional and Forest-level activities. Importantly, as described below, the broad-scale and Forest Plan guidance of this framework are intended to efficiently work together and inform one another. Moreover, this monitoring is strongly linked with watershed analysis components of the Blues ARCS.

In addition, this monitoring framework provides a mechanism for accountability and oversight, and provides a feedback loop, so that management direction or activities can be evaluated and modified at multiple spatial (project-level to Regional) and temporal scales (years to decades or more) by decision-makers at different levels of the agency (District Ranger to Regional Forester).

This framework uses a multi-scale approach because: (1) the Blues ARCS and Plan components (e.g., desired conditions, objectives, standards, and guidelines) cover a broad range of spatial and temporal scales, (2) the condition of watersheds and aquatic and riparian habitats is influenced by numerous processes operating at a similarly large range of scales, (3) the sensitivity to disturbance of different ecosystem components varies widely across those scales, and (4) monitoring feedback needs to be taken by different people at different administrative levels over varying timeframes.

Monitoring, Verification and Feedback in Restoration

Monitoring and verification coupled with feedback loops are essential to ensuring the success of restoration. As such, forests will actively respond to monitoring by adjusting the approach to restoration and other actions as foundational components of their restoration programs, as described in this section. The monitoring plans incorporate a combination of implementation, effectiveness, and validation monitoring. Specifically there will be both WCF monitoring and broad scale monitoring that will feed

into the monitoring plans directly. Information gained from monitoring will be shared to facilitate mutual learning.

Watershed protection and restoration is founded in science. As such, there is a continuous stream of contributions to the body of knowledge. Restoration techniques should be implemented, monitored, and subsequently modified to reflect what was learned through monitoring. Information from monitoring enters a feedback loop, improving future restoration actions (Roni et al. 2002). Reporting, publishing, and disseminating the success or failure of restoration projects will not only help a particular District or Forest learn, but will assist others within and outside the agency, adding to the restoration community's knowledge base.

Implementation, Effectiveness and Validation Monitoring

There are three types of monitoring: implementation, effectiveness and validation monitoring. The following defines those terms as they are referred to in the Revised Forest Plan.

Potential adaptive management actions would usually be taken by the Regional Forester. They would generally focus on significant issues occurring over broad areas (e.g., millions of acres). Actions could include changes to this strategy (Blues ARCS), direction to forests to develop new Revised Forest Plan direction, adjusted approaches to implementing current Revised Forest Plan direction, or adapting or replacing inaccurate analysis models.

Broad-scale and Forest Plan Implementation-scale Monitoring

Monitoring under this planning effort will occur at both broad and Revised Forest Plan implementation scales.

Broad-scale Monitoring

Broad-scale monitoring would generally be authorized and funded by the Regional Forester. This type of monitoring would generally focus on significant issues occurring over broad areas (i.e., many forests). Actions could include development or refinement of Regional policies and procedures, training and functional assistance trips to forests, and direction to forests to focus additional resources towards certain activities. These actions would generally occur over short to medium time-scales (e.g., one to five years).

PACFISH/INFISH Biological Opinion Monitoring Program (PIBO), in the Interior Columbia River Basin

The PIBO monitoring is a long-term monitoring program that is designed to support implementation and effectiveness monitoring in the Interior Columbia Basin, particularly with regards to instream habitat and riparian conditions.

Use of long term monitoring, such as PIBO, support adaptive management actions that would generally be taken by local line officers (District Rangers or Forest Supervisors). Use of these datasets could include increasing or decreasing the type, scope, scale or location of different activities (e.g., watershed restoration, timber harvest, road building or decommissioning, fuels treatment, or livestock grazing) or the implementation of other Revised Forest Plan components (e.g., standards and guidelines). These actions would generally occur over moderate to long time-scales (e.g., a decade or more).

Forest Plan Implementation Monitoring

Implementation monitoring is intended to comply with the 2012 Planning Rule. The Revised Forest Plan monitoring that correlates most directly to the Blues ARCS is also responsive to the 2012 Planning Rule (36 CFR 219.12.a.5).

- Status of watershed conditions.
- Status of select ecological conditions
- Status of ecological conditions (see 219.9) related to threatened, endangered, candidate, and conservation concern species
- Status of surrogate species (related to 219.9 diversity)
- Changes due to climate change and other stressors
- Progress toward meeting desired conditions and objectives, including multiple use opportunities.

Implementation may happen at the District and/or Forest scale. Implementation monitoring would measure the effects of various activities such as watershed restoration, timber harvest, grazing, road building, decommissioning, and fuels treatment.

Linkage Between Monitoring, Watershed Analysis and Restoration

The products of broad-scale status and trend monitoring will be used as part of watershed analysis for specific watersheds. Analysis teams will, for example, use those data to characterize how upslope and instream conditions and trends for a particular watershed fit within the distribution of conditions and trends across all reference and managed watersheds within a larger area (e.g., subbasin, basin, Forest). From there, they will identify and use other information for the watershed of interest to more completely and accurately assess watershed and aquatic habitat conditions, the reasons (cause/effect) those conditions exist (e.g., natural disturbance or human impacts), what actions might be warranted in the watershed, and generally how and where they should be implemented. They may also choose to develop attributes of watershed-specific desired conditions, based in part upon products from broad-scale monitoring.

Additionally, the watershed condition assessment, associated with the watershed condition framework, serve as a coarse form of long-term monitoring. These assessments will be completed on a regular timeframe and before each Forest Plan revision, for use by analysis teams to determine changes in watershed condition and species viability between Forest Plan revisions. This information can be used to inform future Forest Plan development, revisions, or amendments, as well as specific watershed restoration planning.

Hells Canyon National Recreation Area and CMP

When Congress established the HCNRA, the boundary included portions of the Nez Perce, Payette, and Wallowa-Whitman national forests in Regions 1, 4, and 6, respectively. The Chief of the Forest Service decided that the area would be managed as one administrative unit in Region 6 by the Forest Supervisor of the Wallowa-Whitman National Forest. The Wallowa-Whitman National Forest is responsible for establishing programmatic direction for the management of the HCNRA and for completing consultation in accordance with the ESA for programmatic decisions.

The previous Wallowa-Whitman Forest Plan (1990), as amended, provides guidance through its established goals, objectives, desired future conditions, Forest-wide standards and guidelines, and specific management area direction. The 1990 Forest Plan incorporates the 2003 CMP, subsequent Forest Plan amendments (especially PACFISH, INFISH, and Eastside Screens), and terms and conditions related to consultation on the 2003 CMP in accordance with the ESA to provide existing management direction for the HCNRA.

Management of the HCNRA is guided by the enacting legislation in the HCNRA Act of 1975. Section 7 of the HCNRA Act specifies that administration of the HCNRA for public outdoor recreation must be done in a manner compatible with seven objectives. Objectives pertinent to sensitive species management include:

1. The maintenance and protection of the free flowing nature of the rivers within the recreation area;
2. Conservation of scenic, wilderness, cultural, scientific, and other values contributing to the public benefit;
3. Preservation, especially in the area generally known as Hells Canyon, of all features and peculiarities believed to be biologically unique including, but not limited to, rare and endemic plant species, rare combinations of aquatic, terrestrial, and atmospheric habitats, and the rare combinations of outstanding and diverse ecosystems and parts of ecosystems associated therewith;
4. Protection and maintenance of fish and wildlife habitat;
5. Protection of archeological and paleontological sites and interpretation of these sites for the public benefit and knowledge insofar as it is compatible with protection;
6. Preservation and restoration of historical sites associated with and typifying the economic and social history of the region and the American West; and
7. Such management, utilization, and disposal of natural resources on federally owned lands, including, but not limited to, timber harvesting by selective cutting, mining and grazing, and the continuation of such existing uses and developments as are compatible with the provisions of the HCNRA Act.

A complete description of the desired conditions, goals and objectives, standards and guidelines, and management areas that guide management of the HCNRA are found in Appendix F.

Action Area

The ESA Section 7 implementing regulations define the “action area,” which includes all areas to be affected directly or indirectly by the Revised Forest Plan’s Proposed Action, not merely the immediate area involved in the action (50 CFR §402). The planning area includes all federal land managed or administered by the Malheur, Umatilla, and Wallowa-Whitman national forests which overlays the following counties in Oregon: Baker, Crook, Grant, Harney, Malheur, Morrow, Umatilla, Union, Wallowa, and Wheeler counties, and in Washington ; Asotin, Columbia, Garfield, and Walla Walla counties.

The Malheur (and a portion of the Ochoco administered by the Malheur), Umatilla, and Wallowa-Whitman national forests include approximately 5.5 million acres in northeastern Oregon and southeastern Washington (Figure 2). The majority of the acreage (4.8 million acres) is in Oregon, with about 311,000 acres in Washington.

The Malheur National Forest is comprised of about 1.7 million acres in the southern Blue Mountains with headquarters in John Day and district offices in Prairie City, John Day, and Hines, Oregon. The Malheur NF Emigrant Creek Ranger District also administers an adjacent 240,000-acre portion of the Ochoco NF.

The 1.4-million-acre Umatilla National Forest straddles the Oregon-Washington border. It is the northernmost national forest in the planning area and is administered from Pendleton, Oregon with district offices located in Pomeroy and Walla Walla, Washington and Heppner and Ukiah, Oregon.

Located on the eastern edge of the Blue Mountains, the Wallowa-Whitman National Forest (NF) consists of more than 2.4 million acres, which includes the Hells Canyon National Recreation Area (HCNRA). This Revised Forest Plan, in combination with the HCNRA CMP, constitutes an integrated resource management plan for the Wallowa-Whitman NF. The HCNRA is located in western Idaho and the

northeast corner of Oregon on portions of the Wallowa-Whitman, Nez Perce, and Payette national forests. It is administered by the Wallowa-Whitman National Forest. There are 652,488 acres within the HCNRA boundary which is approximately 28 percent of the land under the administration of the Wallowa-Whitman NF. About 33,000 acres of privately-owned land occur within the HCNRA. Approximately 117,073 acres of the Nez Perce and 24,000 acres of the Payette national forests occur in the HCNRA. This Revised Forest Plan carries forward in its entirety the HCNRA CMP, which guides management on the HCNRA on the Wallowa-Whitman NF (USDA Forest Service 2003). The headquarters of the Wallowa-Whitman NF is located in Baker City, Oregon. District offices are in Baker City, La Grande, and Enterprise, Oregon.

The highly diverse natural resources of Blue Mountains National Forests serve many important ecological, social, and economic functions. A complete description of these Forests can be found in the Revised Forest Plan

The forests are at the extreme eastern edge of the Cascade Mountain Range's rain shadow. This produces a combination of high-desert climate with hot, dry summers (less than 10 inches of precipitation per year) in the lower valleys with moist maritime conditions influenced by the Columbia River at the higher elevations (more than 80 inches of precipitation per year). This variety of landform, elevation, and climate results in a diversity of plants and animals within the Forests watersheds that range from lower to higher elevations: juniper, sage, herblands, ponderosa pine plant communities, mixed conifer, subalpine fir, Engelmann spruce stands, and alpine plants.

The national forests provide habitat for more than 250 native wildlife species, including larger species, such as cougar, black bear, mountain goat, bighorn sheep, deer, pronghorn antelope, gray wolf, and elk, along with a host of smaller birds and animals, such as pine marten, mink, beaver, badger, bobcat, coyote, river otter, Clark's nutcracker, ruffed and blue grouse, and turkey. The Blue Mountains area provides an important corridor for many of these species between the Rocky Mountains and central Oregon.

The Blue Mountains are inhabited by one of the Nation's largest herds of Rocky Mountain elk. Cooperative efforts to restore and protect Rocky Mountain elk, as well as bighorn sheep populations, are recognized regionally and nationally.

Streams, rivers, and lakes provide habitat for a variety of native, anadromous fish species. For example, the Imnaha and Grande Ronde River drainages provide the highest upstream spawning areas for Chinook salmon and steelhead trout on the Snake River in Oregon. The John Day River is the second longest undammed river (280 miles) in the contiguous United States and supports four different species of naturally reproducing, native salmonids.

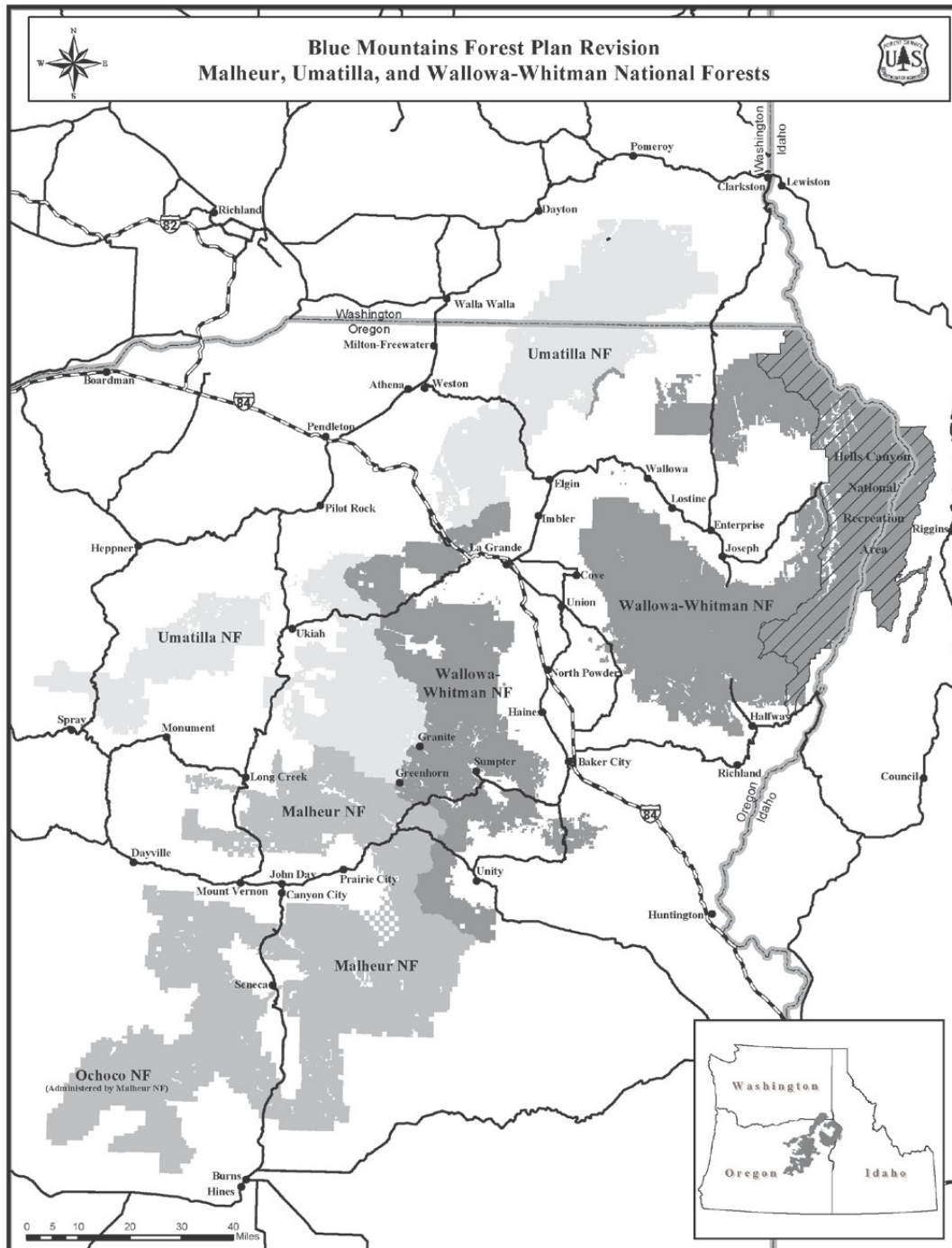


Figure 2. Vicinity map of the Blue Mountains national forests

There are 27 subbasins (HUC 4) in the action area which cover the three national forests (Table 25)

Table 25. Current distribution of key (PACFISH) and priority (INFISH) subwatersheds by subbasin for each National Forest.

National Forest	Subbasin	Subwatersheds Occupied by One or More ESA-listed Species	PACFISH Key Subwatersheds	INFISH Priority Subwatersheds
Malheur	Middle Fork John Day	29	29	0
	Upper John Day	47	47	0
	Upper Malheur	19	0	19
	Silvies	0	0	20
	Silver	0	0	14
	North Fork John Day	4	4	0
	Harney-Malheur	0	0	4
	South Fork Crooked River-Beaver Creek	0	0	7
	Totals	137	80	64
Umatilla	Middle Fork John Day	1	1	0
	North Fork John Day	84	84	0
	Lower John Day	4	4	0
	Willow-Columbia	2	2	0
	Umatilla	15	15	0
	Walla Walla	10	10	0
	Tucannon	7	7	0
	Asotin	6	6	0
	Lower Grande Ronde	25	25	0
	Upper Grande Ronde	9	9	0
	Totals	163	163	0
Wallowa-Whitman	Imnaha	29	29	0
	Lower Grande Ronde	29	29	0
	Upper Grande Ronde	50	50	0
	Lower Snake-Asotin	1	1	0
	North Fork John Day	7	7	0
	Hells Canyon, Brownlee, Salmon	32	20	12
	Powder	30	0	30
	Burnt	0	0	22
	Wallowa	22	22	0
	Totals	172	132	64

Fisheries Chapter

Environmental Baseline of Aquatic Species and Critical Habitat

Introduction

The Matrix of Pathways and Indicators (MPIs) complemented with PACFISH/INFISH Biological Opinion (PIBO) effectiveness monitoring and watershed condition class framework ratings were used as a template for displaying existing environmental conditions relative to specific pathways. The pathways represent ways by which actions can potentially affect the listed species and their habitat. Matrix pathways were previously developed as a tool in making effects calls by NMFS (1996), building on previous versions, and revisited by USDI Fish and Wildlife Service (1998). The intent is to have a simple, yet holistic suite of pathways (and indicators) to characterize environmental baseline conditions. Again, this approach is used along with PIBO and watershed condition class framework information in this BA to provide a level of uniformity and standardization in the subbasin baseline descriptions.

Eighth-field (old fourth-field hydrologic units) as delineated by the U.S. Geological Service (USGS) were used to define each subbasin, then baseline conditions were assessed for each subbasin and their respective subwatersheds (12th field HUCs) in the action area.

Evaluating baseline conditions using the matrix required some flexibility and a certain level of professional judgment in arriving at the ratings. Matrix values were not modified to reflect natural, existing conditions that better suit each subbasin. This would be appropriate to do at a finer scale because of the typically large variation in environmental conditions that exist across a subbasin.

PACFISH and INFISH were implemented in 1995 with the intent of protecting, conserving, and managing riparian habitats for protected resident and anadromous fish species. Monitoring of the effectiveness of these measures began in 2001 as required by the PACFISH/INFISH Biological Opinion (PIBO). To date, repeat PIBO sampling has been completed on more than 200 monitoring reaches in the Blue Mountains (Archer et al. 2009)(see also Appendices C through E). In the case of riparian areas and wetlands, this monitoring information, combined with long-term camera point monitoring and professional observation, indicates that there has been recovery, although it falls short of being restored to a near natural rate. Many of the parameters most closely associated with livestock grazing effects (managed sites) are still showing high departure rates from desired conditions. Large differences remain in several variables between managed and reference sites. Vegetative variables are improving at a faster rate than physical habitat (channel) variables. While PIBO monitoring points within areas managed for permitted livestock tend to be at a lower current condition relative to specific parameters than are reference sites (not grazed by permitted livestock), the difference may or may not be significant, depending on the specific parameter. For example, while there are differences in bank angle (favoring the reference sites), there is no apparent difference in bank stability between reference and managed areas, although there were apparent improvements in the reference sites based on repeat sampling. Further, repeat monitoring findings show little difference in effective ground cover between reference and managed sites, although green-line cover was greater at the reference sites than at the managed sites. This trend was also borne out by sampling of cross-section vegetation. One key finding was that at the managed sites, nonnative plant cover was consistently greater than on the reference sites.

Overall, PIBO monitoring tends to show a more stable riparian condition at the reference sites, while certain parameters recorded lower values at the managed sites relative to the reference sites.

The current environmental conditions in the action area are not solely due to actions authorized or administered by the forests. In some cases, land and water uses managed by other entities, and other factors exclusive of the forests, including natural disturbances, have had a greater effect on pathway conditions at the subbasin scale. This influence can correspond to the amount of other administrations and landownerships versus that of the forests. In addition, factors outside the action area (such as Snake River and mainstem {Columbia River} hydropower projects, ocean and river harvest, hatchery influences, and downstream habitat conditions) play a role in determining the status of migratory fish populations that spawn and rear in streams within the planning area. These factors are recognized as contributing to the decline in numbers of the listed fish.

The data and information sources utilized results from existing Forest information, including but not limited to, temperature data, stream survey, PIBO, and professional judgment which informed MPI and WCF ratings. This analysis centered on obtaining current information and their cause for the soil, water, riparian, and aquatic resources while integrating the soil-hydrologic function, dynamic stream equilibrium, associated aquatic habitat, and status of listed and native fish populations for each subbasin and their respective subwatersheds. Data from GIS database were used to identify fish presence/absence, spawning/rearing habitat.

Scale of the Subbasin Baseline Organization

Matrix of Pathways and Indicators

Subbasin baseline ratings are summarized at the 8th-field (old 4th-field hydrologic units) as delineated by USGS.

Population Characteristics (Bull Trout Only)

Any special population characteristics, genetically unique populations, and isolated local bull trout populations are identified under this heading, drawing on information from the sources below.

PIBO

PIBO information was summarized for each Forest. Managed reaches within the ‘area of interest’ (e.g., forest-wide; a 4th field HUC) were analyzed by comparing them to reference reaches at three landscape scales: (1) reference reaches within the area of interest (if present); (2) reference reaches within the ecoregion; and (3) reference reaches throughout the PIBO study area (n = 254). The ecoregions included were the Blue Mountains, Idaho Batholith, Middle Rockies, Canadian Rockies, and Northern Rockies (for details, see Omernick 1987). If at least one managed site was located within a given ecoregion, then all reference sites from that ecoregion were included in the analysis. At least five managed reaches for a given area were necessary to run the analysis. In addition, at least five reference reaches had to be present in the area of interest in order to make a comparison at that scale.

Watershed Condition Framework

Subbasin baseline ratings summarized at the 8th-field (old 4th-field hydrologic units) as delineated by USGS were used to define each subbasin; then baseline conditions were assessed for each subbasin and their respective subwatersheds (12th field HUCs) in the action area.

Matrix of Pathways and Indicators

Integration of Species and Habitat Information

At the 4th-field subbasin scale, general conclusions were made based on all the above information in an attempt to rate each subbasin regarding the overall condition of pathways. Although this sometimes was

based on limited information, it was important to establish a general idea of baseline conditions at the subbasin scale, in order to have a benchmark for effects discussions relative to Revised Forest Plan related actions. An attempt was made to relate baseline conditions to known causes, and their resultant effects. Ratings are general and do not reflect local conditions in all parts of each subbasin.

Table 26. Summary of Baseline Conditions for all subbasins within the planning area.

Subbasin 4th level HUC. and Name	Pathways						
	Population Charact. ¹	Watershed conditions	Water quality	Habitat Access	Channel conditions and dynamics	Flow/ Hydrology	Integration of species and habitat conditions
17050116 Upper Malheur	FUR	FUR	FR	FUR	FR	FUR	FUR
17050201 Brownlee Reservoir	FUR	FR	FR	FR	FR	FR	FR
17050203 Powder River	FUR	FR	FUR	FUR	FUR	FUR	FUR
17060101 Hells Canyon	FR	FA	FR	FR	FA	FA	FR
17060102 Imnaha River	FR	FR	FR	FA	FR	FR	FR
17060103 Lower Snake-Asotin	FUR	FR	FR	FR	FR	FR	FR
17060104 Upper Grand Ronde	FUR	FR	FUR	FA	FUR	FUR	FUR
17060105 Wallowa River	FR	FR	FR	FR	FUR	FR	FR
17060106 Lower Grande Ronde	FUR	FR	FR	FUR	FR	FR	FR
17060107 Lower Snake-Tucannon	FR	FR	FR	FR	FR	FR	FR
17070102 Walla Walla	FR	FR	FA	FR	FR	FA	FR
17070103 Umatilla	FUR	FUR	FUR	FR	FUR	FUR	FUR
17070201 Upper John Day	FUR	FUR	FUR	FUR	FUR	FUR	FUR
17070202 North Fork John Day	FA	FR	FR	FR	FR	FA	FR
17070203 Middle Fork John Day	FUR	FR	FUR	FUR	FR	FUR	FUR
17070204 Lower John Day	N/A	FUR	FUR	FR	FR	FR	FR

1. For bull trout only.

2. Ratings are for non-wilderness portions of these subbasins only. The wilderness portions are all considered to be functioning appropriately.

FR = functioning at risk

FA = functioning appropriately

FUR = functioning at an unacceptable risk

Ratings largely reflect conditions within the Blue Mountains, because available information weighted heavily toward that generated by, and available to, the forests. However, known conditions off-forest influence the function of pathways as well and were also reflected in the ratings. When taken together, the ratings of pathways for the subbasins generally reflect the environmental conditions of the action area as a

whole, though they do not reflect actual conditions in each stream in the action area. No subbasins were found to have any pathways functioning appropriately across an entire 4th field HUC, outside of the wilderness. While human impacts occur in the wilderness and can influence the function of pathways in site-specific instances, they were not considered to have a broad enough influence to alter a pathway at the subbasin scale.

Population Characteristics

Bull trout within the action area occur within the Middle Columbia and Upper Snake recovery units. Bull trout population characteristics within each subbasin are summarized by regions within the recovery units.

Middle Columbia Recovery Unit

Lower Mid-Columbia Region

Only one of the six core areas is located completely in Washington. Demographic status is highly variable throughout the region. Status is the poorest in the Umatilla and Middle Fork John Day Core Areas. However, the Walla Walla River core area contains nearly pristine habitats in the headwater spawning areas and supports the most abundant populations in the region. Most core areas support both a resident and fluvial life history; however, recent evidence suggests a significant decline in the resident and fluvial life history in the Umatilla River and John Day core areas respectively. Connectivity between the core areas of the Lower Mid-Columbia Region is unlikely given conditions in the connecting FMO habitats. Connection between the Umatilla, Walla Walla, and Touchet core areas is uncommon but has been documented, and connectivity is possible between core areas in the John Day basin. Connectivity between the John Day core areas and Umatilla/Walla Walla/Touchet core areas is unlikely.

Lower Snake Region

Demographic status is variable within the Lower Snake Region. Although trend data are lacking, several core areas in the Grande Ronde Basin and the Imnaha core area are thought to be stable. The Upper Grande Ronde Core Area is the exception where population abundance is considered depressed. Wenaha, Little Minam, and Imnaha creeks are strongholds (as mentioned above), as are most core areas in the Clearwater River basin. Most core areas contain populations that express both a resident and fluvial life history strategy. There is potential that some bull trout in the upper Wallowa River are adfluvial. There is potential for connectivity between core areas in the Grande Ronde basin, however conditions in FMO are limiting.

Middle Snake Region

In the Middle Snake Region, core areas are distributed along both sides of the Snake River above Hells Canyon Dam. The Powder River and Pine Creek basins are in Oregon and Indian Creek and Wildhorse Creek are on the Idaho side of the Snake River. Demographic status of the core areas is poorest in the Powder River Core Area where populations are highly fragmented and severely depressed. The East Pine Creek population in the Pine-Indian-Wildhorse core area is likely the most abundant within the region. Populations in both core areas primarily express a resident life history strategy; however, some evidence suggests a migratory life history still exists in the Pine Creek-Indian-Wildhorse core area. Connectivity is severely impaired in the Middle Snake Region. Dams, diversions, and temperature barriers prevent movement among populations and between core areas. Brownlee Dam isolates bull trout in Wildhorse Creek from other populations.

Upper Snake Recovery Unit

Weiser River Core Area

Bull trout are currently known to occur in at least five streams or stream complexes (i.e., local populations). These local populations include Upper Hornet Creek, East Fork Weiser River, Upper Little Weiser River, Anderson Creek, and Sheep Creek.

Bull trout spawning and rearing habitat occurs only in the upper watersheds on Federal and State of Idaho lands. There is no connectivity between the current three stream complexes (Hornet Creek, Anderson Creek, and East Fork Weiser River). Idaho Department of Fish and Game (IDFG) indicated in 2014 that trend was increasing.

Little Lower Salmon River Core Area

Bull trout are currently known to use spawning and rearing habitat in at least seven streams or stream complexes (i.e., local populations). These local populations include Slate Creek, John Day Creek, Rapid River, Boulder Creek, Hard Creek, Lake/Lower Salmon, and Partridge Creek.

The mainstem Salmon River provides for migration, adult and sub-adult foraging, rearing, and wintering habitat. The Little Salmon River also provides for foraging/adult rearing habitat and connectivity between local populations in the core area. Current trend information for the Rapid River portion of this core area shows that the population is increasing, while surveys in Slate Creek and John Day indicate that those populations are decreasing. The Forest Service will attempt to be conservative in identifying primary threats and conservation actions.

Malheur River Region

The Malheur River basin contains major dams that are impassable to fish. The largest are Warm Springs Dam, impounding Warm Springs Reservoir on the mainstem Malheur River, and Agency Valley Dam, impounding Beulah Reservoir on the North Fork Malheur. The dams result in two core areas that are isolated from each other and from other core areas. Local populations in the two core areas are limited to habitat in the upper watersheds. The Malheur River basin contains 2 of the 22 core areas and 8 of the 206 local populations in the recovery unit. Fluvial and resident populations are present in both core areas while adfluvial populations are present in the North Fork Malheur. This basin contains less than 3 percent of the occupied habitat in the recovery unit, and approximately 60 percent of lands in the two core areas are federally owned. Trend data indicates that populations are declining in both core areas.

Hells Canyon Complex dams and others have removed the migratory component of bull trout populations, eliminated connectivity, and fragmented habitat (and completely eliminated anadromous fish presence) in all but the John Day River system and a small segment in the Snake River below the Hells Canyon Complex, resulting in isolated remaining populations. Smaller dams, diversions, and water withdrawals on private land are additional factors fragmenting habitat and decreasing connectivity for remaining fish.

Brook trout, and in some cases other non-native fishes, hinder recovery of bull trout populations and put the species at risk in nearly all the subbasins. Generally, the assumption is made that if brook trout are present they were a risk to bull trout even if no documentation existed as to displacement or hybridization with bull trout.

In most of the subbasins, a functioning at risk rating is made because of a lack of data with which to confirm a local population trend (see matrix pathway criteria).

PIBO Monitoring Data

Background

Salmon, steelhead, and bull trout stocks have been listed under the Endangered Species Act in most drainages within the interior Columbia River Basin. While many environmental factors led to the listing of these populations, habitat degradation is one of the major causes (Williams et al. 1999). Good or improving stream habitat, and the protection of processes that maintain these habitats, increases the likelihood of successful adult spawning and juvenile rearing for these listed species. A useful approach for assessing the status of stream habitat condition at a given stream reach is to compare its habitat characteristics to those of streams likely to be functioning properly (Stoddard et al. 2006). The PACFISH/INFISH Biological Opinion effectiveness monitoring program (PIBO) uses this approach to evaluate status of stream habitat within portions of the interior Columbia River and Missouri River basins, and to also document changes in habitat conditions (e.g., “trend”) over the 15 year period of PIBO sampling (2001-2015).

The following summary assesses habitat conditions for PIBO sites located within the three Blue Mountains national forests. The PIBO program sample sites are a combination of three different types (integrator sites, designated monitoring areas, and contract sites), which were selected to answer different management questions (see descriptions below).

- 1) PIBO integrator (I) sites were selected following the procedures laid out in Kershner et al. (2004) and are located at the lowest most “response reach” (Kershner et al. 2004) in the randomly selected sub-watersheds—most are located in the most downstream response reach (stream gradient less than 3 percent), while the remaining are at the downstream most transport reach (stream gradient between 3 and 5 percent). Integrator reaches represent the “status” and “trend” of stream and riparian areas within the randomly selected sub-watersheds and are intended to show the integrated effects of upstream management.
- 2) PIBO designated monitoring areas (DMA) (K) sites were selected by Forest personnel to be representative of grazing within a randomly selected subwatershed. DMA sites are used for annual implementation monitoring with the objective to develop a link between implementation and effectiveness monitoring as part of adaptive management feedback process.
- 3) PIBO contract sites – contract sites were selected by Forest personnel in areas of concern to provide additional information on status and trend of aquatic habitats. The Malheur NF made the decision to densify the number of PIBO monitoring sample sites in order to answer different management questions (additional sites for monitoring associated with grazing management, recovery of wild and scenic river segments, recovery of critical habitat for listed fish species, and compliance monitoring associated with Total Maximum Daily Loads (TMDLs) and water quality recovery). To date, 55 new sites have been added across the Forest. These sites are designated as contract sites by the PIBO effectiveness monitoring program, as they are above and beyond the original established sampling scheme, and represent a third sampling site type. At these sites, the PIBO EM team will complete effectiveness monitoring data collection every five years for numerous stream channel and habitat attributes, while the Malheur NF is responsible for any annual implementation monitoring (annual use indicators – stubble height, bank alteration, and shrub use).

The PIBO program generated this report to evaluate status and trends of two groups of sampling sites. The first group consists of all integrator sites (referred henceforth as PIBO Integrators) and the second group is all designated monitoring area and contract sites combined (referred henceforth as PIBO DMAs).

The PIBO program evaluates eight different habitat metrics to assess trend of aquatic resources. These metrics evaluate bank condition, substrate composition, pool habitat quantity and quality, and abundance of woody debris. PIBO evaluates overall habitat integrity using an approach published by Al-Chokhachy et al. (2010) which combines six commonly measured metrics into an overall habitat “Index Score.” This score ranges from a low of 0 to a high of 100 and is based on metric values expected in reference reaches. In addition, PIBO collects macroinvertebrate data which is scored from 0 to 100 based on methods described by Hawkins et al. (2000), and which also rates sites based on macroinvertebrate taxa expected in reference streams. This evaluation, called the “RivPac Score,” compares the proportion of macroinvertebrate taxonomic units observed to the taxonomic units expected in reference sites (O/E), and is a measure of overall biologic integrity.

Estimating Trends in Stream Habitat Conditions

Summary Tables

To estimate trends in stream habitat condition, PIBO used actual measured values (and not index scores) for eight stream habitat attributes. PIBO compared data collected at the first sampling visit with data from the last visit using the Wilcoxon signed rank summed test, a non-parametric statistical test that evaluates repeated measurements at the same site to determine if there has been a change in the metric value. A p-value less than 0.10 indicates that the change is significant. Desirable changes could be either in a positive or negative direction, for example, increased bank stability or fewer fine sediments. The desired direction of change (+ or -) for each habitat attribute is shown in the summary tables found in the below Forest sections. PIBO data also indicate the general direction of change across reference sites sampled. Summary tables also show the mean value for each attribute for the first and last sampling events, and the percent change in the metric over the evaluation period. Below is the overall index values across the Malheur NF. The full PIBO report for the Malheur, Umatilla, and Wallowa-Whitman NF can be viewed in Appendices C through E.

PIBO Monitoring Data Malheur National Forest

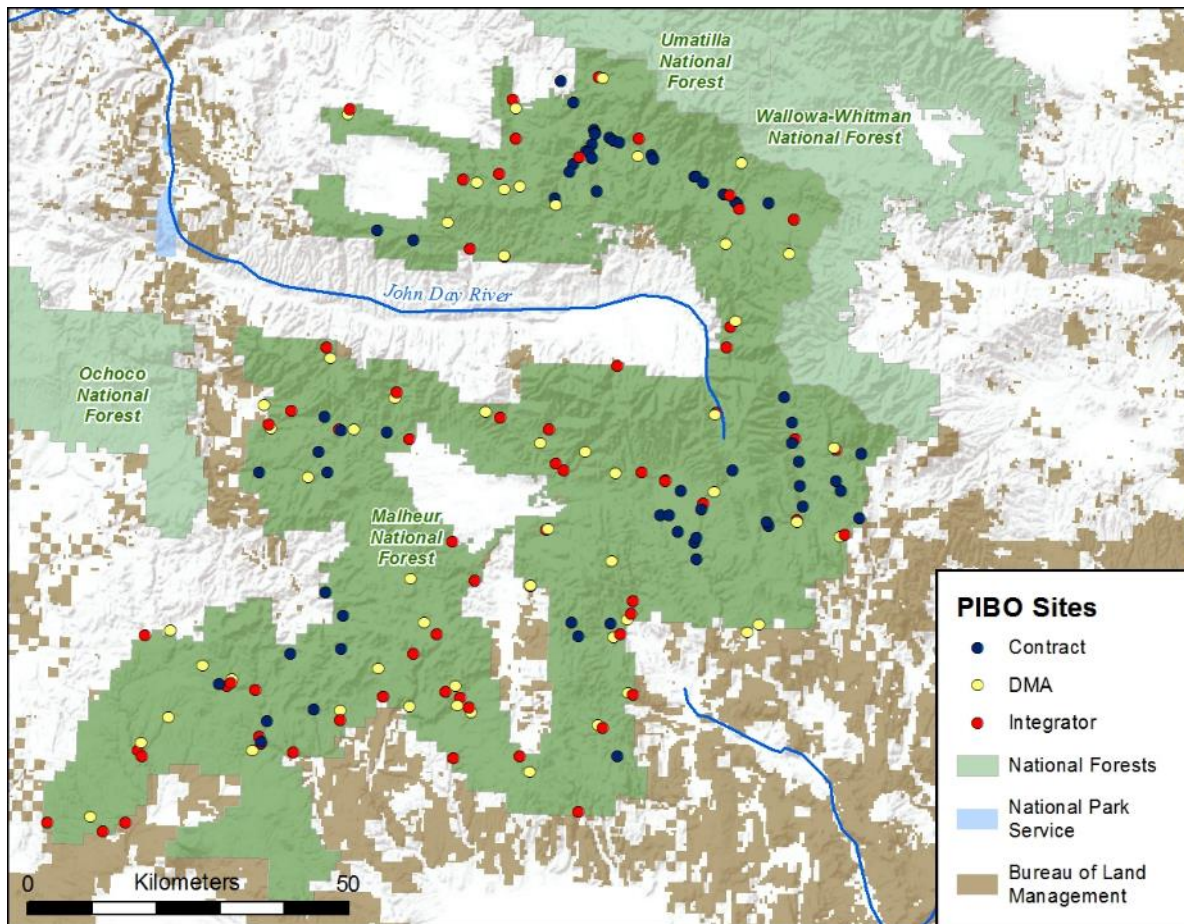


Figure 3. Map of Malheur National Forest PIBO monitoring sites

Unit Scale: Integrators

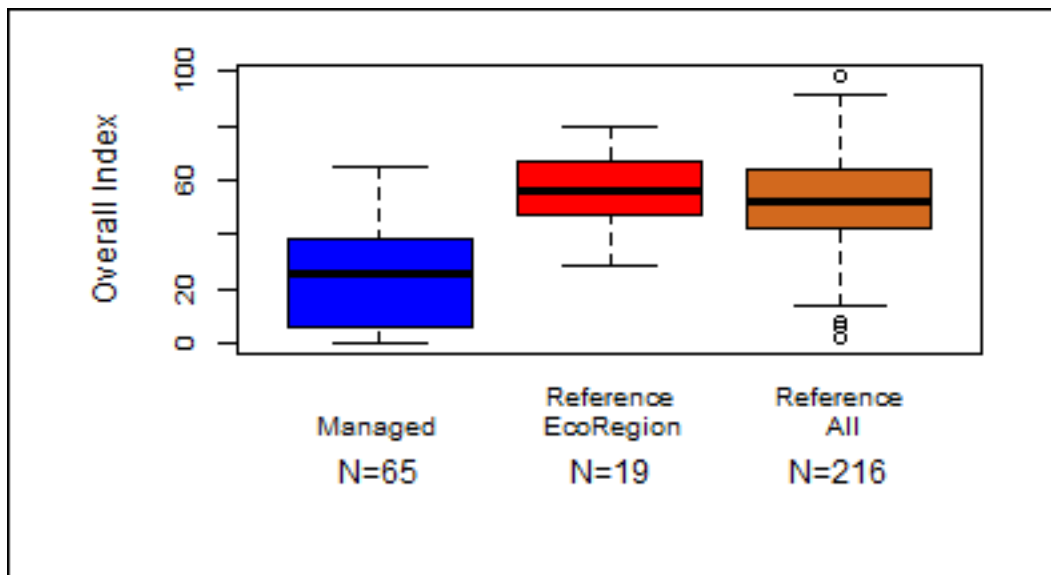


Figure 4. Summary of baseline conditions for all subbasins within the planning area.

Figure 4 depicts overall index values across the Malheur NF, including median and range of index values for managed sites, reference sites within the ecoregion, and reference sites for the entire PIBO study area.

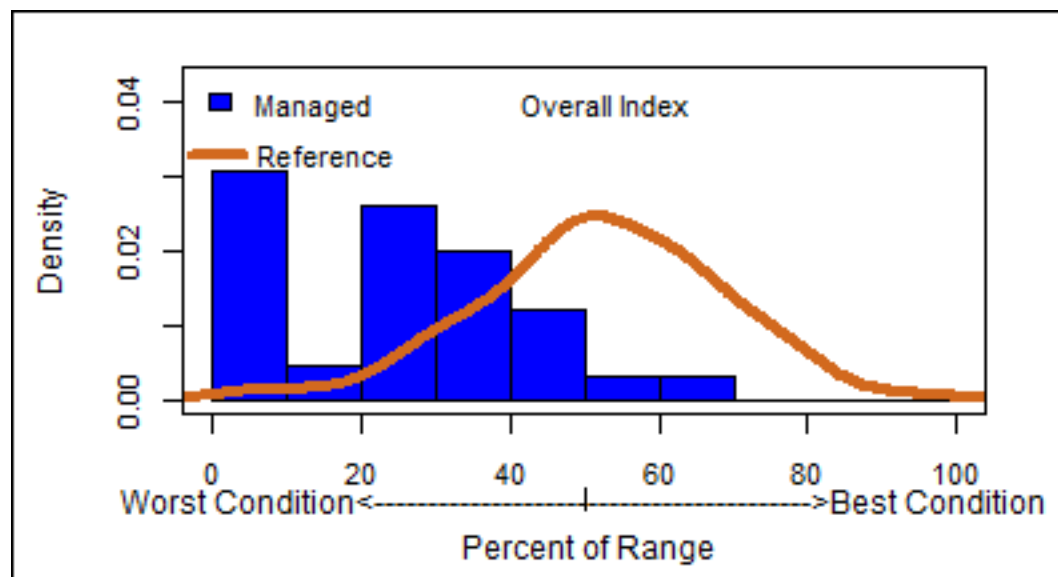


Figure 5. Overall Index values across the Malheur NF. Distribution of index values for managed reaches (histogram) compared to expected values at reference reaches (the line graph). Close matches between histogram height and line indicate conditions are similar at managed and reference reaches.

Trend

Table 27 depicts trends in stream habitat attributes across the Malheur NF including: Overall_Index score; O.E. (observed/expected macroinvertebrate score); VegStab (bank stability); UnCutPct (percent undercut banks); LWFrq (large wood frequency); Bank Angle; PTFines6 (percent fines in pool tails); D50 (median substrate size); RPD (residual pool depth); PoolPct (percent pools); Time1 (mean value during first visit); Time2 (mean value for last visit); Percent Change (percent change in the mean values between the first and last visit); Sample Size (number of observations with repeat visits); Negative Number (number of sites where actual measurement was lower on last visit); Positive Number (number of sites where actual measurement was higher in last visit); None Number (number of sites where last visit and first visit values were equal); P-value (significance test); Desired Direction (direction of change in the mean, which can be either + or -); Actual Change (actual direction of change in the mean, which can be “not statistically significant” {NS}, + or -).

Table 27. Trend in stream habitat attributes across the Malheur NF

Metric	Time1 Value	Time2 Value	Percent Change	Sample Size	Negative Number	Positive Number	No Change Number	P-value	Desired Direction	Actual Change
Overall_Index	23.92	26.03	8.8	63	20	34	9	0.071	+	+
O.E.	0.62	0.64	3.3	65	31	33	1	0.556	+	NS
VegStab	73.58	77.38	5.2	66	31	35	0	0.191	+	NS
UnCutPct	19.47	22.66	16.4	66	23	42	1	0.026	+	+
LWFrq	126.61	169.8	34.1	66	13	46	7	0	+	+
BankAngle	123.7	120.47	-2.6	66	38	27	1	0.051	-	-
PTFines6	33.1	33.68	1.8	64	37	26	1	0.671	-	NS
D50	0.0268	0.0292	9.3	66	28	32	6	0.357	+	NS
RPD	0.23	0.26	10.2	66	29	36	1	0.073	+	+

Metric	Time1 Value	Time2 Value	Percent Change	Sample Size	Negative Number	Positive Number	No Change Number	P-value	Desired Direction	Actual Change
PoolPct	39.91	38.02	-4.7	66	32	33	1	0.42	+	NS

Overall Summary

Overall across the Malheur NF, trend data shows a significant improvement in the overall index, undercut banks, large wood, bank angle, and residual pool depth. While trends for some of these parameters show improvement, the current status of all of the habitat metrics, except mean substrate and percent pool fines, are still highly departed from reference conditions (Archer and Ojala 2016).

PIBO Monitoring Data Umatilla National Forest

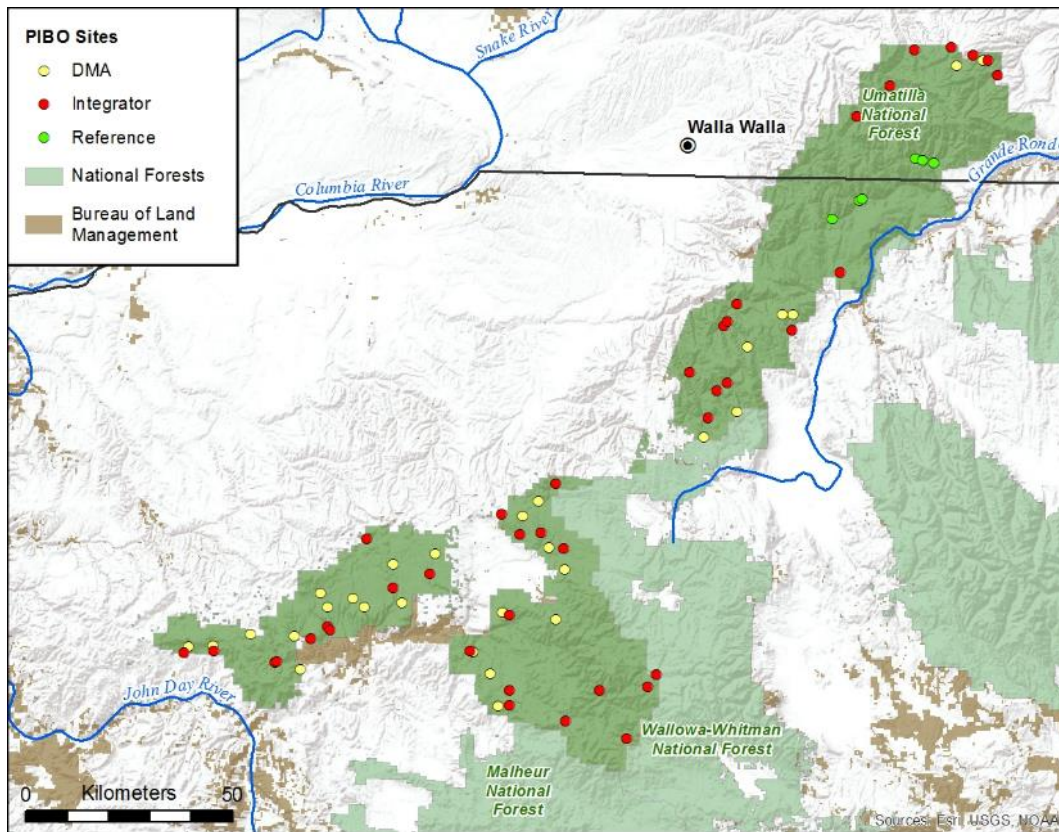


Figure 6. Map of Umatilla National Forest PIBO monitoring sites

Unit Scale: Integrators

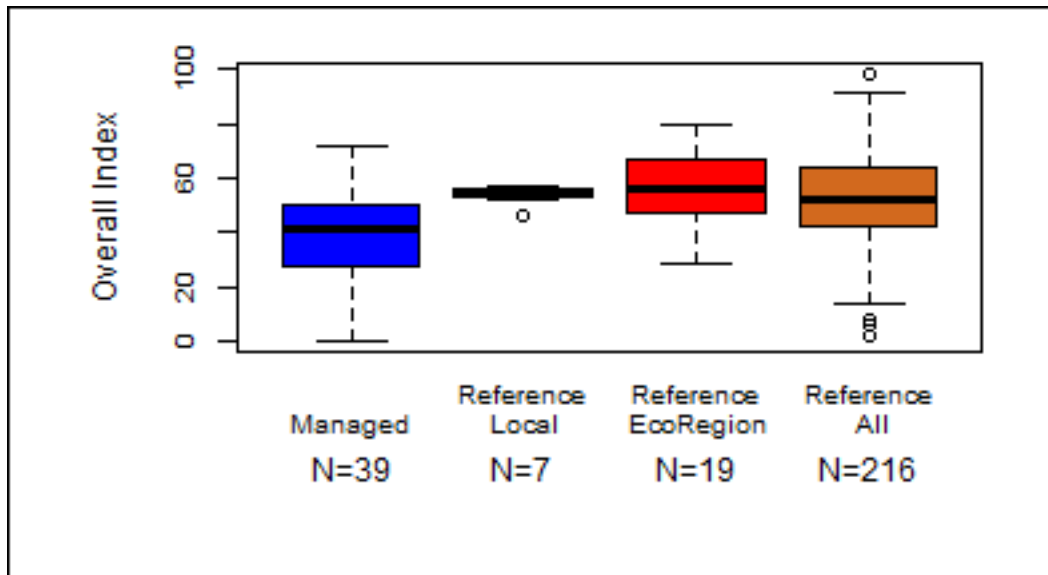


Figure 7. Overall Index values across the Umatilla NF. Median and range of index values for managed sites, reference sites within the area of evaluation, reference sites within the ecoregion, and reference sites for the entire PIBO study area.

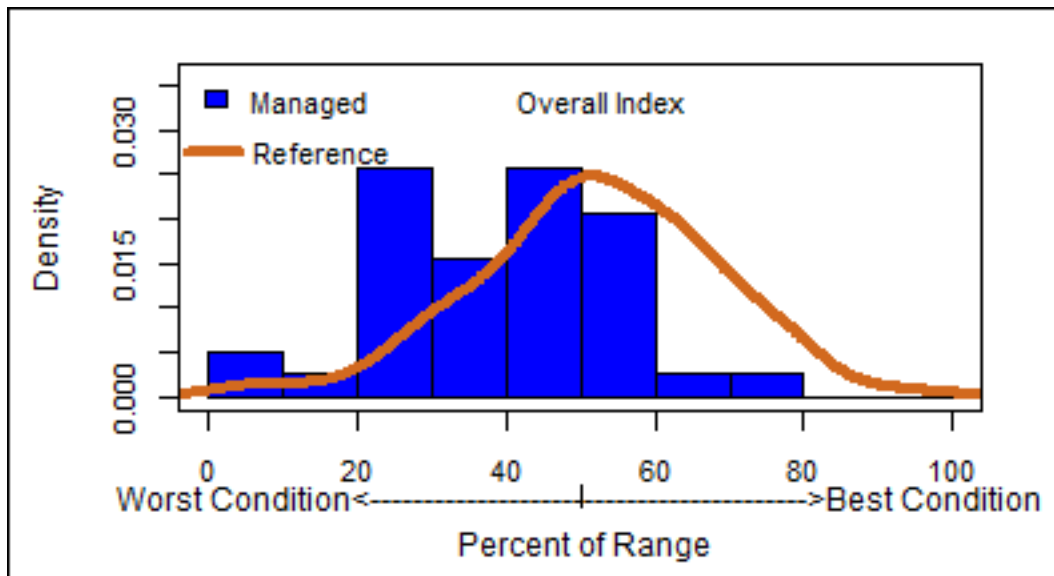


Figure 8. Overall Index values across the Umatilla NF. Distribution of index values for managed reaches (histogram) compared to expected values at reference reaches (the line graph). Close matches between histogram height and line indicate conditions are similar at managed and reference reaches.

Trend

Table 28 depicts trend in stream habitat attributes across the Umatilla NF including: Overall_Index score; O.E. (observed/expected macroinvertebrate score); VegStab (bank stability); UnCutPct (percent undercut banks); LWFrq (large wood frequency); Bank Angle; PTFines6 (percent fines in pool tails); D50 (median substrate size); RPD (residual pool depth); PoolPct (percent pools); Time1 (mean value during first visit); Time2 (mean value for last visit); Percent Change (percent change in the mean values between the first and last visit); Sample Size (number of observations with repeat visits); Negative Number (number of sites where actual measurement was lower on last visit); Positive Number (number of sites where actual measurement was higher in last visit); None Number (number of sites where last visit and first visit values were equal); P-value (significance test); Desired Direction (direction of change in the mean, which can be either + or -); Actual Change (actual direction of change in the mean, which can be “not statistically significant” {NS}, + or -).

Table 28. Trend in stream habitat attributes across the Umatilla NF Subbasin.

Metric	Time1 Value	Time2 Value	Percent Change	Sample Size	Negative Number	Positive Number	No Change Number	P-value	Desired Direction	Actual Change
Overall_Index	39.79	38.85	-2.4	39	18	20	1	0.8	+	NS
O.E.	0.73	0.74	1	38	19	19	0	0.845	+	NS
VegStab	78.87	72.13	-8.5	39	20	19	0	0.302	+	NS
UnCutPct	14.01	15.48	10.5	39	14	24	1	0.204	+	NS
LWFrq	170.62	255.96	50	39	6	33	0	0	+	+
BankAngle	129.1	127.77	-1	39	23	14	2	0.294	-	NS
PTFines6	13.92	18.14	30.3	39	17	22	0	0.026	-	+
D50	0.0639	0.0547	-14.5	39	23	13	3	0.068	+	-
RPD	0.27	0.26	-2.1	39	26	13	0	0.343	+	NS
PoolPct	32.72	34.06	4.1	39	19	20	0	0.596	+	NS

Overall Summary

Overall, across the Umatilla NF, trend data shows a significant improvement in large wood. The trend data also shows there is a statistical significant response opposite the desired direction for percent pool tail fines and mean substrate. While trends for some of these parameters show improvement, the current status of percent pools, bank angle, O.E. macroinvertebrates, residual pool depth, and the overall index score are still highly departed from reference conditions (Archer and Ojala 2016).

PIBO Monitoring Data Wallowa-Whitman National Forest

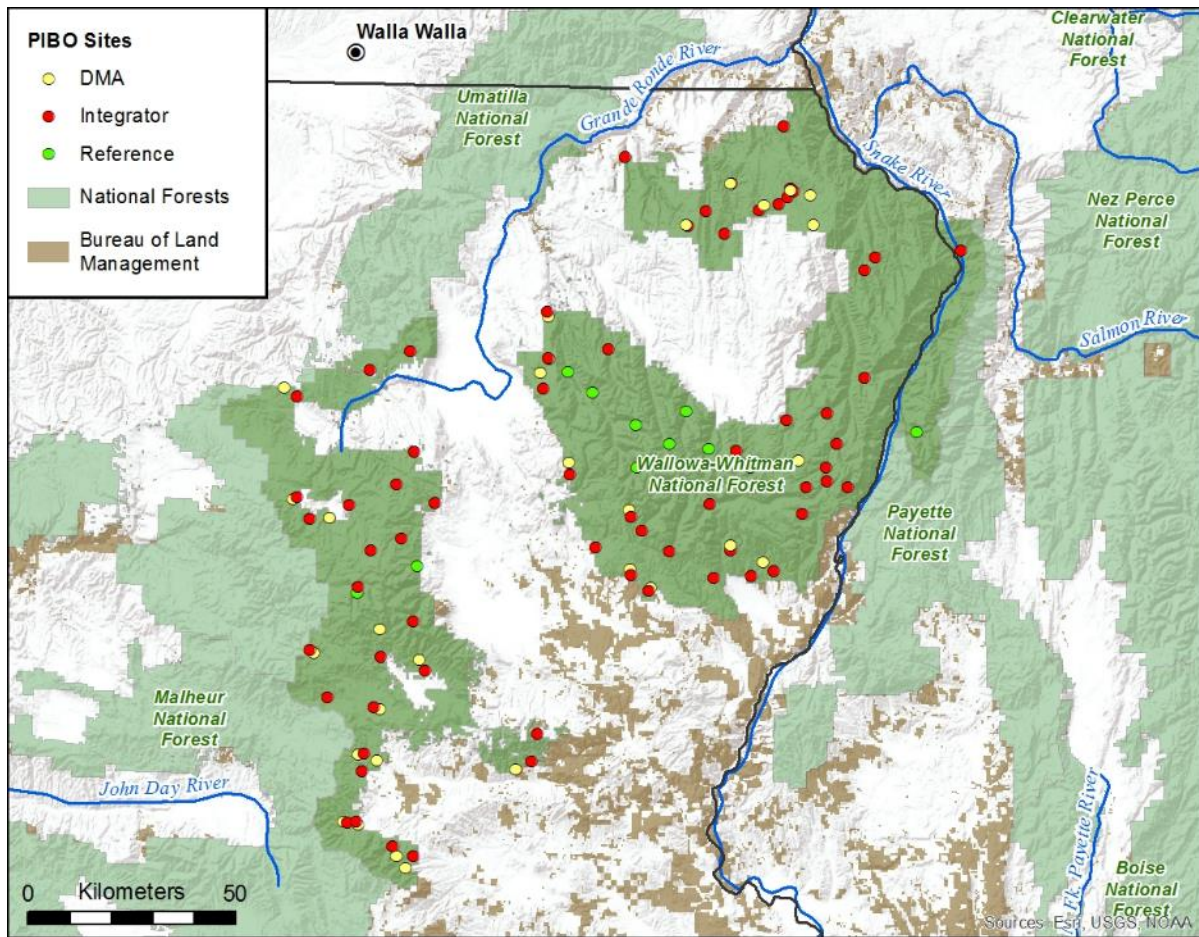


Figure 9. Map of Wallowa-Whitman National Forest PIBO monitoring sites

Unit Scale: Integrators

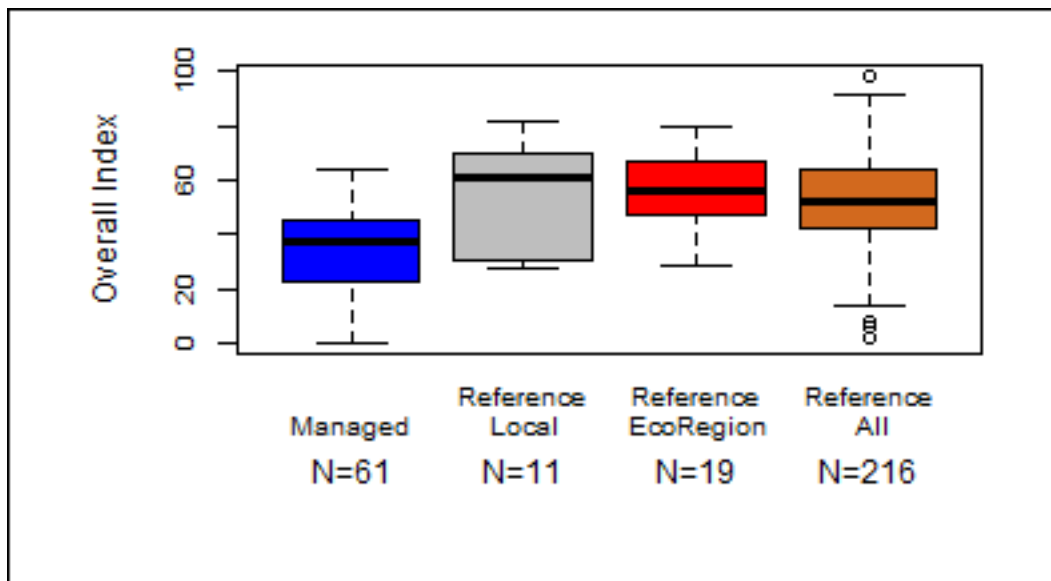


Figure 10. Overall Index values across the Wallowa-Whitman NF. Median and range of index values for managed sites, reference sites within the area of evaluation, reference sites within the ecoregion, and reference sites for the entire PIBO study area.

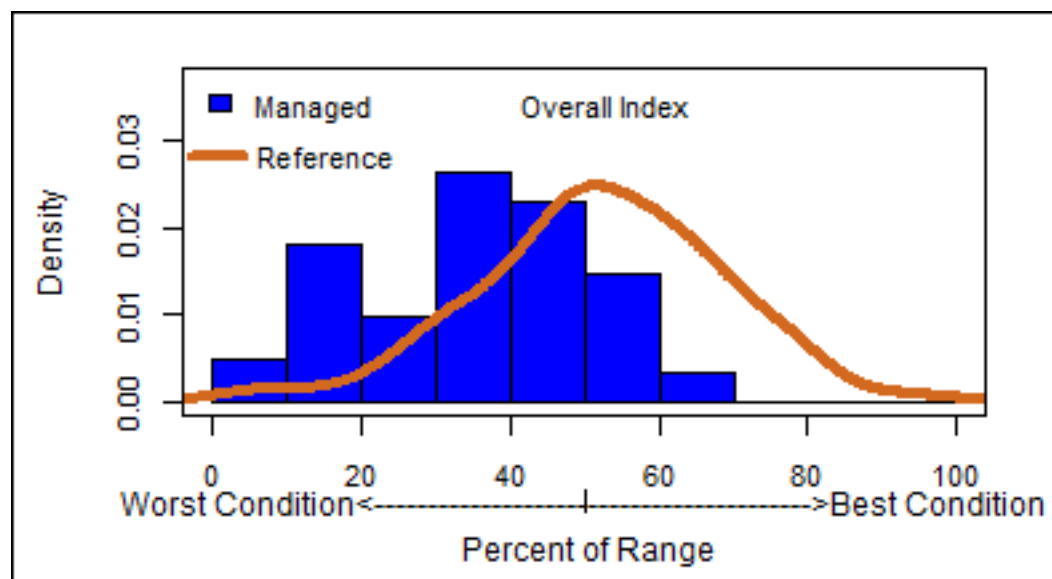


Figure 11. Overall Index values across the Wallowa-Whitman NF. Distribution of index values for managed reaches (histogram) compared to expected values at reference reaches (the line graph). Close matches between histogram height and line indicate conditions are similar at managed and reference reaches.

Trend

Table 29 depicts trend in stream habitat attributes across the Wallowa-Whitman NF including: Overall_Index score; O.E. (observed/expected macroinvertebrate score); VegStab (bank stability); UnCutPct (percent undercut banks); LWFrq (large wood frequency); Bank Angle; PTFines6 (percent fines in pool tails); D50 (median substrate size); RPD (residual pool depth); PoolPct (percent pools); Time1 (mean value during first visit); Time2 (mean value for last visit); Percent Change (percent change in the mean values between the first and last visit); Sample Size (number of observations with repeat visits); Negative Number (number of sites where actual measurement was lower on last visit); Positive Number (number of sites where actual measurement was higher in last visit); None Number (number of sites where last visit and first visit values were equal); P-value (significance test); Desired Direction (direction of change in the mean, which can be either + or -); Actual Change (actual direction of change in the mean, which can be “not statistically significant” {NS}, + or -).

Table 29. Trend in stream habitat attributes across the Wallowa-Whitman Subbasin.

Metric	Time1 Value	Time2 Value	Percent Change	Sample Size	Negative Number	Positive Number	No Change Number	P-value	Desired Direction	Actual Change
Overall_Index	35.85	34.5	-3.8	63	38	24	1	0.191	+	NS
O.E.	0.72	0.72	-0.6	61	26	35	0	0.986	+	NS
VegStab	69.97	74.79	6.9	67	26	41	0	0.082	+	+
UnCutPct	22.75	22.59	-0.7	67	33	34	0	0.973	+	NS
LWFrq	194.35	294.78	51.7	67	15	52	0	0	+	+
BankAngle	119.52	122.32	2.3	67	28	37	2	0.121	-	NS
PTFines6	21.63	25.31	17.1	63	20	43	0	0.009	-	+
D50	0.045	0.0445	-1.1	67	36	26	5	0.283	+	NS
RPD	0.26	0.27	4.3	65	37	26	2	0.897	+	NS

PoolPct	39.5	31.17	-21.1	65	44	19	2	0	+	-
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Overall Summary

Overall, across the Wallowa-Whitman NF, trend data shows a significant improvement in bank stability and large wood. The trend data also shows there is a statistical significant response opposite the desired direction for percent pool tail fines and percent pools. While trends for some of these parameters show improvement, the current status of percent pools, bank angle, O.E. macroinvertebrates, residual pool depth, and the overall index score are still highly departed from reference conditions (Archer and Ojala 2016).

Watershed Condition Class Framework (WCF)

The 2011 watershed condition framework (WCF) is a comprehensive approach for proactively implementing integrated restoration on priority watersheds on national forests and grasslands (Figure 12). The WCF was implemented across all national forests to improve the Forest Service' approach to watershed restoration by establishing a consistent methodology for condition assessment, and targeting the implementation of integrated collections of enhancement activities on those watersheds identified as priorities for restoration (USDA Forest Service 2011).

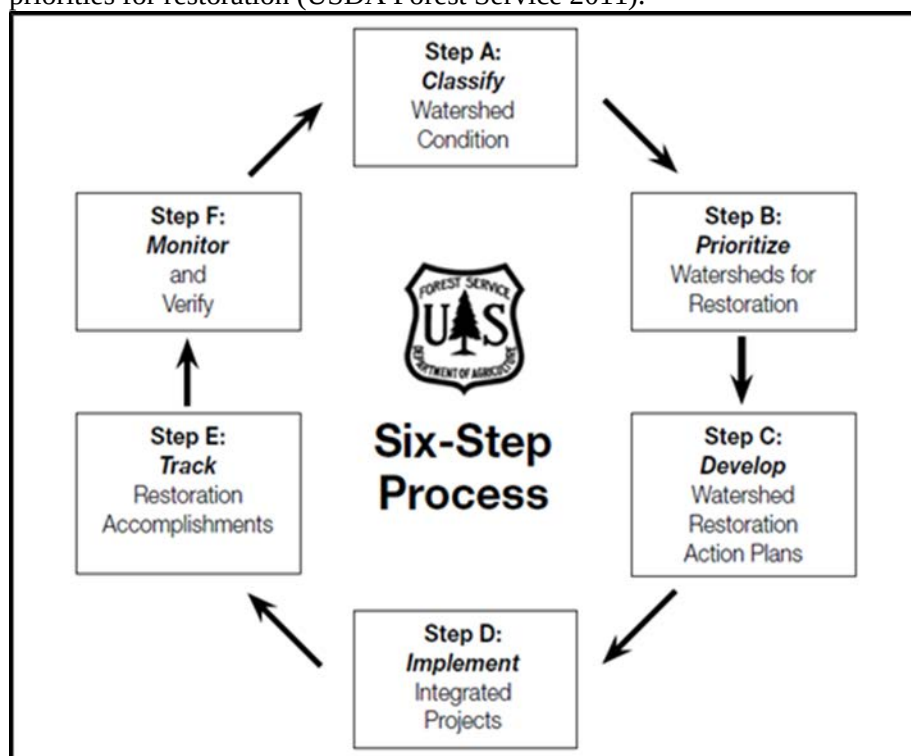


Figure 12. Six steps of the watershed condition framework (WCF) process.

Prior to the WCF, each National Forest classified watershed condition (typically at the watershed, or HUC5, scale) using local methods that were not consistent between forests. The WCF provides a framework for consistent assessments at the subwatershed, or HUC6 scale, and for prioritizing watersheds for restoration.

Watershed condition classification is the process of describing watershed condition in terms of discrete categories (or classes) that reflect the level of watershed health or integrity. The WCF classifies watershed condition using a comprehensive set of 12 indicators that are surrogate variables representing the

underlying ecological, hydrological, and geomorphic functions and processes that affect watershed condition.

The indicators are grouped according to four major process categories: (1) aquatic physical, (2) aquatic biological, (3) terrestrial physical, and (4) terrestrial biological (Figure 13). These categories represent terrestrial, riparian, and aquatic ecosystem processes or mechanisms by which management actions can affect the condition of watersheds and associated resources. The four process categories are then weighted to reflect their relative contribution toward watershed condition from a national perspective. The aquatic physical and aquatic biological categories are weighted at 30 percent each because of their direct impact to aquatic systems (endpoint indicators). The terrestrial physical category was weighted at 30 percent because roads are one of the greatest sources of impact to watershed condition. The terrestrial biological category is weighted at 10 percent because these indicators have less direct impact on watershed condition.

Primary emphasis is placed on aquatic and terrestrial processes and conditions that Forest Service management activities can influence. The approach is designed to promote integrated watershed assessments, target programs of work in watersheds that have been identified for restoration, enhance communication and coordination with external agencies and partners, and improve reporting and monitoring of program accomplishments.

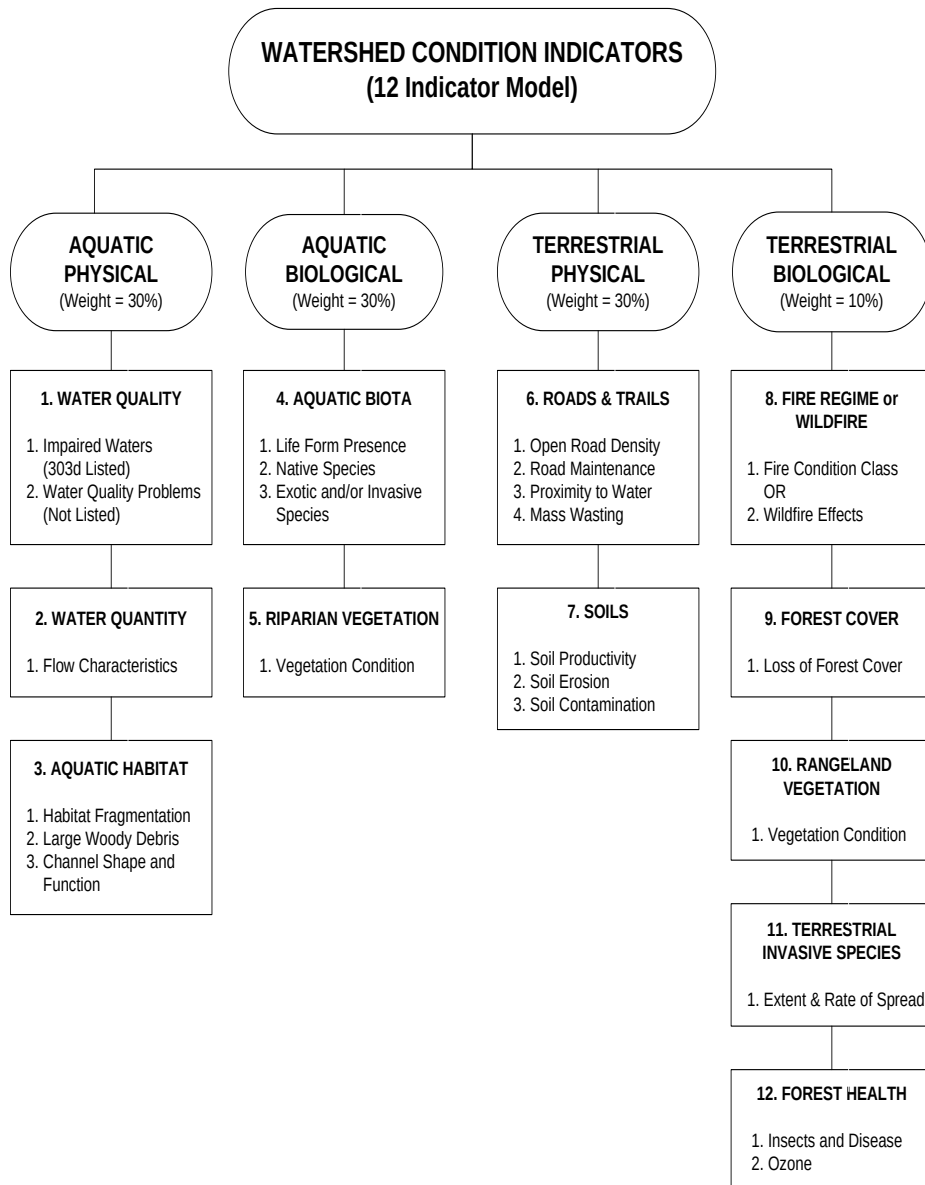


Figure 13. Watershed condition framework indicators.

Selected Indicator Rule Sets

Water Quality Condition

Purpose: This indicator addresses the expressed alteration of physical, biological, or chemical impacts to water quality.

Table 30. Water quality condition rating rule set 1.

Attributes	Good (1) Functioning Properly	Fair (2) Functioning At Risk	Poor (3) Impaired
Water Quality Condition Indicator	Minimal to no impairment of beneficial uses to the water bodies in the watershed.	Minor impairment of beneficial uses to the water bodies in the watershed.	Significant impairment of beneficial uses to the water bodies in the watershed.
Impaired Waters (303d Listed)	No State listed impaired or threatened water bodies.	Less than 10% of the stream miles or lake area are listed on the 303d or 305b lists and not supporting beneficial uses.	10% or more of the stream miles or lake areas are water quality limited and not fully supporting beneficial uses as identified by a State Water Quality Agency integrated report (303d & 305b).
Water Quality (Not Listed)	The watershed has minor or no water quality problems. For example, no documented evidence of excessive sediment, nutrients, chemical pollution or other water quality issues above natural or background levels; no consumption advisories or contamination from abandoned or active mines; little or no evidence of acidification, toxicity, or eutrophication due to atmospheric deposition (see "Additional Guidance" related to mines and atmospheric deposition).	The watershed has moderate water quality problems. For example, consumption advisories in localized areas; minor contamination from active or abandoned mines; localized incidence of accelerated sediment, nutrients, chemicals, or infrequent, documented incidents of water contamination of public drinking water sources. Moderate evidence of acidification, eutrophication, or toxicity due to atmospheric deposition (see "Additional Guidance" related to mines and atmospheric deposition).	The watershed has extensive water quality problems. For example, consumption advisories over extended areas; excessive sediment, nutrients, chemicals, extensive contamination from active or abandoned mines; or frequent incidents of contamination in public drinking water sources. Strong evidence of acidification, eutrophication, or toxicity due to atmospheric deposition (see "Additional Guidance" related to mines and atmospheric deposition).

Aquatic Habitat Condition

Purpose: This indicator addresses aquatic habitat condition with respect to habitat fragmentation, large woody debris, and channel shape and function.

Table 31. Aquatic habitat condition rating rule set 3

Attributes	GOOD (1) Functioning Properly	FAIR (2) Functioning at Risk	POOR (3) Impaired
Aquatic Habitat Condition Indicator	The watershed supports large continuous blocks of high quality aquatic habitat and high quality stream channel conditions.	The watershed supports medium to small blocks of contiguous habitat. Some high quality aquatic habitat is available, but stream channel conditions show signs of being degraded.	The watershed supports small amounts of continuous high quality aquatic habitat. Most stream channel conditions show evidence of being degraded by disturbance.

Attributes	GOOD (1) Functioning Properly	FAIR (2) Functioning at Risk	POOR (3) Impaired
Habitat Fragmentation (including Aquatic Organism Passage)	Fragmentation of habitat is not a serious concern (>95% of historical aquatic habitats are still connected).	Aquatic habitat fragmentation is increasing due to temperature, aquatic organism passage blockages, or dewatering (only 25% - 95% of the historical aquatic habitats are still connected).	Aquatic habitat fragmentation due to temperature, blockages, or dewatering is a serious concern (>25% of the historical aquatic habitats are no longer connected).
Large Woody Debris	In aquatic and riparian systems that evolved with wood, large woody debris is present and continues to be recruited into the system at near natural rates.	In aquatic and riparian systems that evolved with wood, large woody debris is present but is recruited into the system at less than natural rates due to riparian management activities.	In systems that should contain large wood as an ecosystem component, it is lacking resulting in poor riparian or aquatic habitat conditions including bank destabilization, little pool formation, and little microclimate maintenance.
Channel Shape and Function	Channel width-to-depth ratios exhibit the range of conditions expected in the absence of human influence. Less than 5% of the stream channels show signs of widening. Channels are vertically stable, with isolated locations of aggradation or degradation as would be expected in near natural conditions. The distribution of channels with floodplain connectivity is close to that found in reference watersheds of similar size and geology.	Channel width-to-depth and vertical stability are maintained except where riparian vegetation has been disturbed. From 5 to 25% of the stream channel have seen an increase in width-to-depth ratios. Channel degradation and/or aggradation are evident but limited to relatively small sections of the channel network. Evidence of downcutting so that some stream channels are no longer connected to their floodplain.	More than 75% of channels have width-to-depth ratios greater than expected under near-natural conditions. The size and extent of gullied sections of channels are extensive, currently increasing, or have increased recently. Many streambanks show signs of active erosion above that expected naturally. Channel degradation and/or aggradation are evident and widespread due to unstable streambeds and banks. Many (>50%) of the stream channels are disconnected from their floodplain or are braided channels due to increased sediment loads.

Riparian and Wetland Vegetation Condition

Purpose: This indicator addresses the function and condition of native riparian vegetation along streams, water bodies, and wetlands.

Table 32. Riparian and wetland vegetation condition rating rule set 5.

Attributes	GOOD (1) Functioning Properly	FAIR (2) Functioning at Risk	POOR (3) Impaired
Riparian Vegetation Condition Indicator	Native vegetation is in proper functioning condition throughout the stream corridor or along wetlands and water bodies.	Disturbance partially compromises proper functioning condition of native vegetation attributes in stream corridor areas or along wetlands and water bodies.	A large percent of native vegetation attributes along stream corridors, wetlands and water bodies are not in proper functioning condition.

Attributes	GOOD (1) Functioning Properly	FAIR (2) Functioning at Risk	POOR (3) Impaired
Vegetation Condition	Native mid to late seral vegetation appropriate to the sites potential dominates the plant communities and is vigorous, healthy and diverse in age, structure, cover and composition on >80% of the riparian/wetland areas in the watershed. Sufficient reproduction of native species appropriate to the site is occurring to ensure sustainability. Mesic herbaceous plant communities occupy most of their site potential. Vegetation is in a dynamic equilibrium appropriate to the stream or wetland system.	Native vegetation demonstrates a moderate loss of vigor, reproduction and growth, or changes in composition, especially in areas most susceptible to human impact. Areas displaying light to moderate impact to structure, reproduction, composition and cover may occupy 25 to 80% of the overall riparian area with only a few areas displaying significant impacts. Up to 25% of the species cover or composition occurs from early seral species and/or there are some localized but relatively small areas where early seral vegetation dominates, but the communities across the watershed are still dominated by mid to late seral. Xeric herbaceous communities exist where water relationships have been altered but are relatively small, localized, generally are not continuous across large areas, and do not dominate across the watershed.	Native vegetation is vigorous, healthy and diverse in age, structure, cover and composition on <75% of the riparian/wetland areas in the watershed. Native vegetation demonstrates a noticeable loss of vigor, reproduction and growth, and changes in composition as compared with the site potential communities throughout areas most susceptible to human impact. In these areas, cover and composition are strongly reflective of early seral species dominance although there will be late seral and mid seral species present, especially in pockets. Mesic dependent herbaceous vegetation is limited in extent with many lower terraces dominated by Xeric species most commonly associated with uplands. Reproduction of mid and late seral species is very limited. For much of the area, the water table is disconnected from the riparian area and the vegetation reflects this loss of available soil water

Road and Trail Condition

Purpose: This indicator addresses changes to the hydrologic and sediment regimes due to the density, location, distribution, and maintenance of the road and trail network.

Table 33. Roads and trails condition rating rule set 6

Attributes	GOOD (1) Functioning Properly	FAIR (2) Functioning at Risk	POOR (3) Impaired
Road and Trail Condition Indicator	The density and distribution of roads and linear features within the watershed indicates the hydrologic regime is substantially intact and unaltered.	The density and distribution of roads and linear features within the watershed indicate there is a moderate probability that the hydrologic regime is substantially altered.	The density and distribution of roads and linear features within the watershed indicate there is a higher probability that the hydrologic regime (timing, magnitude, duration, and spatial distribution of runoff flows) is substantially altered.

Attributes	GOOD (1) Functioning Properly	FAIR (2) Functioning at Risk	POOR (3) Impaired
Open Road Density	Default road/trail density < 1 mi/mi ² , OR a locally determined threshold for good conditions supported by Forest Plans or analysis and data.	Default road/trail density 1 - 2.4 mi/mi ² , OR a locally determined threshold for fair conditions supported by Forest Plans or analysis and data.	Default road/trail density >2.4 mi/mi ² , OR a locally determined threshold for poor conditions supported by Forest Plans or analysis and data.
Road and Trail Maintenance	BMPs for the maintenance of designed drainage features are applied to >75% of the roads, trails, and water crossings in the watershed.	BMPs for the maintenance of designed drainage features are applied to 50 to 75% of the roads, trails, and water crossings in the watershed.	BMPs for the maintenance of designed drainage features are applied to <50% of the roads, trails, and water crossings in the watershed.
Proximity to Water	No more than 10% of road/trail length is located within 300 feet of streams and water bodies or hydrologically connected to them.	10 - 25% of road/trail length is located within 300 feet of streams and water bodies or hydrologically connected to them.	More than 25% of road/trail length is located within 300 feet of streams and water bodies or hydrologically connected to them.
Mass Wasting	Very few roads are on unstable landforms or rock types subject to mass wasting with little evidence of active movement or evidence of road damage. There is no danger of large quantities of debris being delivered to the stream channel due to mass wasting.	Few roads are on unstable landforms or rock types subject to mass wasting with moderate evidence of active movement or road damage. There is some danger of large quantities of debris being delivered to the stream channel. It is not a primary concern in this watershed.	Most roads are on unstable landforms or rock types subject to mass wasting with extensive evidence of active movement or road damage. Mass wasting that could deliver large quantities of debris to the stream channel is a primary concern in this watershed.

Summary of Selected Indicators

Ratings for most indicators show varying distributions of functioning properly (good), functioning at risk (fair), and impaired function (poor). Four indicators most relevant to water quality and fisheries are discussed in more detail; water quality, aquatic habitat, riparian/wetland vegetation, and roads and trails.

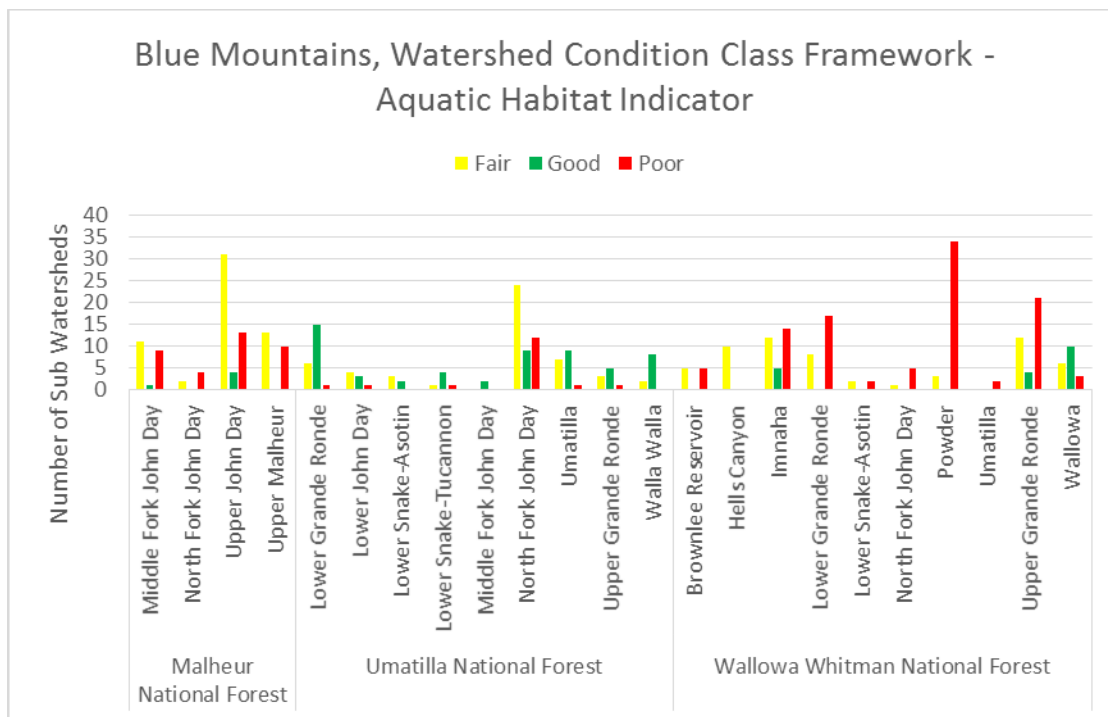


Figure 14. Blue Mountains; watershed condition class framework aquatic habitat indicator

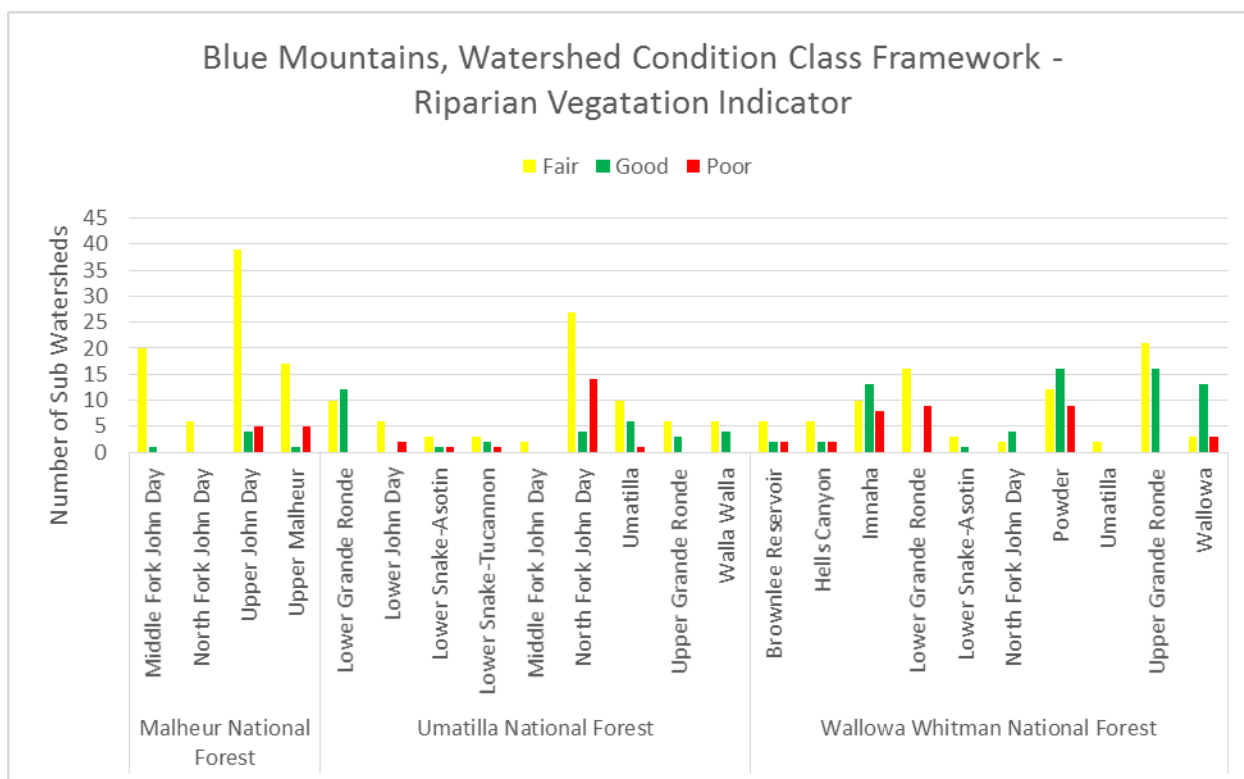


Figure 15. Blue Mountains; watershed condition class framework riparian vegetation indicator

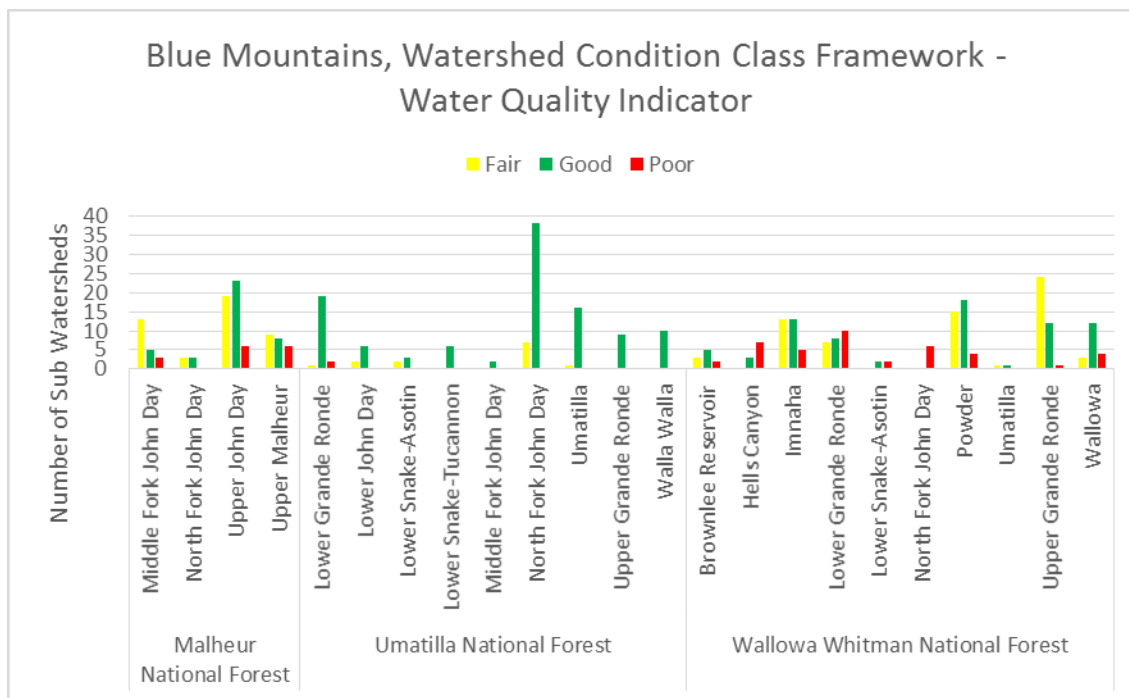


Figure 16. Blue Mountains; watershed condition class framework water quality indicator

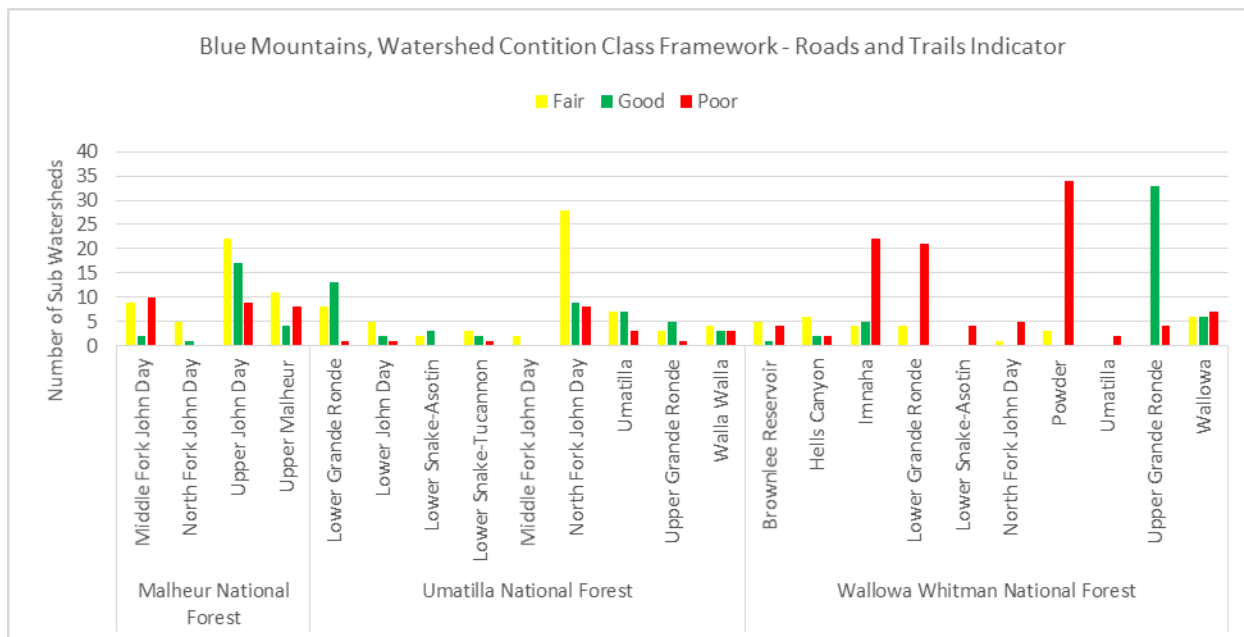


Figure 17. Blue Mountains; watershed condition class framework roads and trails vegetation indicator

Malheur NF Watershed Condition Class Framework

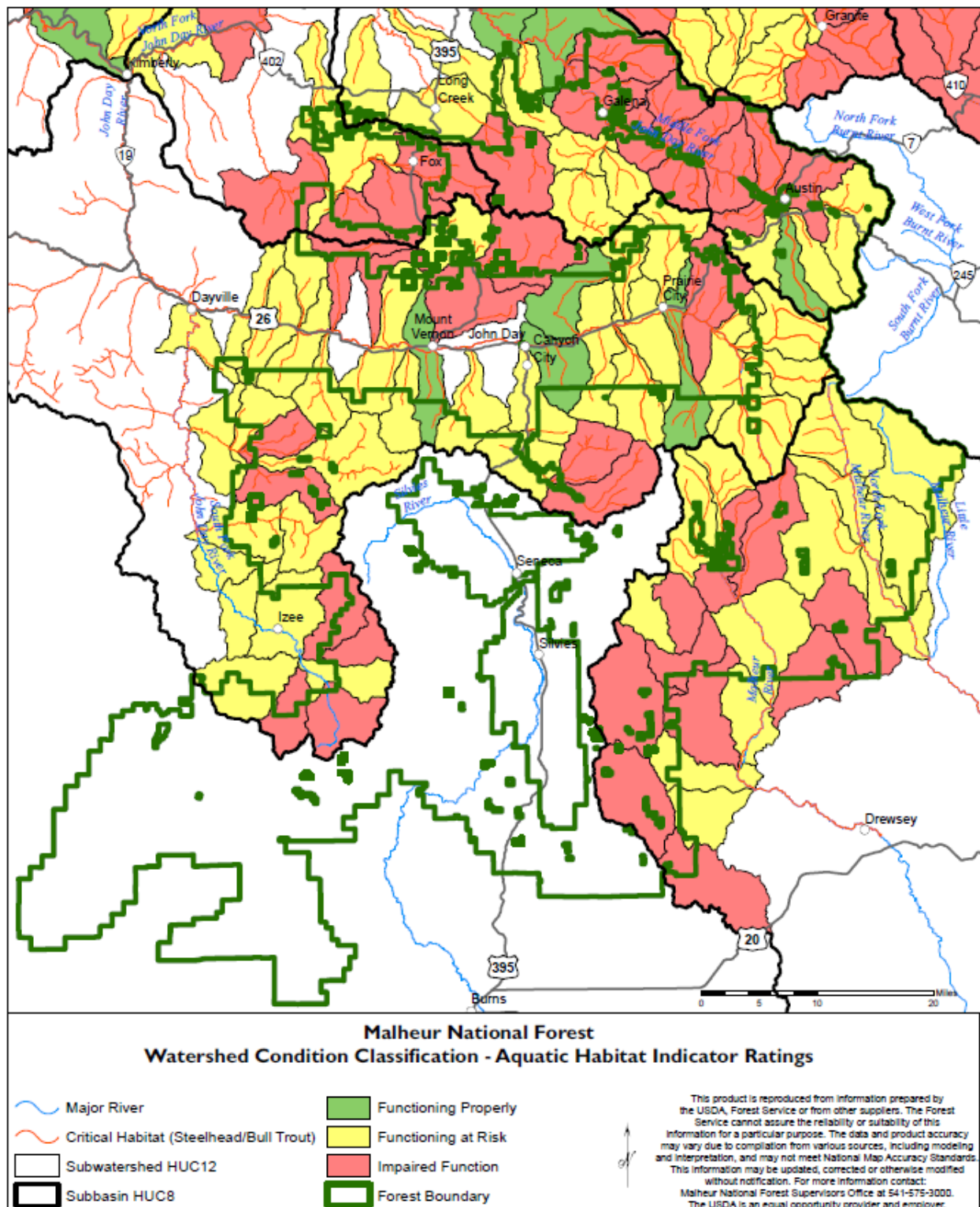


Figure 18. Malheur NF watershed condition class framework aquatic habitat indicator

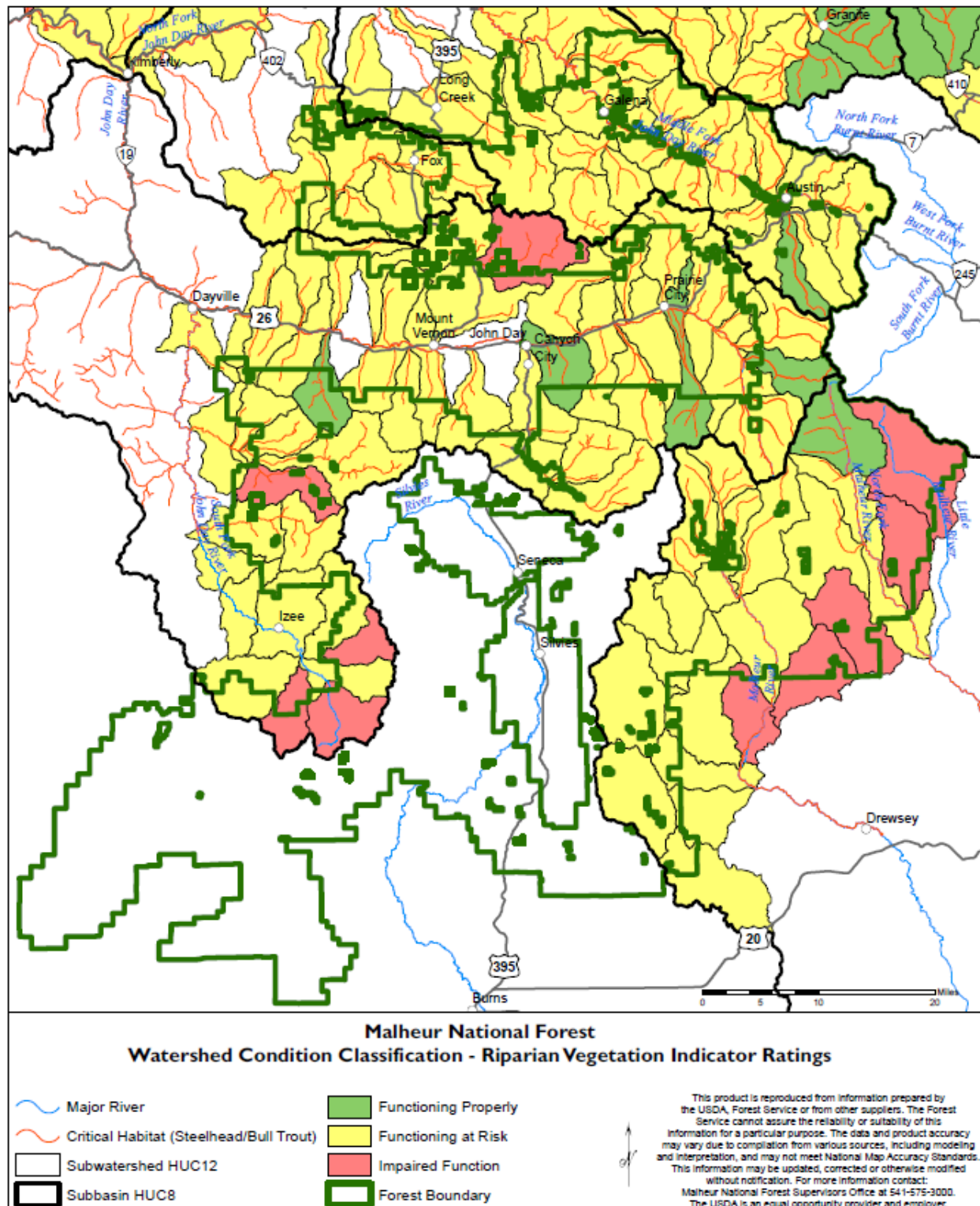


Figure 19. Malheur NF watershed condition class framework riparian vegetation indicator

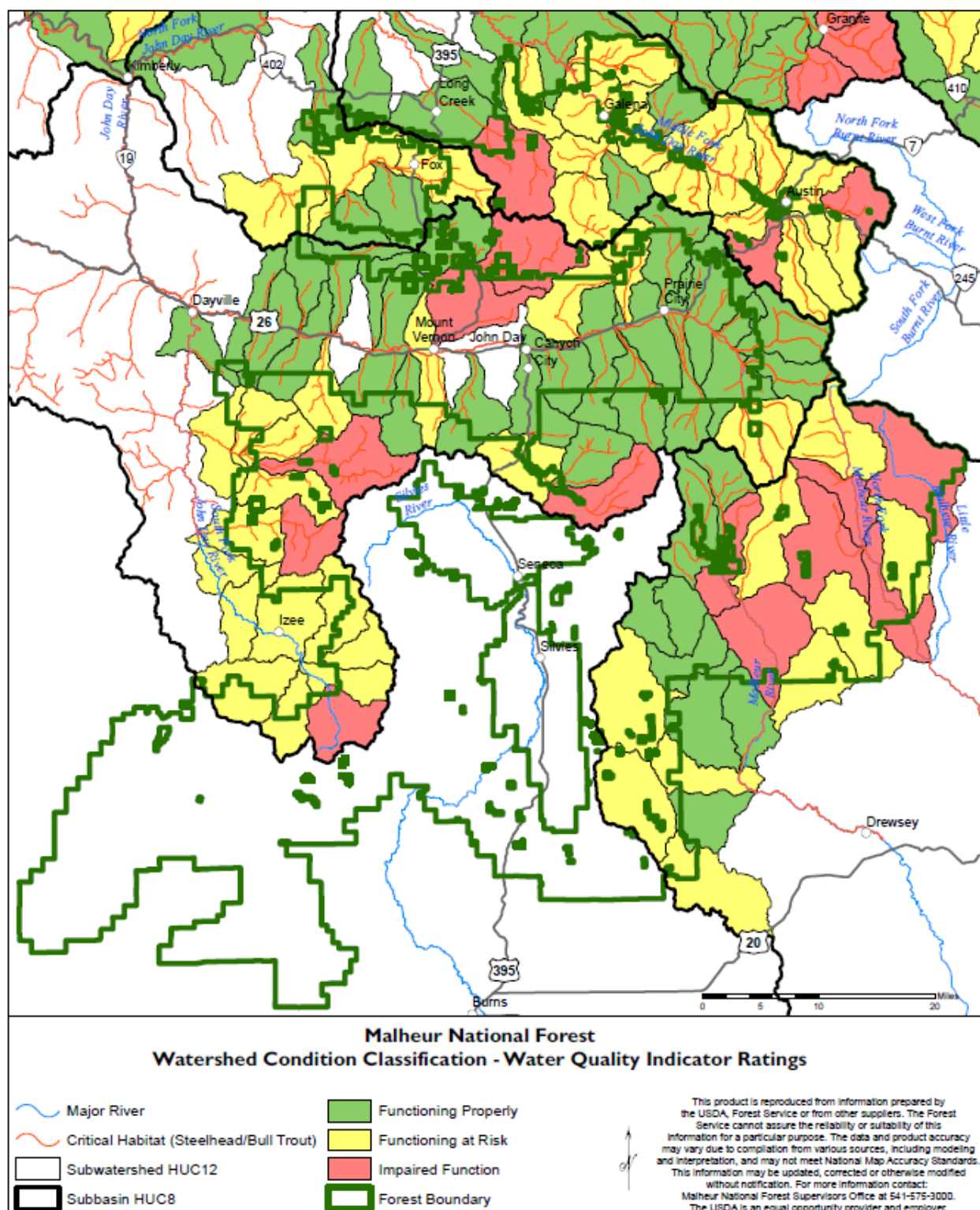


Figure 20. Malheur NF watershed condition class framework water quality indicator

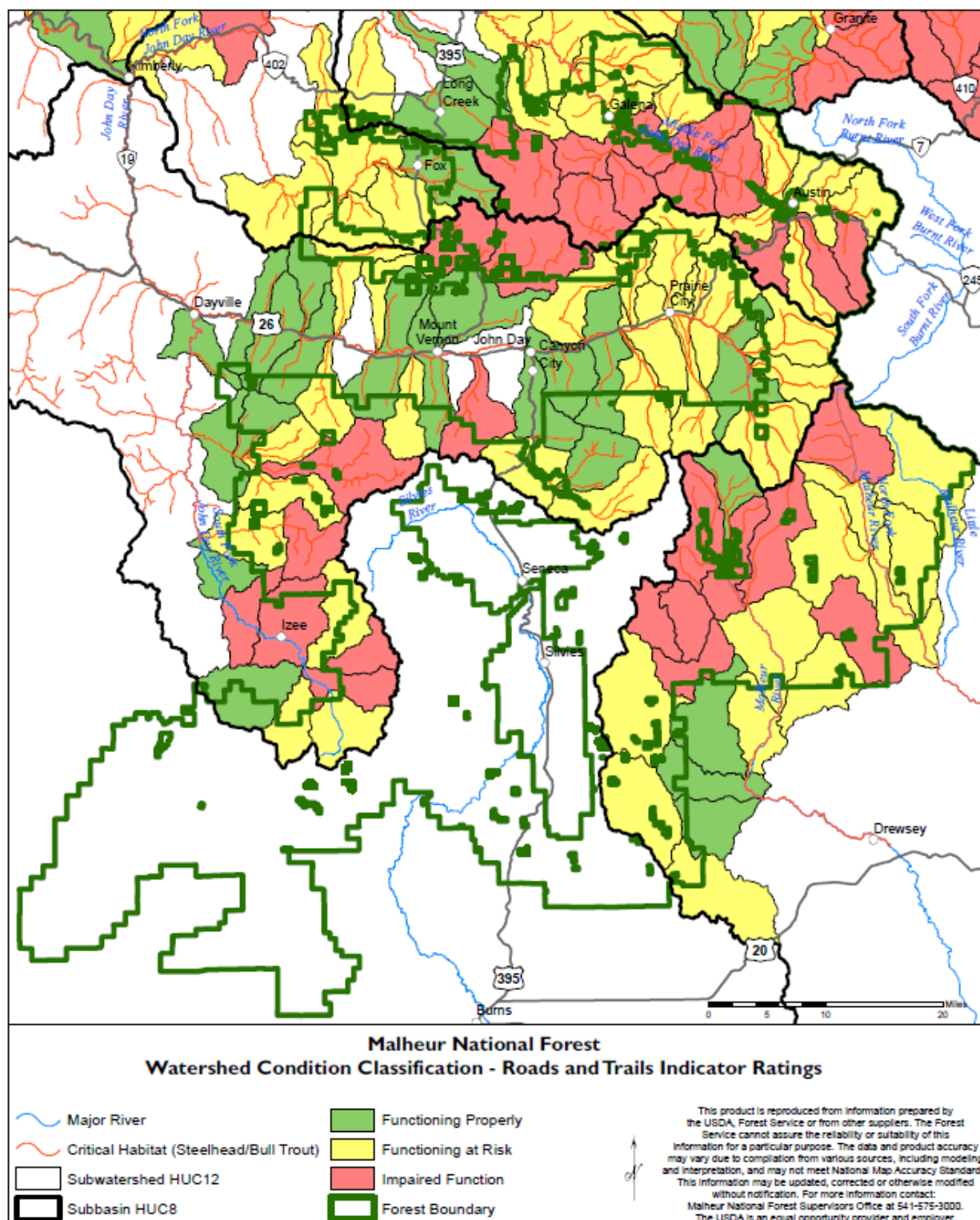


Figure 21. Malheur NF watershed condition class framework roads and trails indicator.

Summary of Selected Indicators

Ratings for most indicators show varying distributions of functioning properly (good), functioning at risk (fair), and impaired function (poor). The four indicators most relevant to water quality and fisheries are shown in more detail; water quality, aquatic habitat, riparian/wetland vegetation, and roads & trails.

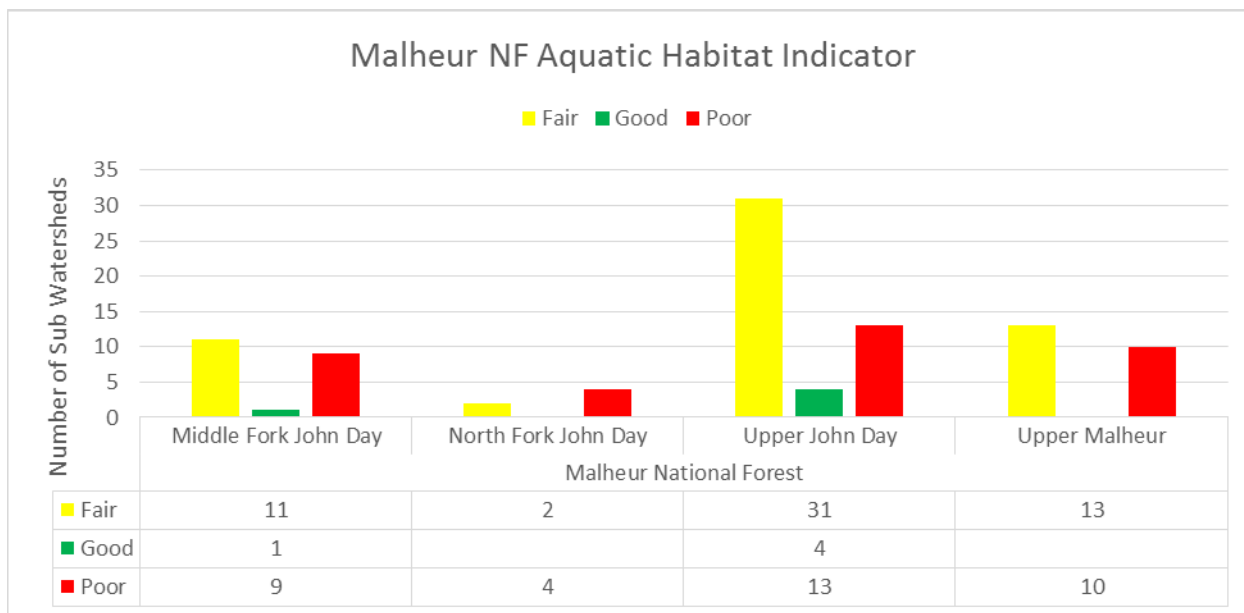


Figure 22. Malheur NF; WCF aquatic habitat indicator

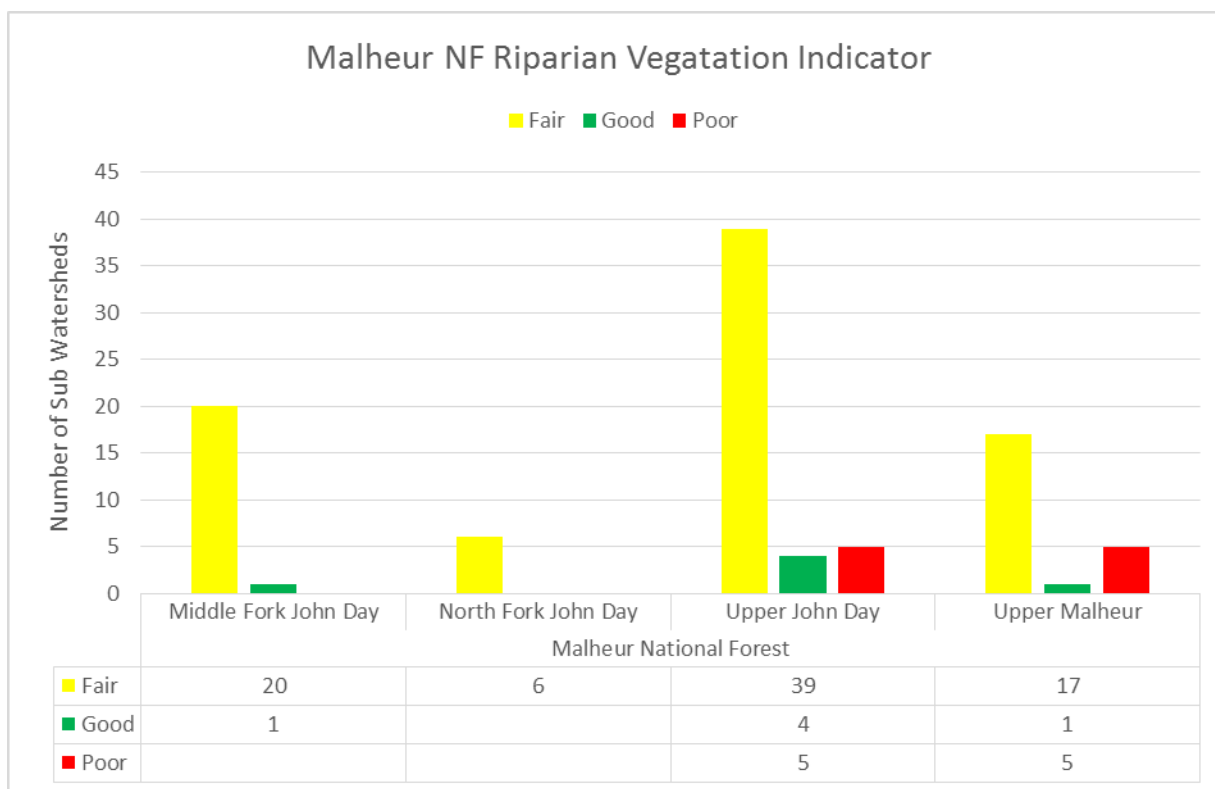


Figure 23. Malheur NF; WCF riparian vegetation indicator

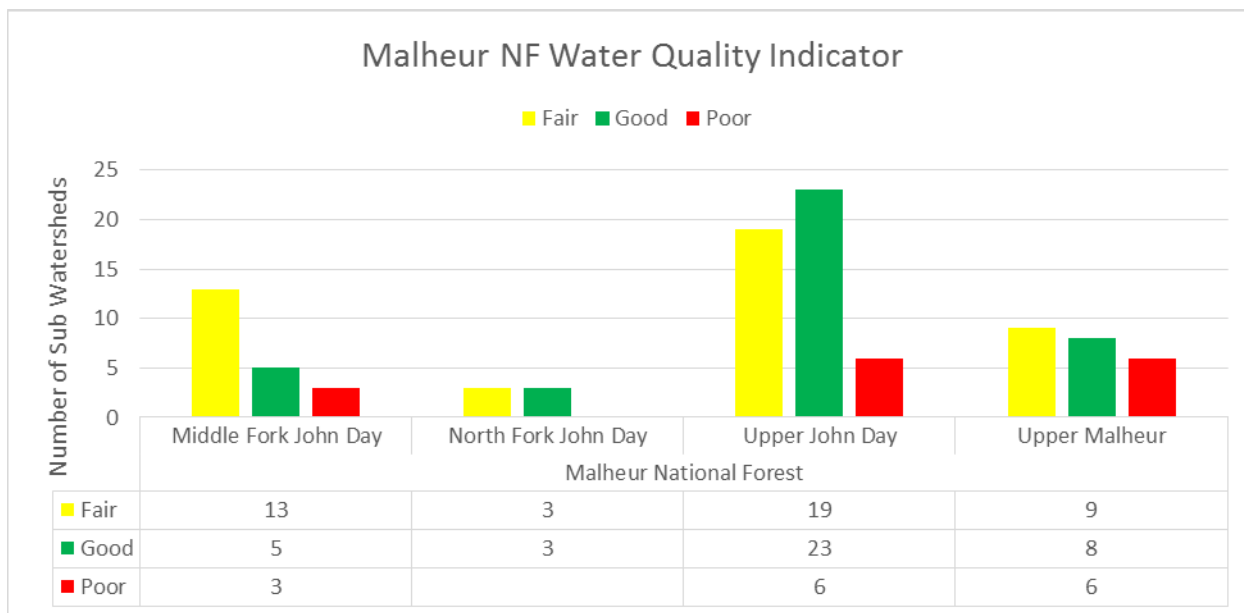


Figure 24. Malheur NF; WCF water quality indicator

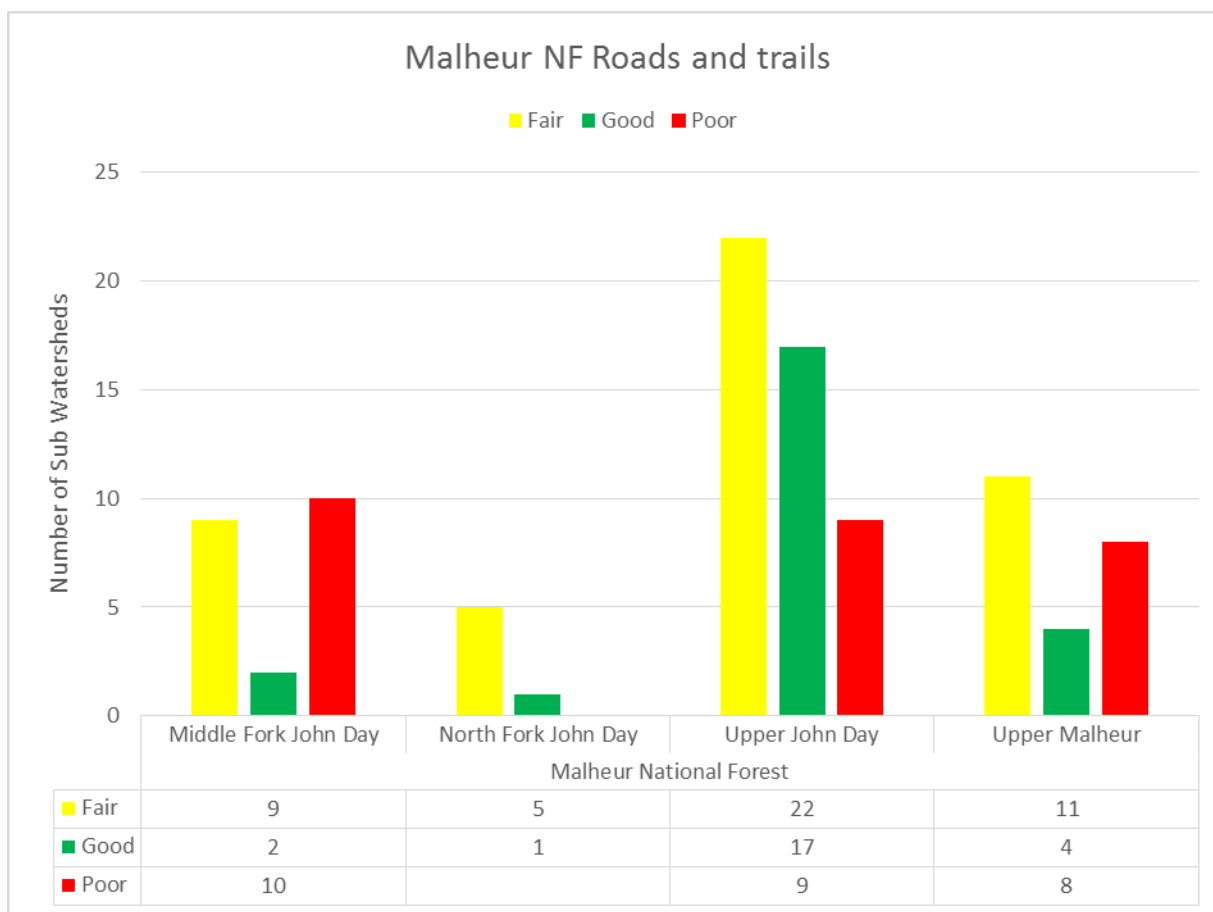


Figure 25. Malheur NF; watershed condition class framework roads and trails indicator

Conclusions

Watershed conditions on the Malheur NF vary but generally are functioning properly (good condition) in headwater wilderness and minimally managed areas, and functioning at risk (fair condition) or in poor condition in other managed areas. Water produced on the Malheur NF is generally of fair quality. The most persistent and widespread water quality concern across Malheur NF managed lands is high stream temperatures during low stream flow periods in summer. High summer air temperatures, changes in stream surface shading, and low flows are key factors contributing to warmer water. Sediment levels in streams vary significantly with stream flows, with the highest levels during winter and spring runoff. Some stream reaches show evidence of fine sediment accumulation from varying sources, such as local stream bank erosion or contributing watershed conditions (for example, areas of high sediment-producing geology and roads close to streams). Sediment accumulation is a natural function in lower gradient streams, but some areas show evidence of sediment accumulation from past and ongoing management activities. Road densities are generally in fair to poor condition across the forest with the exception of the Upper John Day basin. Road density across the forest is 3.56 miles per square mile. When excluding wilderness and roadless areas, road densities are 4.23 miles per square mile. Other water quality concerns that have been observed include nutrient and bacteria sources from livestock, wildlife, and recreation uses. Impacts are generally localized in areas and at times of concentrated use.

Umatilla National Forest Service WCF

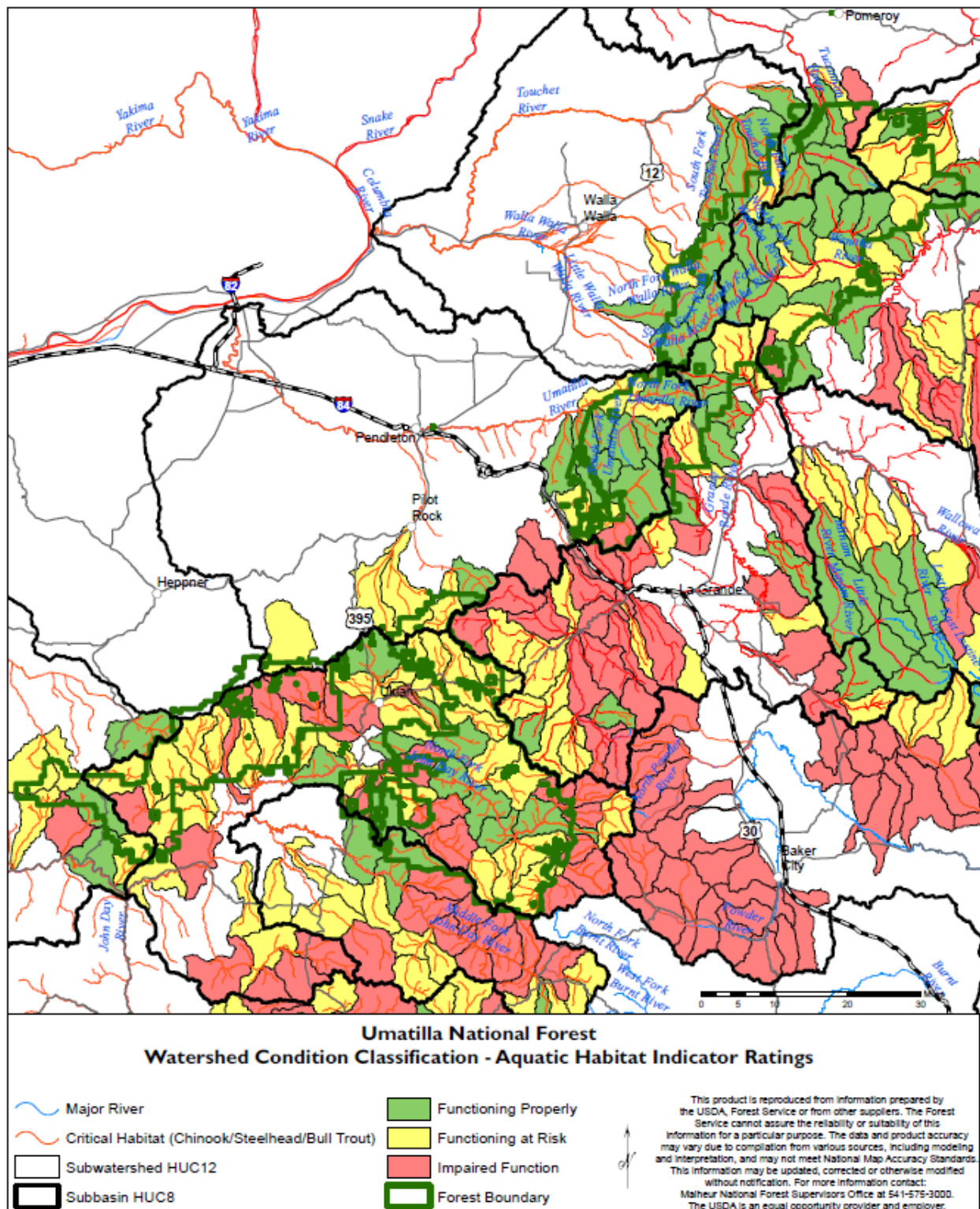


Figure 26. Umatilla NF watershed condition class framework aquatic habitat indicator

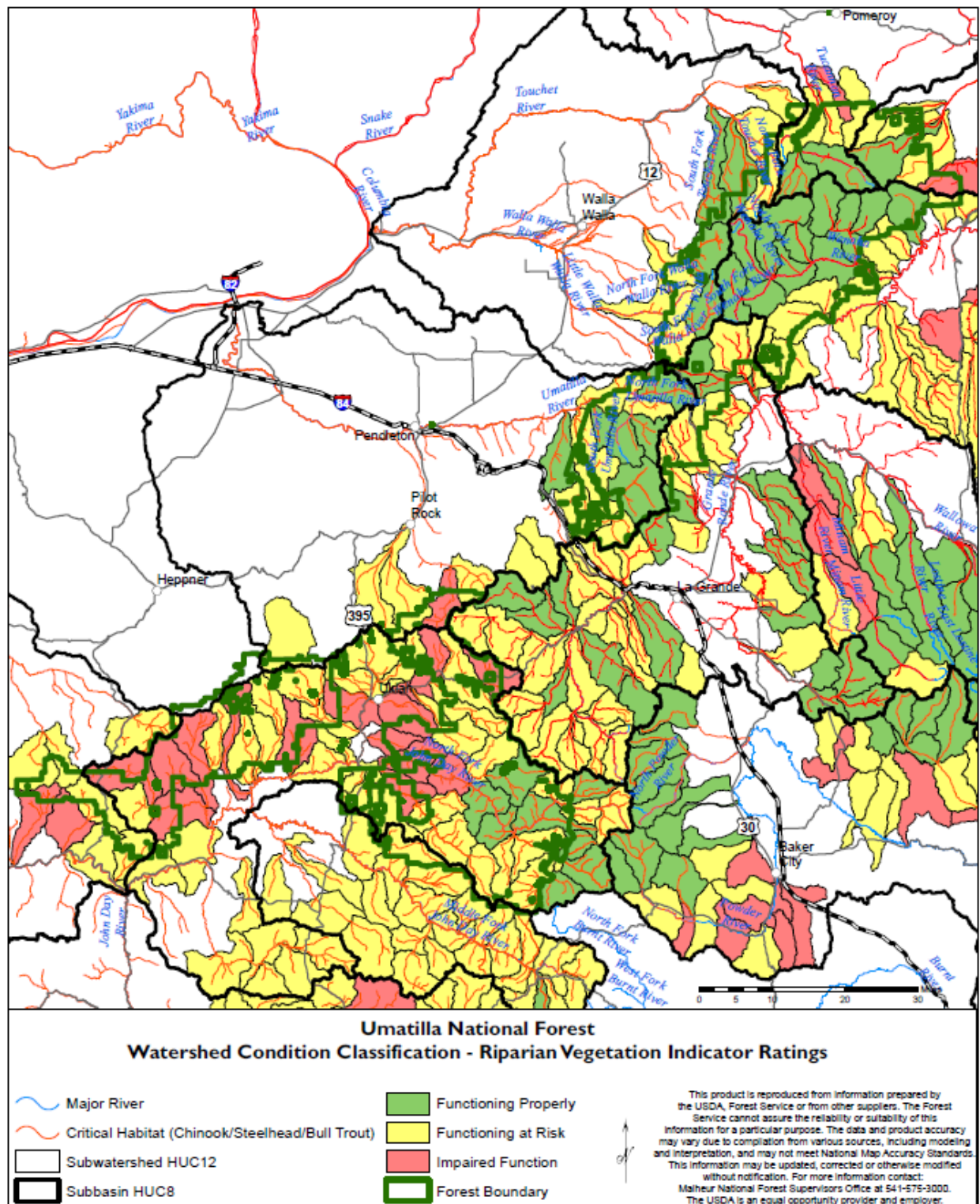


Figure 27. Umatilla NF watershed condition class framework riparian vegetation indicator

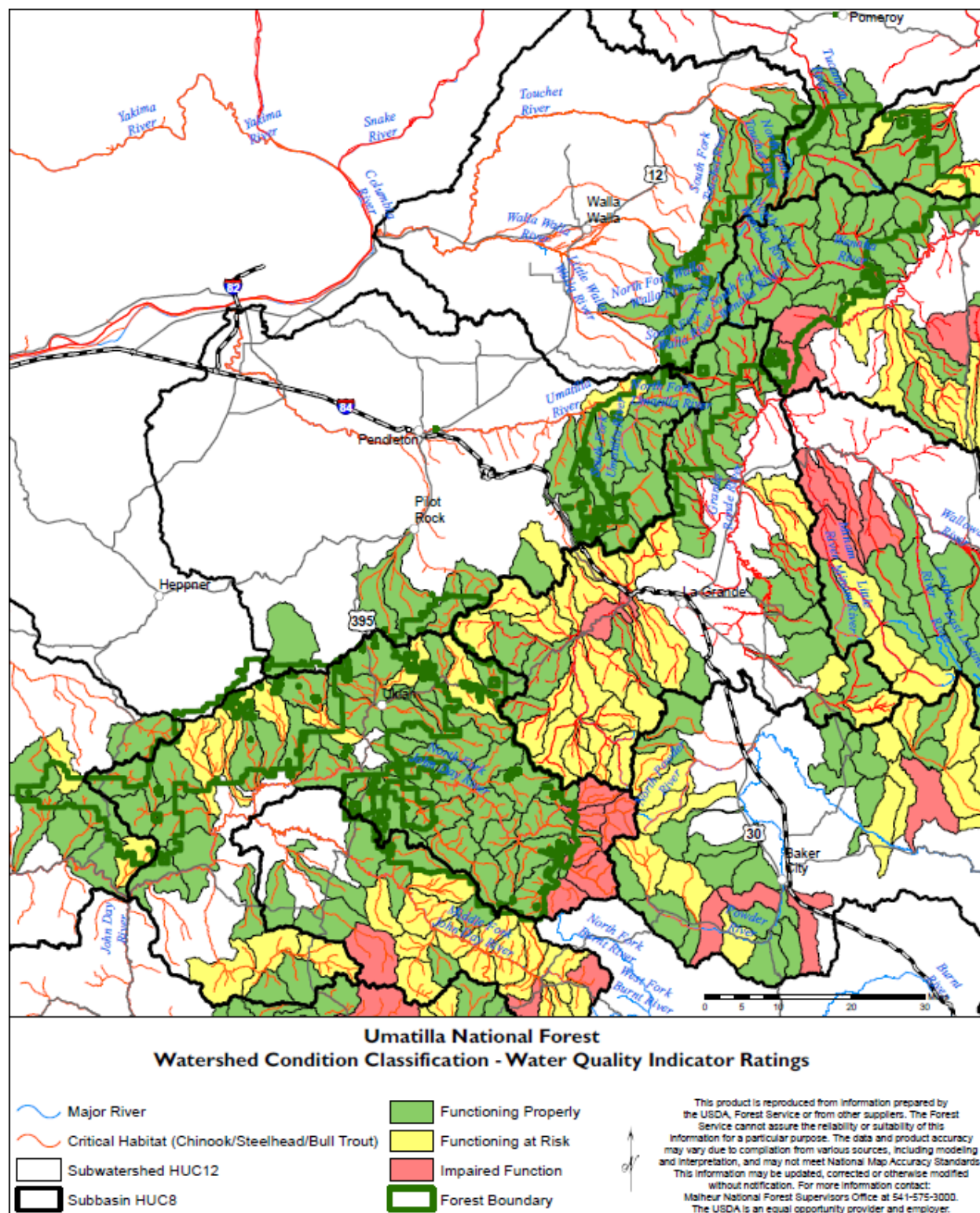


Figure 28. Umatilla NF watershed condition class framework water quality indicator

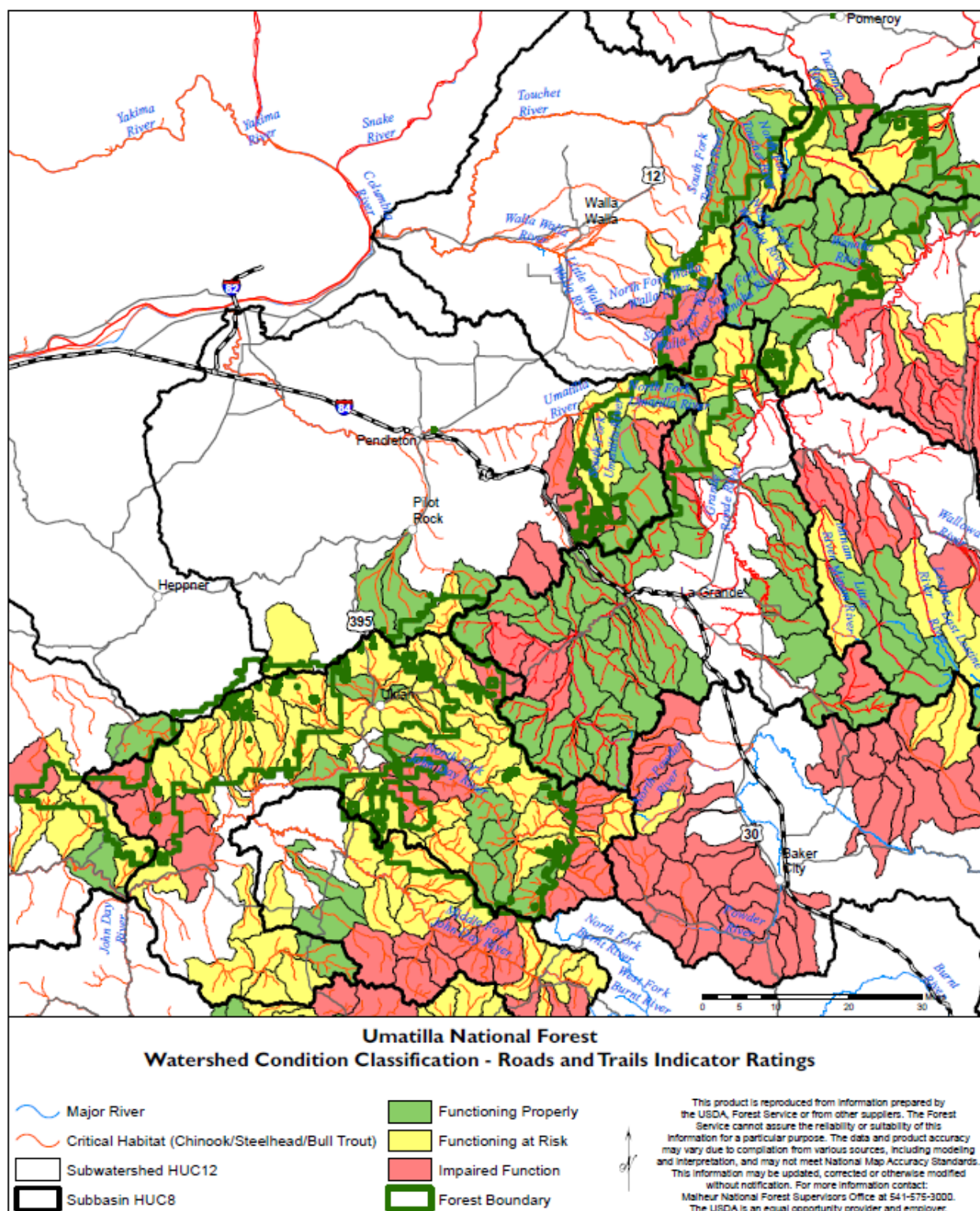


Figure 29. Umatilla NF watershed condition class framework roads and trails indicator

Summary of Selected Indicators

Ratings for most indicators show varying distributions of functioning properly (good), functioning at risk (fair), and impaired function (poor). The four indicators most relevant to water quality and fisheries are shown in more detail; water quality, aquatic habitat, riparian/wetland vegetation, and roads and trails.

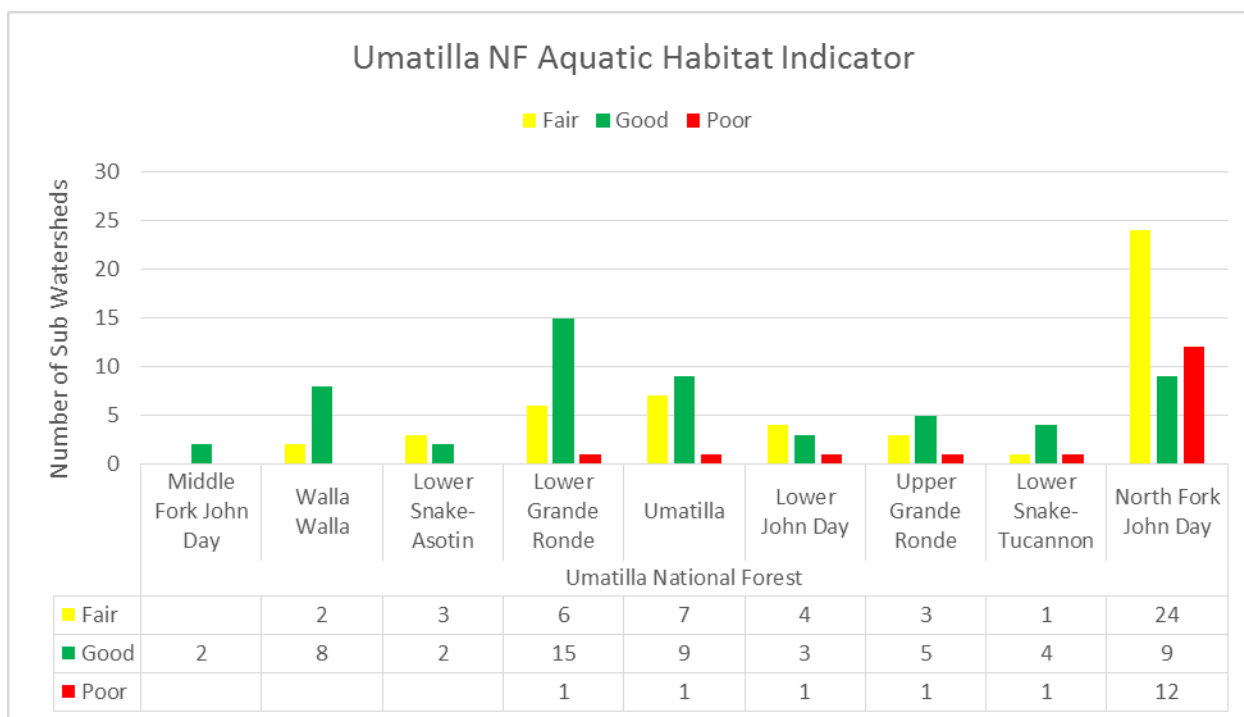


Figure 30. Umatilla NF; WCF aquatic habitat indicator

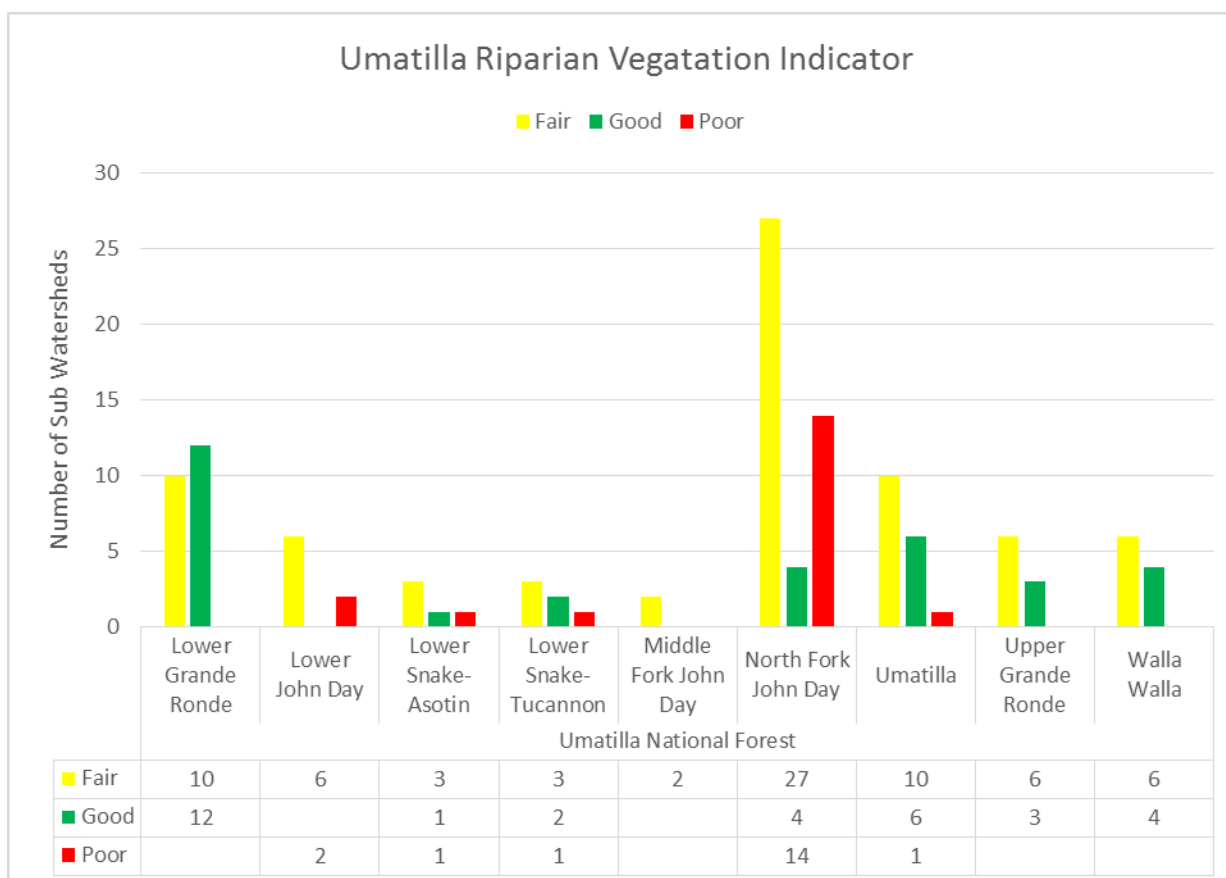


Figure 31. Umatilla NF; WCF riparian vegetation indicator

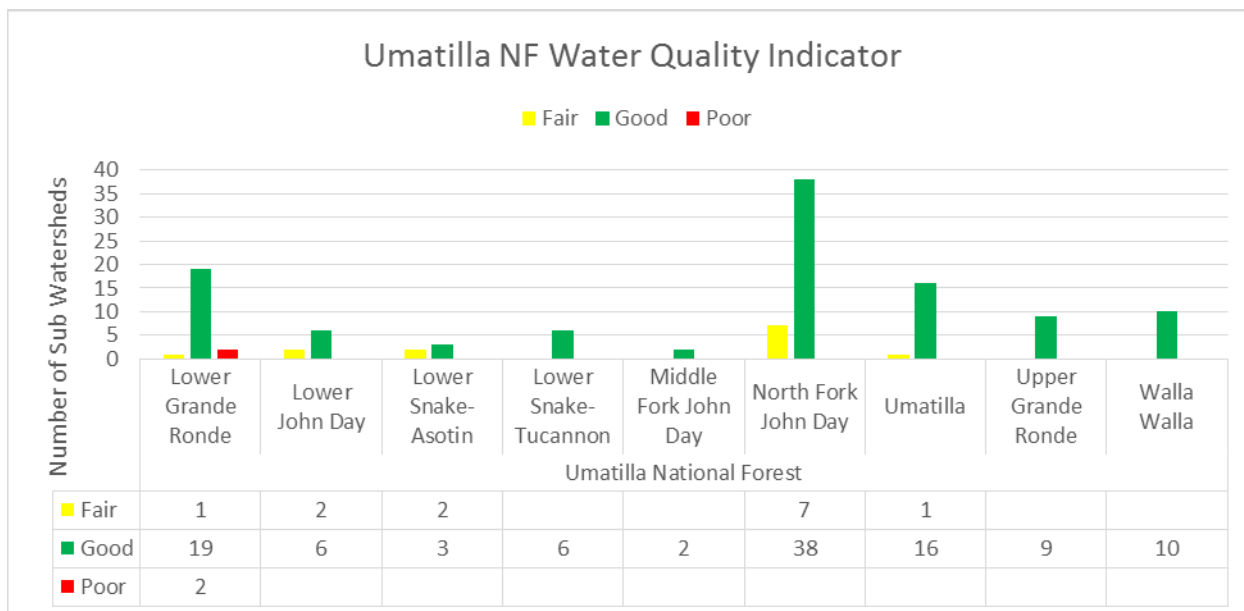


Figure 32. Umatilla NF; WCF water quality indicator

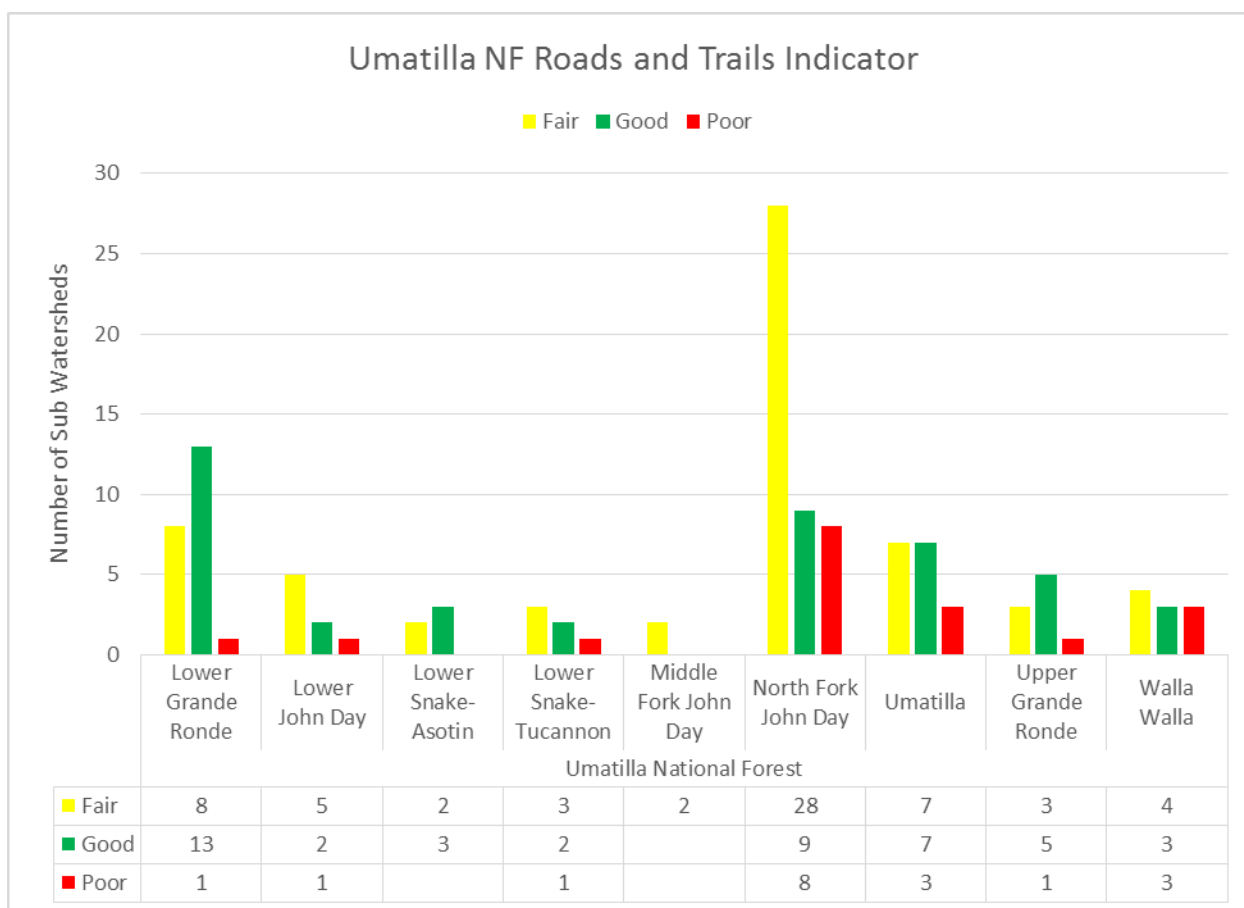


Figure 33. Umatilla NF; WCF roads and trails indicator

Conclusions

Watershed conditions on the Umatilla NF appear to be in better shape than the other two forests. Conditions vary but are generally functioning properly (good condition) in headwater wilderness and minimally managed areas and some managed areas, and functioning at risk (fair condition) or in poor condition in other managed areas. Water produced on the Umatilla NF is generally of good quality. The most persistent and widespread water quality concern across Umatilla NF lands is high stream temperatures during low stream flow periods in summer. High summer air temperatures, changes in stream surface shading, and low flows are key factors contributing to warmer water. Sediment levels in streams vary significantly with stream flows, with the highest levels during winter and spring runoff. Some stream reaches show evidence of fine sediment accumulation from varying sources, such as local stream bank erosion or contributing watershed conditions (for example, areas of high sediment-producing geology and roads close to streams). Sediment accumulation is a natural function in lower gradient streams, but some areas show evidence of sediment accumulation from past and ongoing management activities. Road densities are generally in fair to poor condition across the forest with the exception of the Upper and Lower Grande Ronde, Lower Snake-Asotin, and Umatilla basins. Road density across the forest is 2.04 miles per square mile. When excluding wilderness and roadless areas, road densities are 3.48 miles per square mile. Other water quality concerns that have been observed include nutrient and bacteria sources from livestock, wildlife, and recreation uses. Impacts are generally localized in areas and at times of concentrated use.

Wallowa Whitman National Forest Service WCF

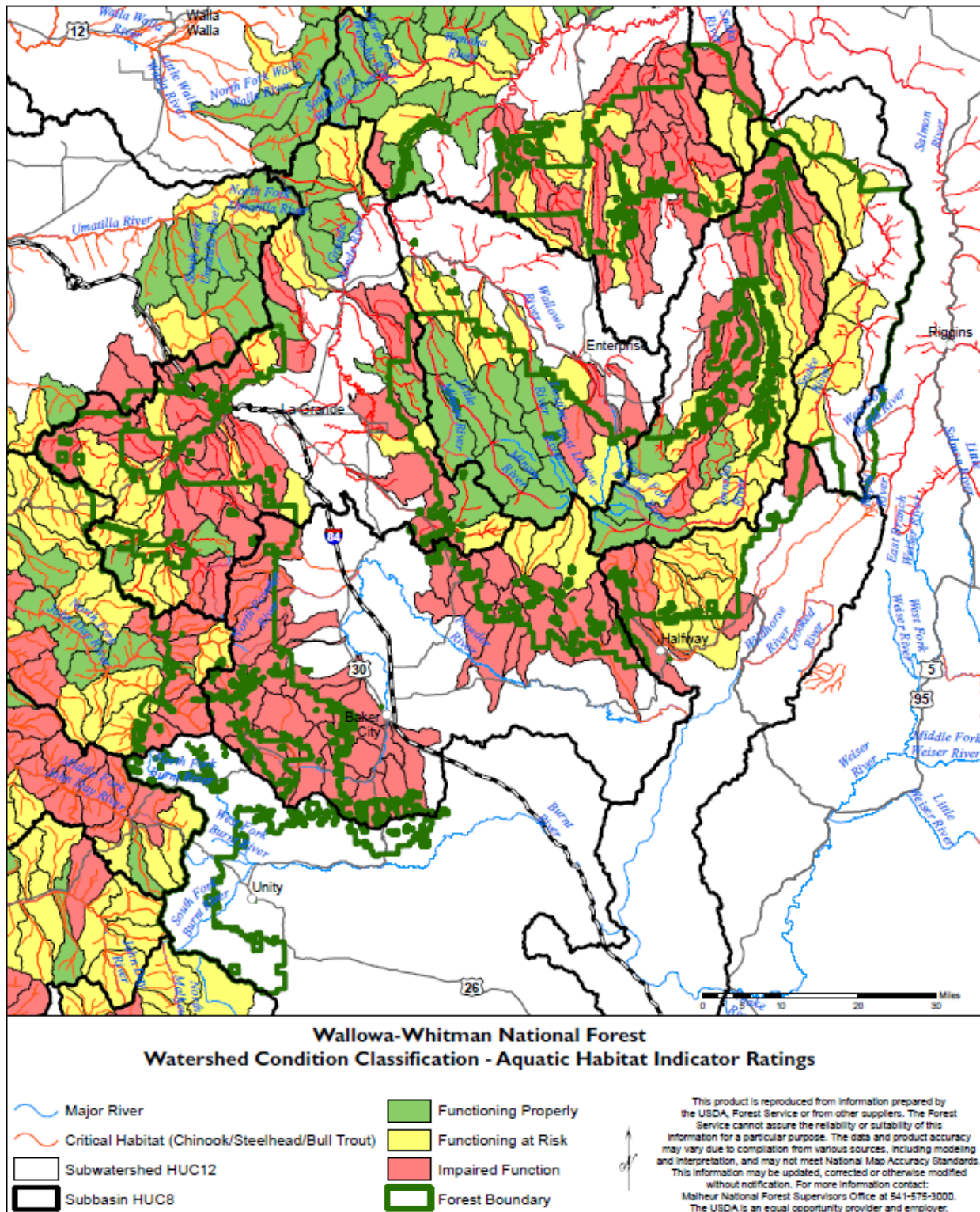


Figure 34. Wallowa Whitman NF watershed condition class framework aquatic habitat indicator

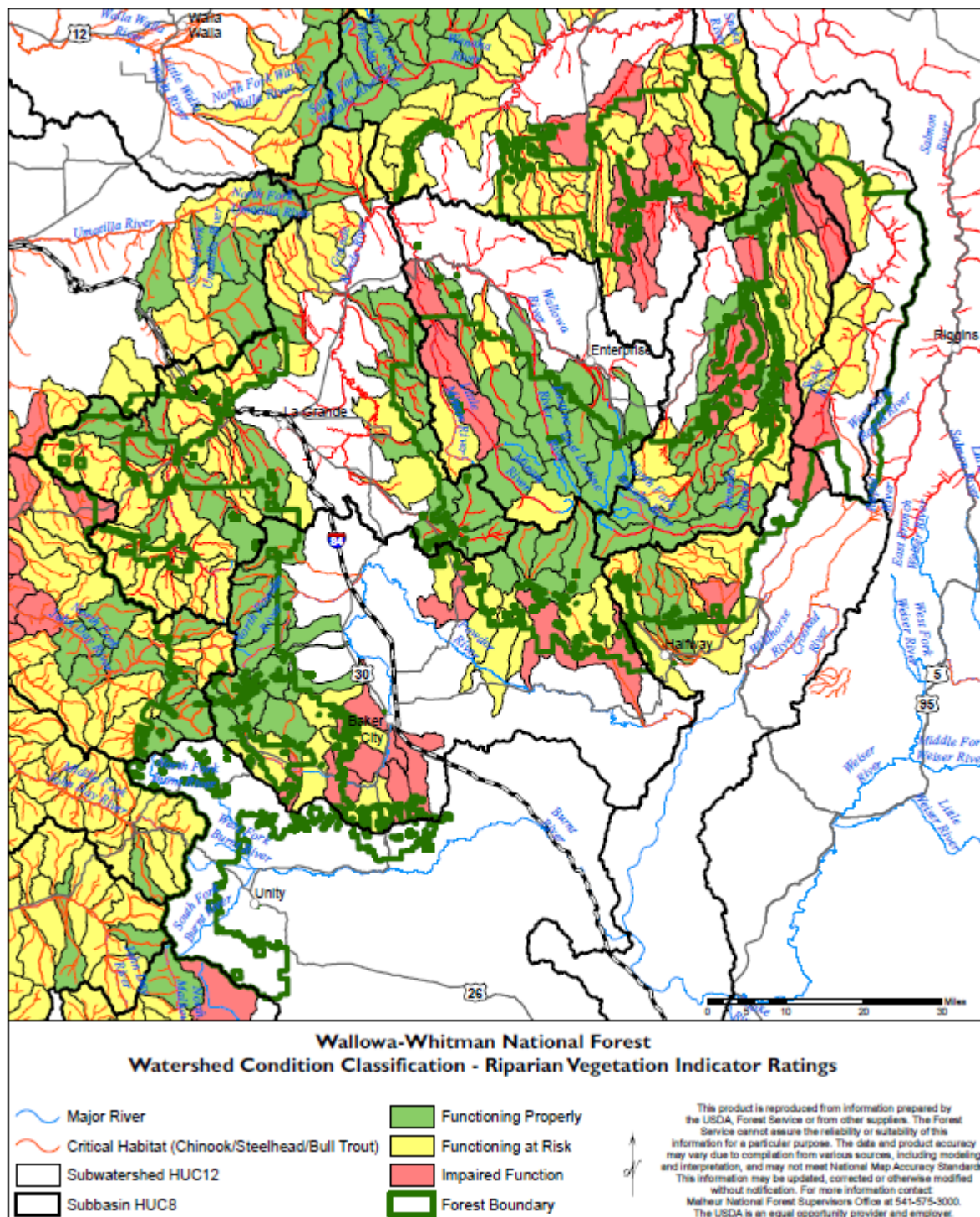


Figure 35. Wallowa Whitman NF watershed condition class framework riparian vegetation indicator

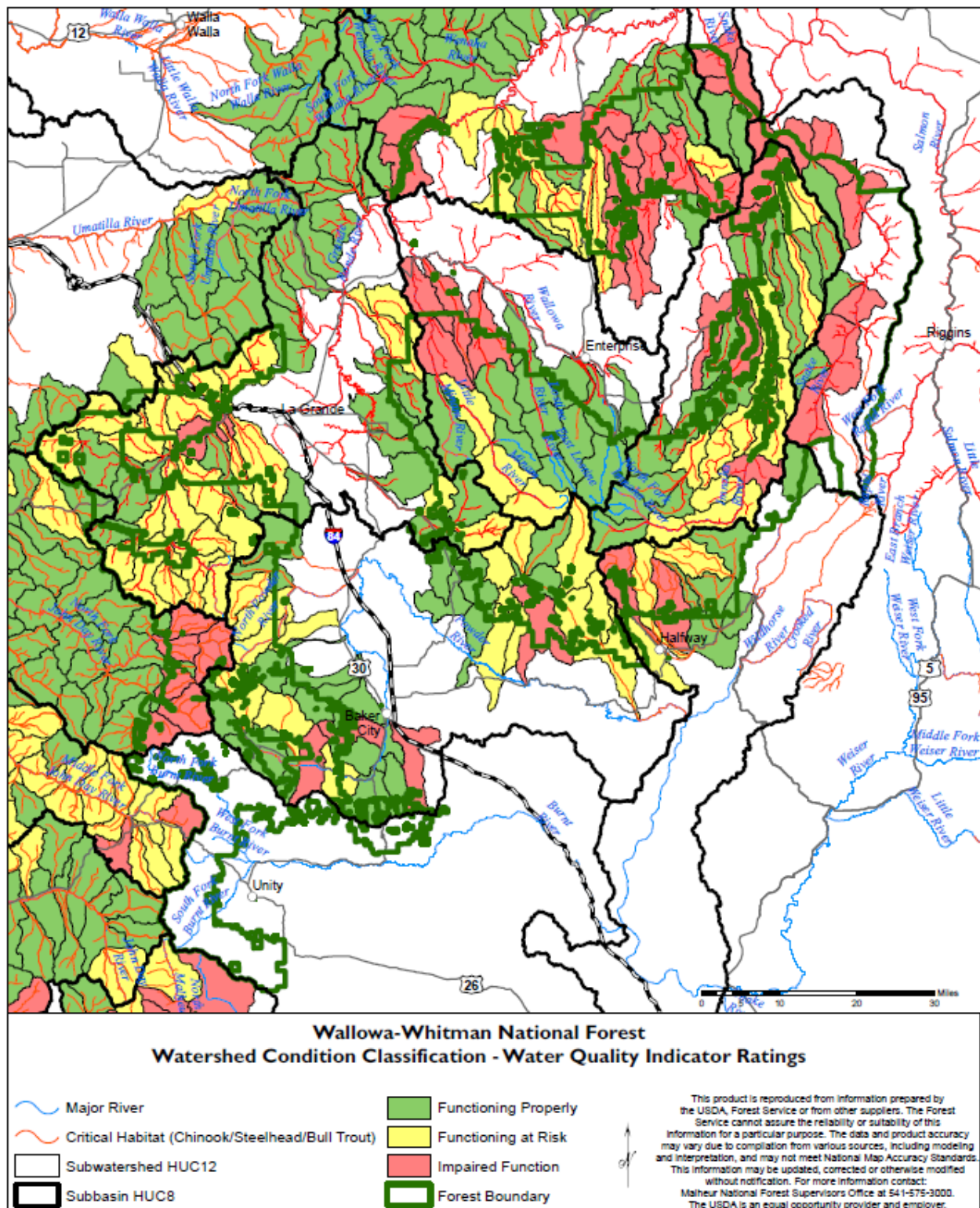


Figure 36. Wallowa Whitman NF watershed condition class framework water quality indicator

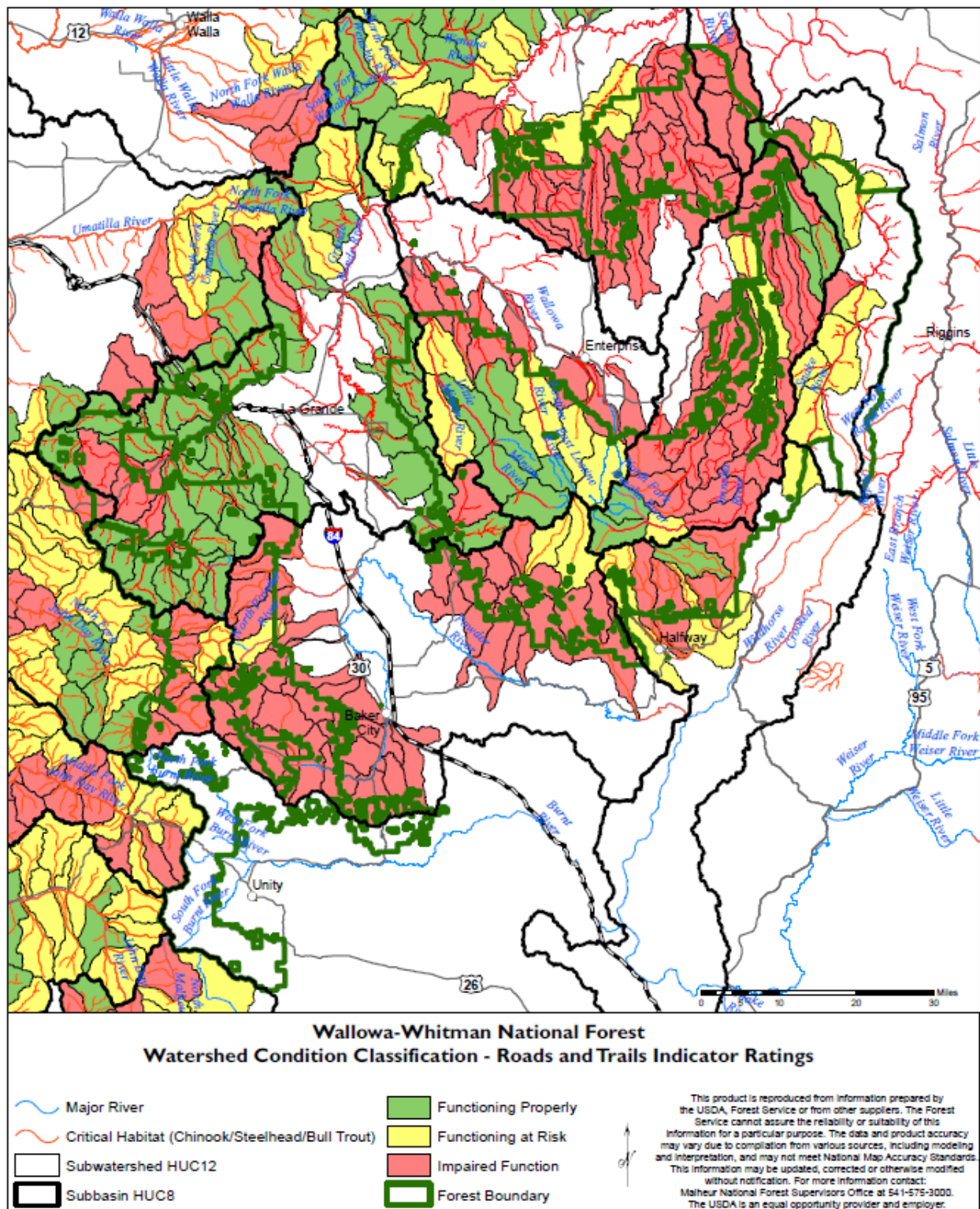


Figure 37. Wallowa Whitman NF watershed condition class framework roads and trails indicator

Summary of Selected Indicators

Ratings for most indicators show varying distributions of functioning properly (good), functioning at risk (fair), and impaired function (poor). The four indicators most relevant to water quality and fisheries are shown in more detail; water quality, aquatic habitat, riparian/wetland vegetation, and roads and trails.

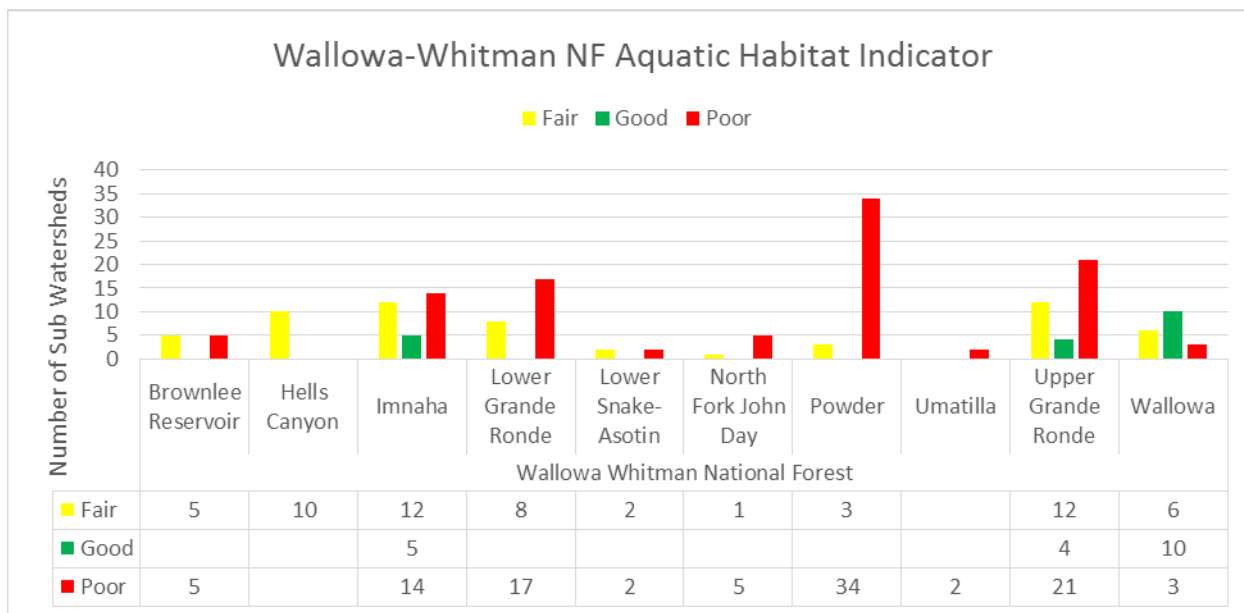


Figure 38. Wallowa Whitman NF; watershed condition class framework aquatic habitat indicator

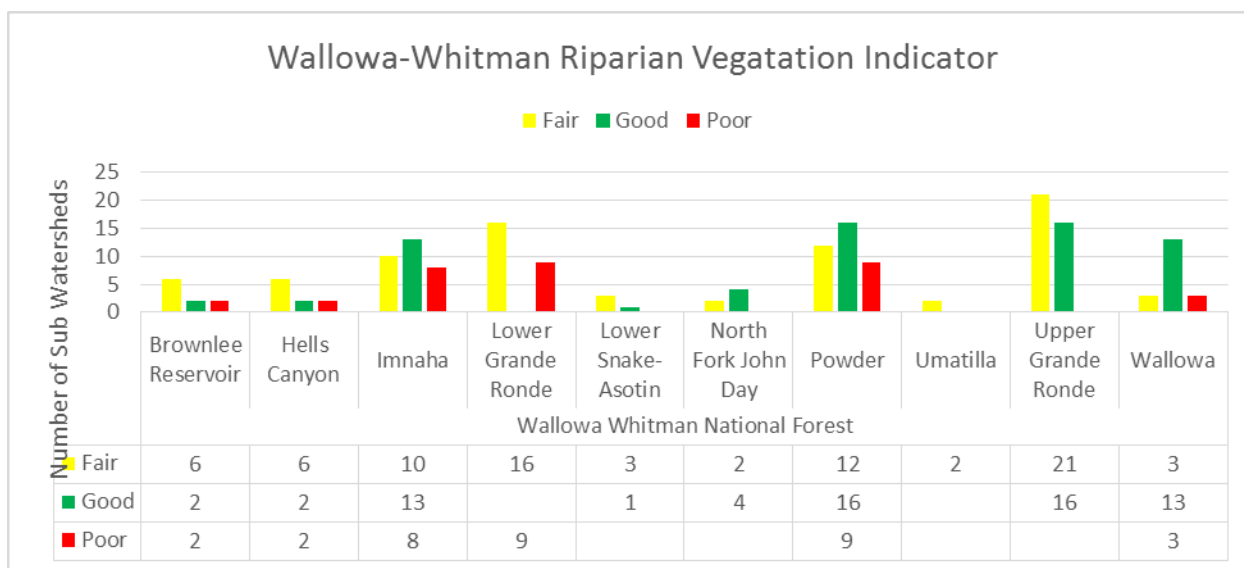


Figure 39. Wallowa Whitman NF; WCF riparian vegetation indicator

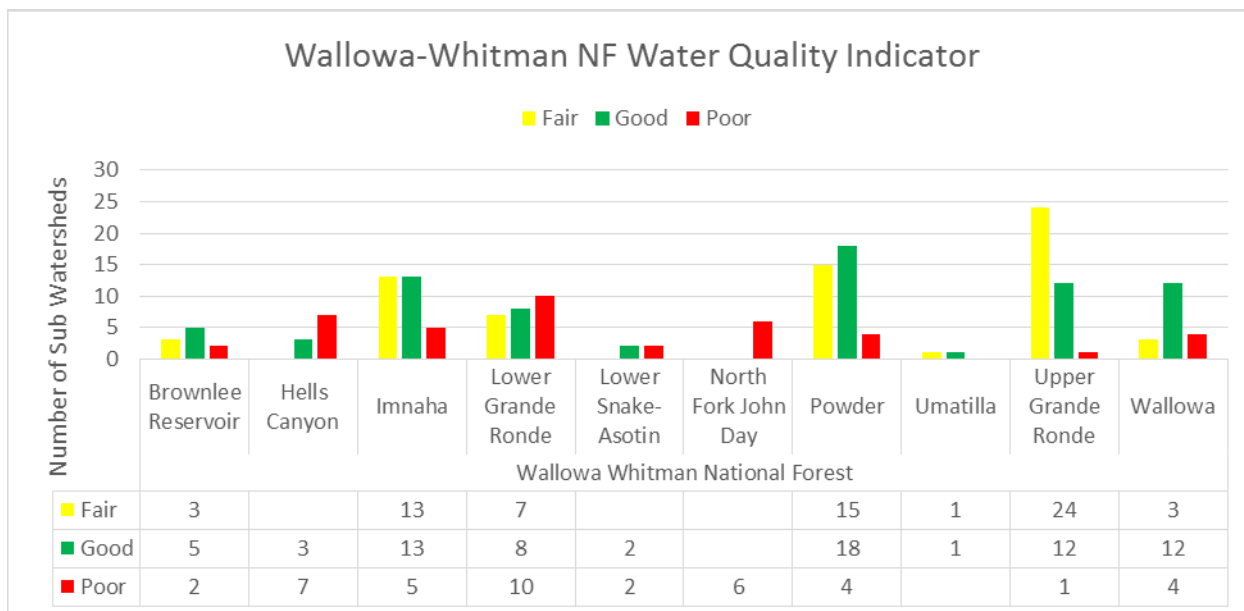


Figure 40. Wallowa Whitman NF; WCF water quality indicator

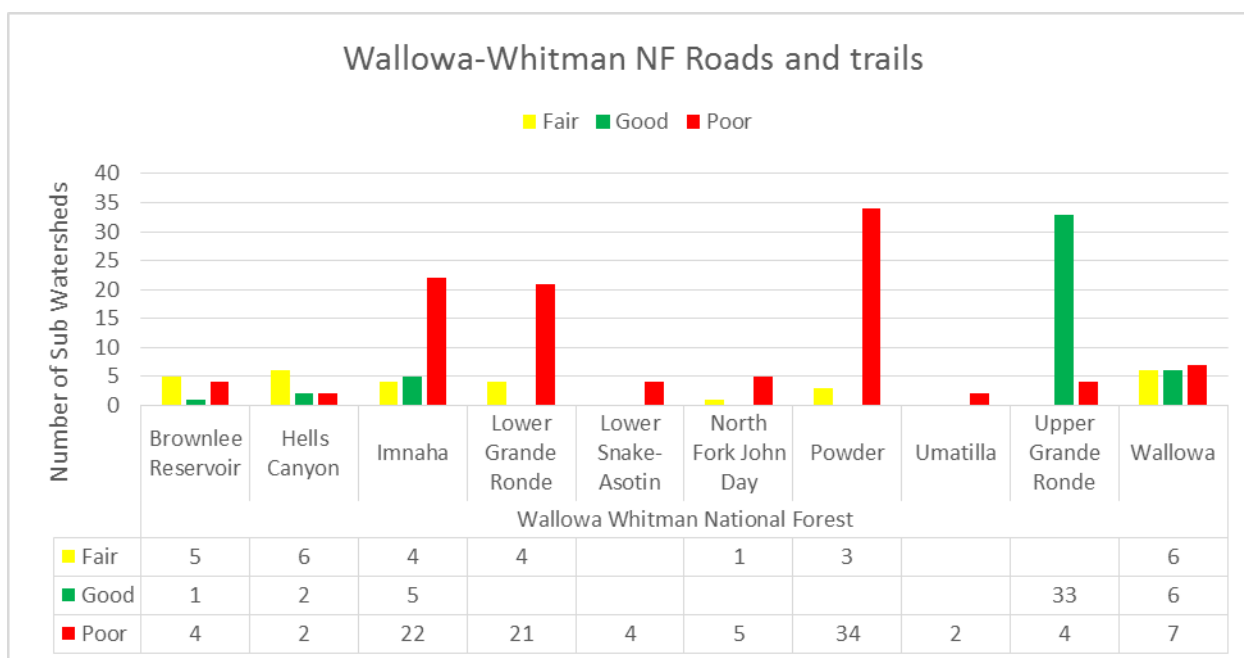


Figure 41. Wallowa Whitman NF; WCF roads and trails indicator

Conclusions

Watershed conditions on the Wallowa Whitman NF vary but are generally are functioning properly (good condition) in headwater wilderness and minimally managed areas, and functioning at risk (fair condition) or in poor condition in other managed areas. The Wallowa Whitman NF shows a high percentage of subwatersheds in the “poor” condition for the aquatic habitat and roads and trails indicator. Water produced on the Wallowa Whitman NF is generally of fair quality. The most persistent and widespread water quality concern across Wallowa-Whitman NF lands is high stream temperatures during low stream flow periods in summer. High summer air temperatures, changes in stream surface shading, and low flows are key factors contributing to warmer water. Sediment levels in streams vary significantly with stream

flows, with the highest levels during winter and spring runoff. Some stream reaches show evidence of fine sediment accumulation from varying sources, such as local stream bank erosion or contributing watershed conditions (for example, areas of high sediment-producing geology and roads close to streams). Sediment accumulation is a natural function in lower gradient streams, but some areas show evidence of sediment accumulation from past and ongoing management activities. Road densities are generally in fair to poor condition across the forest with the exception of the Upper Grande Ronde basins. Road density across the forest is 2.40 miles per square mile. When excluding wilderness and roadless areas, road densities are 3.71 miles per square mile. Other water quality concerns that have been observed include nutrient and bacteria sources from livestock, wildlife, and recreation uses. Impacts are generally localized in areas and at times of concentrated use.

Aquatic Species

Overview

Information on critical habitat and essential habitat features, and the biological requirements and distribution factors leading to decline, population trends, status, etc., for the aquatic species to be assessed exists in numerous documents including: the Federal Register final rules for the species listings (sockeye: 56 FR 58619, salmon critical habitat: 58 FR 68543, spring/summer and fall Chinook salmon: 57 FR 14653, steelhead: 62 FR 43937, and bull trout: 63 FR 31647), bull trout critical habitat – designated (75 FR 63698) and other pertinent programmatic consultation records for the species (USDC NMFS 1995, USDA Forest Service and USDI BLM 1998, USDC NMFS 1998, USDA Forest Service and USDI BLM 1998, USDI Fish and Wildlife Service 1998). Other sources were: USDC NMFS (2000), Waples et al. (1991), Groot and Margolis (1991), Groot et al. (1995), Myers et al. (1998), Matthews and Waples (1991), USDC NMFS (1991a and 1991b), BRT (1997), and USDI Fish and Wildlife Service 2002. Status reviews for salmon species are also available on the NMFS website at www.nwr.noaa.gov/1salmon/salmesa/index.htm. An exhaustive review is not repeated here; however, these sources were used to prepare the following synopses and should be referenced for more detailed information.

There are five factors listed in Section 4(a)(1) of the ESA that are considered through a regulatory process in determining if a species is to be listed as endangered or threatened. These are: (A) the present or threatened destruction, modification, or curtailment of its habitat or range; (B) over-utilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; and (E) other natural or man-made factors affecting its continued existence. A review of the Federal Register final rules shows that all these factors have affected Chinook salmon, sockeye salmon, steelhead, and bull trout and have played a role in the decline of these species. The one exception is that disease or predation was not thought to be a major factor affecting bull trout (63 FR 31647). There are elements to A, B, D, and E that the Forest Service has discretion over and can influence; these are discussed in more detail for each species below.

Recovery Plans

Recovery plans have been drafted for Snake River spring/summer Chinook salmon, Snake River fall Chinook salmon, Snake River steelhead, Mid-Columbia River steelhead and Columbia River Basin bull trout. These recovery plans contain information on status, viability assessment, threats and factors for decline, and actions to conserve and recovery the species. These aspects of the recovery plans are incorporated into this BA.

Evolutionarily Significant Units, Distinct Population Segments, and Recovery Units

The salmon and steelhead addressed in this assessment are part of one evolutionarily significant unit (ESU) for Snake River spring/summer Chinook salmon, one ESU of fall Chinook salmon and two distinct populations segments (DPS); Snake River Steelhead and Mid-Columbia Steelhead. These ESUs/DPSs are distinctive groups of salmon or steelhead and include multiple spawning populations, some of which occur on the three forests. The Snake River Basin ESUs for spring/summer and fall Chinook salmon and steelhead trout contain considerable diversity in their genetic and life history traits and habitat features, and extend across a geographic area considerably larger than the planning area. Within the Snake River DPS, there are three DPSs found within the planning area. These DPSs include the Snake River Steelhead DPS, which is further divided into five major populations groups (MPG). The planning area covers the Lower Snake River MPG, the Grande Ronde MPG, and the Imnaha River MPG. The Mid-Columbia River Steelhead DPS is further divided into four MPGs. The Revised Forest Plan covers two of these four MPGs; the John Day River MPG, and the Umatilla/Walla Walla MPG.

Bull trout addressed in this BA are part of the Columbia River Distinct Population Segment (DPS). This DPS is significant because the overall range of the species would be substantially reduced if this discrete population were lost. Within the Columbia River DPS, the USFWS has identified five recovery units. Within the planning area, three of the recovery units are found; Mid-Columbia Recovery Unit, Mid Snake Recovery Unit, and the Upper Snake Recovery Unit. Within these Recovery Units the USFWS has identified core areas for recovery. Within the Revised Forest Plan are there are 16 core areas identified and one historically occupied core area (Eagle Creek). These recovery units are the major units identified by the USFWS for managing recovery efforts.

Essential Fish Habitat

The identification of EFH is a requirement of the Magnuson-Stevens Act (MSA). Coho and Chinook salmon EFH are found in the planning area. Chinook salmon EFH is found within the Forests in the Imnaha and Snake Rivers (including the HCNRA), Upper and Lower Grande Ronde, Wallowa, Tucannon, Asotin, and Umatilla rivers. Coho were historically present in the Umatilla, Tucannon, Asotin, Upper and Lower Grande Ronde and Wallowa rivers but went extinct and have been reintroduced in some drainages. Hatchery coho are present in the Umatilla River downstream of the Umatilla National Forest. Hatchery coho are also currently present in the Grande Ronde River to the confluence with the Wallowa River, occupying habitat managed by the Umatilla and Wallowa-Whitman National Forests, and in the lower Wenaha River and North Fork Wenaha River (tributary to the Grande Ronde) managed by the Umatilla National Forest. Current distribution of hatchery coho is based on information provided by the Pacific Salmon Marine Fisheries Commission (PSMFC). Historic and current Coho and Chinook salmon habitats in these rivers are considered essential fish habitat under the Magnuson-Stevens Act (Federal Register /Vol. 79, No. 243 /Thursday, December 18, 2014). Effects on chinook and coho EFH would therefore be the same as those described for designated critical habitat for Snake River Chinook salmon.

Factors of Decline and Threats

Threats to the Snake River spring/summer and fall Chinook salmon, Snake River steelhead, Mid-Columbia steelhead, and Columbia River Basin bull trout are typically described as contributing to the factors of decline listed above. The threats described for these species center on habitat and the limiting factors associated with life history stages. This BA will focus on the threats associated with tributary habitat conditions. The Blues ARCS addresses these threats through specific standards and guidelines. In addition, these threats to habitat conditions will be addressed through watershed protection and restoration.

Two threats, climate change and invasive species, have emerged as major issues since the existing strategies were first developed in the early- to mid-1990s. These threats and the ways in which the Blues ARCS addresses them are described below. These threats reinforce and amplify the need for this type of strategy (Blues ARCS), and associated monitoring and adaptive management (Seavey et al. 2009, Furniss et al. 2010). As described below, these threats will also influence the details of how the Blues ARCS is implemented at subbasin, watershed, and site scales (Furniss et al. 2010, Rieman and Isaak 2010, Perry et al. 2015).

Climate Change

Science conducted since the existing strategies were developed has greatly advanced understanding of the potential effects of climate change on water resources and aquatic ecosystems. Some of this knowledge was summarized by the Independent Scientific Advisory Board (ISAB), which provides independent scientific advice and recommendations to the National Marine Fisheries Service, Columbia River Indian Tribes, and Northwest Power and Conservation Council in 2007 (ISAB 2007).

The ISAB identified the following potential impacts in the Pacific coastal region's future: (1) higher temperatures will result in more precipitation falling as rain rather than snow; (2) snowpacks will diminish and seasonal stream flow patterns will be altered; (3) peak river flows will likely increase; (4) summer low flows will be lower; and (5) water temperatures will continue to rise. The magnitude of likely effects and the sensitivity of affected resources varies substantially across the landscape and not all anticipated effects are necessarily harmful to aquatic habitats. In addition, the magnitude of anthropogenic impacts may be much greater than climate impacts. Nonetheless, climate change will likely have major implications for native fishes and aquatic ecosystems.

Climate change is expected to increase large flood events, wildfires, and forest pathogen outbreaks. These could actually improve habitat complexity in some areas as a result of floodplain reconnection and large wood recruitment. However, many climate change effects will likely have negative habitat consequences for aquatic organisms. For example, more frequent severe floods may increase egg mortality due to gravel scour. However, these effects are unlikely to extirpate entire populations of salmonids because while scour magnitude may increase, the frequency of these events relative to typical salmonid life cycles is relatively low (Goode et al. 2013). Moreover, unconfined portions of the stream network are less susceptible to increased scour than those in confined valleys because overbank flows can spread across floodplains.

Winter snowpacks will likely retreat and runoff earlier in the spring (Mote 2003a and 2003b), potentially impacting species whose migration to the ocean is timed to coincide with plankton blooms (Pearcy 1997). Summer base flows will probably decline. This may shrink the network of perennially flowing streams and thus force fish into smaller channels and less diverse habitats (Battin et al. 2006). Warmer water temperatures would increase physiological stresses and lower growth rates. Summer peak temperatures may approach or exceed lethal levels for salmon and trout (Crozier and Zabel 2006, Crozier et al. 2008). Higher temperatures will also favor species that are better adapted to warmer water, including potential predators and competitors (Reeves et al. 1987). Recent science, however, suggests that stream temperatures in steep, mountain streams of the Pacific Northwest may be less sensitive than those in larger, low gradient rivers (Isaak et al. 2016).

Climate change will likely force shifts in the distribution of fish populations. This could reduce their resilience to natural disturbances, particularly drought (Battin et al. 2006). Streams located high in watersheds that historically provided some of the best habitat may no longer be accessible to migratory fish if snowpack is reduced, thus limiting available rearing areas and access to thermal refugia in summer. Even moderate climate-induced changes may significantly increase the risk of extirpating local

populations of Chinook salmon (Crozier et al. 2008). Climate-related factors such as temperature and streamflow could affect habitat in different ways and at different scales, depending on local site characteristics. Therefore a diversity of conditions is needed for population stability (Crozier and Zabel 2006).

Existing well-connected, high-elevation habitats on public lands will be important to supporting salmon survival and recovery as the climate continues to warm (Martin and Glick 2008). Protecting, maintaining and restoring these areas is a fundamental objective of the Blues ARCS. The strategy incorporates numerous adaptive actions relevant to climate change. These include maintaining instream flows by managing water withdrawals, reducing flood peaks by enhancing floodplain connectivity and disconnecting roads from streams, reconnecting isolated habitats by removing anthropogenic barriers, managing riparian forests to provide shade and other functions, and improving waters where aquatic habitats and water quality have been degraded (Furniss et al. 2010). Importantly, some of these actions can, in some situations, more than offset the effects of climate change (Diabat et al. 2016). Actual impacts to aquatic ecosystems will be highly dependent on the degree to which these adaptation actions are implemented now and in the future. Without them, aquatic habitats may become increasingly isolated, simplified, and less likely to recover after significant disturbance events.

Climate change has been factored into the Revised Forest Plan, in that many of the desired conditions factor in climate change. The Forest Service has added a monitoring plan component, to ensure monitoring of climate change effects. Lastly, the Blue Mountains Climate Change vulnerability assessment and adaptation strategies (e.g., Halofsky and Peterson 2016) will be incorporated into the Revised Forest Plan. As the assessment becomes incorporated, findings will be incorporated, by validating the desired conditions, standards and guidelines, and key and priority watershed selections, and by integrating additional objectives, indicating a commitment to address vulnerable ecosystems and processes in this Revised Forest Plan period. The vulnerability assessment utilized the best available science to assess the impacts of changes in streamflows, stream temperatures, and disturbance regimes on water and aquatic resources. The map-based products summarized in the assessment will form the basis for characterizing the relative magnitude, spatial, and temporal variability of these effects across the landscape.

Invasive Species

Climate change effects will be compounded by those associated with the distribution of aquatic and terrestrial invasive species, which are likely to intensify in the future. For example, in some large coastal rivers, non-native species have come to dominate fish assemblages and have largely replaced native fishes within the river food web. The effects of invasive riparian plants on the water quality, nutrient cycling, and the physical habitat of streams and lakes are not fully understood. Where studies have been conducted, concerns have been raised. Japanese knotweed, for example, can displace other riparian vegetation chemically and physically (crowding and shading), but it dies back with the first frost, exposing stream banks to erosive winter stream flow forces until they emerge again in the spring (Urgenson 2009).

The magnitude of these effects will depend on the effectiveness of invasive species prevention and eradication programs, the reinvasion rate of invasive species after control actions are taken, and the speed with which native species reoccupy habitats previously dominated by the non-native species. Effective control will also depend heavily on successful public awareness programs to prevent spread of new invasive species on both public and adjacent private lands. The forests are committed as part of their management focus to detect, eradicate, control, or contain high priority aquatic invasive species occurrences, where feasible.

An example is nonnative brook trout. Brook trout are the only species known to commonly hybridize with bull trout throughout their range. There are numerous examples where bull trout hybridization with brook trout has been documented resulting in bull trout declines or even local extirpations (Leary et al. 1983, DeHaan et al. 2009, Ardren et al. 2011). When bull trout hybridize with brook trout, the resulting hybrid offspring are often, but not always, sterile (Kanda et al. 2002, DeHaan et al. 2010), which leads to “wasted” reproductive effort, and these hybrid fish likely compete with remaining bull trout for food and space.

The Blues ARCS addresses these issues through specific standards and guidelines focused on preventing or reducing the spread of invasive species. In addition, invasive species will be addressed through watershed protection and restoration, via implementation of WCF and other treatments outside of priority watersheds.

Description of Species and Designated Critical Habitat

Snake River Spring/Summer Chinook Salmon (*Oncorhynchus tshawytscha*)

Distribution/Abundance

Within the planning area, spawning and rearing spring/summer Chinook salmon occur in a wide range of streams across the Salmon River basin. Bevan et al. (1994) estimated the number of wild adult Snake River spring/summer Chinook salmon in the late 1800s to be more than 1.5 million fish annually. By the 1950s, the population had declined to an estimated 125,000 adults. Escapement estimates indicate that the population continued to decline throughout the 1970s. Estimated annual numbers of adult, natural-origin Snake River spring/summer Chinook salmon returning to Lower Granite Dam since 1979 varied through the 1980s, but there have been further declines in recent years. Record low returns occurred in 1994 (1,721 fish) and 1995 (1,116 fish). Dam counts were modestly higher from 1996 through 1998, reaching about 8,400 fish in 1998, but declined in 1999 to 3,276 fish.

Snake River basin spring Chinook salmon are found in the Tucannon, Grande Ronde, Wallowa, Imnaha, and Snake River/Hells Canyon subbasins within the Umatilla and Wallowa-Whitman national forests (Figure 42 and Figure 43). Lower reaches of the Tucannon, Grande Ronde and Imnaha Rivers used by spring/summer Chinook salmon are also used by Snake River fall Chinook salmon. Those river segments are identified in Figures 42 and 43 as receiving use by both Snake River spring/summer and fall Chinook salmon. Snake River spring/summer Chinook salmon spawning and rearing distribution is listed in Table 34.

BLUE MOUNTAINS FOREST PLAN REVISION

Date: 1/25/2018

Wallowa Whitman NF - Snake River Fish Distribution for Spring & Fall Chinook Salmon

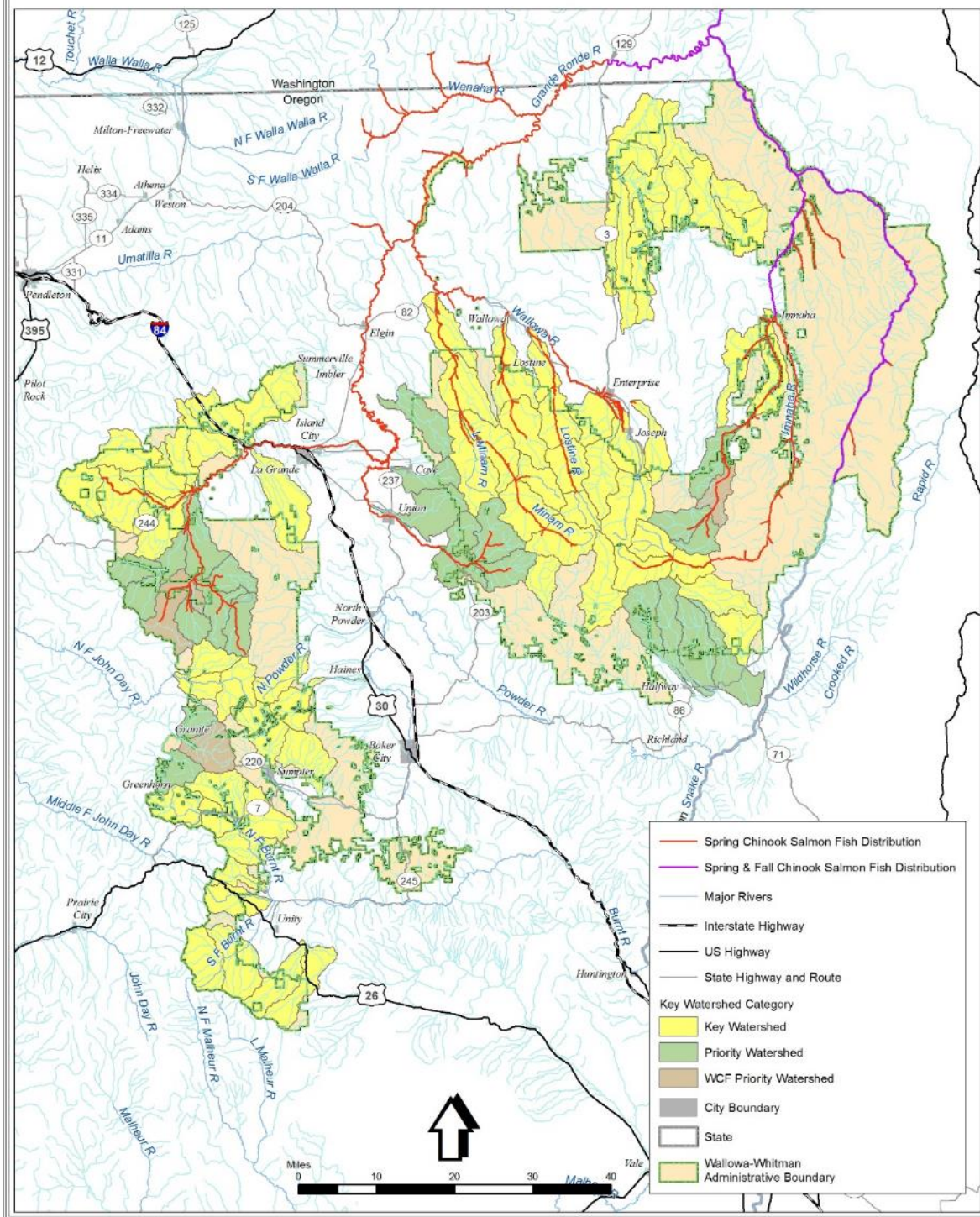


Figure 42. Wallowa Whitman NF; fish distribution for Snake River spring/summer and fall Chinook salmon

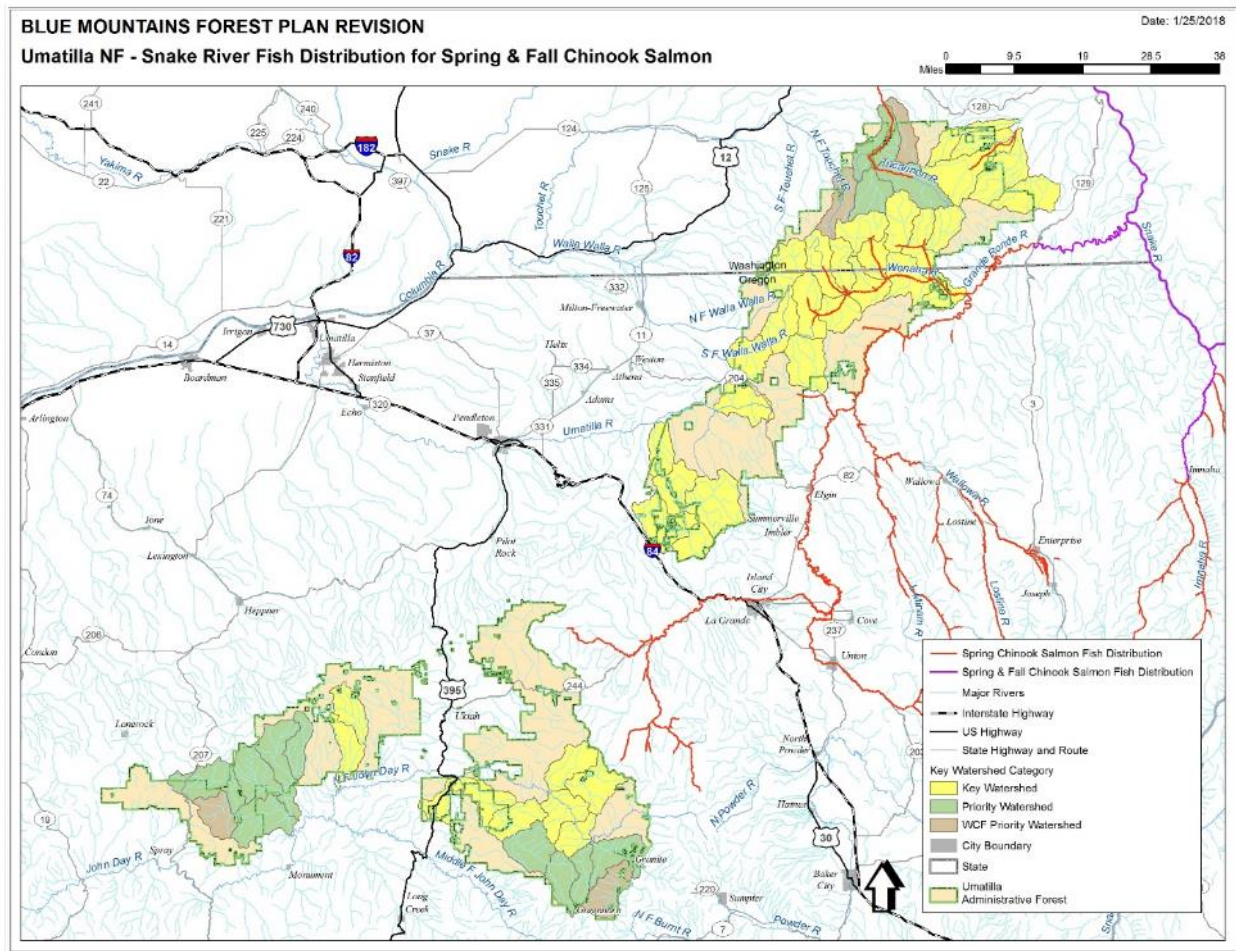


Figure 43. Snake River spring/summer and fall Chinook salmon distribution for the Umatilla NF

Table 34. Designated critical habitat for Snake River spring/summer Chinook salmon for the planning area

Forest	Subbasin	Watershed	Subwatershed	Category	Total
Umatilla National Forest (UNF)	Lower Snake-Tucannon	Upper Tucannon River	Headwaters Tucannon River	P	8.20
			Panjab Creek	P	0.31
			Little Tucannon River-Tucannon River	P	13.50
	Lower Grande Ronde	Wenaha River	Beaver Creek	KWS	1.63
			Lower Butte Creek	KWS	13.45
			Upper Butte Creek	KWS	2.31
			Upper South Fork Wenaha River	KWS	5.54
			Lower South Fork Wenaha River	KWS	6.38
			Rock Creek-Wenaha River	KWS	15.25
			North Fork Wenaha River	KWS	19.34
			Cross Canyon-Wenaha River	KWS	16.22

Forest	Subbasin	Watershed	Subwatershed	Category	Total
			Dry Gulch-Wenaha River	KWS	13.36
UNF Total					115.49
Wallowa-Whitman National Forest (WNF)	Imnaha	Lower Big Sheep Creek	Lower Little Sheep Creek-Big Sheep Creek	KWS	8.33
		Upper Big Sheep Creek	Carrol Creek-Big Sheep Creek	P	5.77
			Lick Creek	P	3.80
			Salt Creek-Big Sheep Creek	P	3.78
			Steer Creek-Big Sheep Creek	KWS	13.48
			Tyee Creek-Big Sheep Creek	WCF/P	8.46
		Upper Imnaha River	North Fork Imnaha River	KWS	0.00
			Rock Creek-Imnaha River	KWS	5.78
			South Fork Imnaha River	KWS	1.53
	Wallowa	Bear Creek	Lower Bear Creek	KWS	12.99
			Upper Bear Creek	KWS	2.98
		Lostine River	Lake Creek-Lostine River	KWS	6.96
			Lower Lostine River	KWS	10.19
			Silver Creek-Lostine River	KWS	8.93
			Upper Lostine River	KWS	0.32
		Minam River	Chaparral Creek-Minam River	KWS	13.46
			China Cap Creek-Minam River	KWS	9.10
			Little Minam River	KWS	5.36
			Lower Minam River	KWS	10.73
			North Minam River	KWS	0.76
			Trout Creek-Minam River	KWS	10.13
			Upper Minam River	KWS	6.48
		Upper Wallowa River	Hurricane Creek	KWS	3.93
			Upper Prairie Creek	KWS	0.01
			Wallowa Lake-Wallowa River	KWS	9.70
			Spring Creek	KWS	3.20
	Upper Grande Ronde	Indian Creek-Grande Ronde River	Upper Indian Creek	P	2.27
		Meadow Creek Upper Grande Ronde River	Lower McCoy Creek	KWS	0.73
			Lower Meadow Creek	KWS	9.87
			Middle Meadow Creek	KWS	0.14
			Dark Canyon Creek	KWS	0.38
			Chicken Creek	P	5.74
			Sheep Creek	WCF/P	9.76
			Tanner Gulch-Grande Ronde River	P	1.10
			Meadowbrook Creek-Grande Ronde River	P	9.19

Forest	Subbasin	Watershed	Subwatershed	Category	Total
			Warm Springs Creek-Grande Ronde River	P	14.42
			Limber Jim Creek	P	3.43
			Lower Fly Creek	P	2.07
		Upper Catherine Creek	North Fork Catherine Creek	P	8.90
			Little Catherine Creek	P	1.69
			Milk Creek-Catherine Creek	P	7.18
			South Fork Catherine Creek	P	5.79
WNF Total					248.82
Grand Total					364.31

Designated Critical Habitat

Critical habitat was designated for Snake River spring/summer Chinook salmon in 1993 [Federal Register, December 28, 1993 (58 FR 68543)] (Figure 44 and Figure 45). Critical habitat includes all river reaches presently or historically accessible and adjacent riparian zones, except reaches above impassable natural falls. The Federal Register designation of critical habitat specifically defines geographic areas and essential habitat elements.

The critical habitat designation identifies those physical and biological features (PFBs) of the habitat that are essential to the conservation of Snake River spring/summer Chinook salmon and that may require special management consideration or protection.

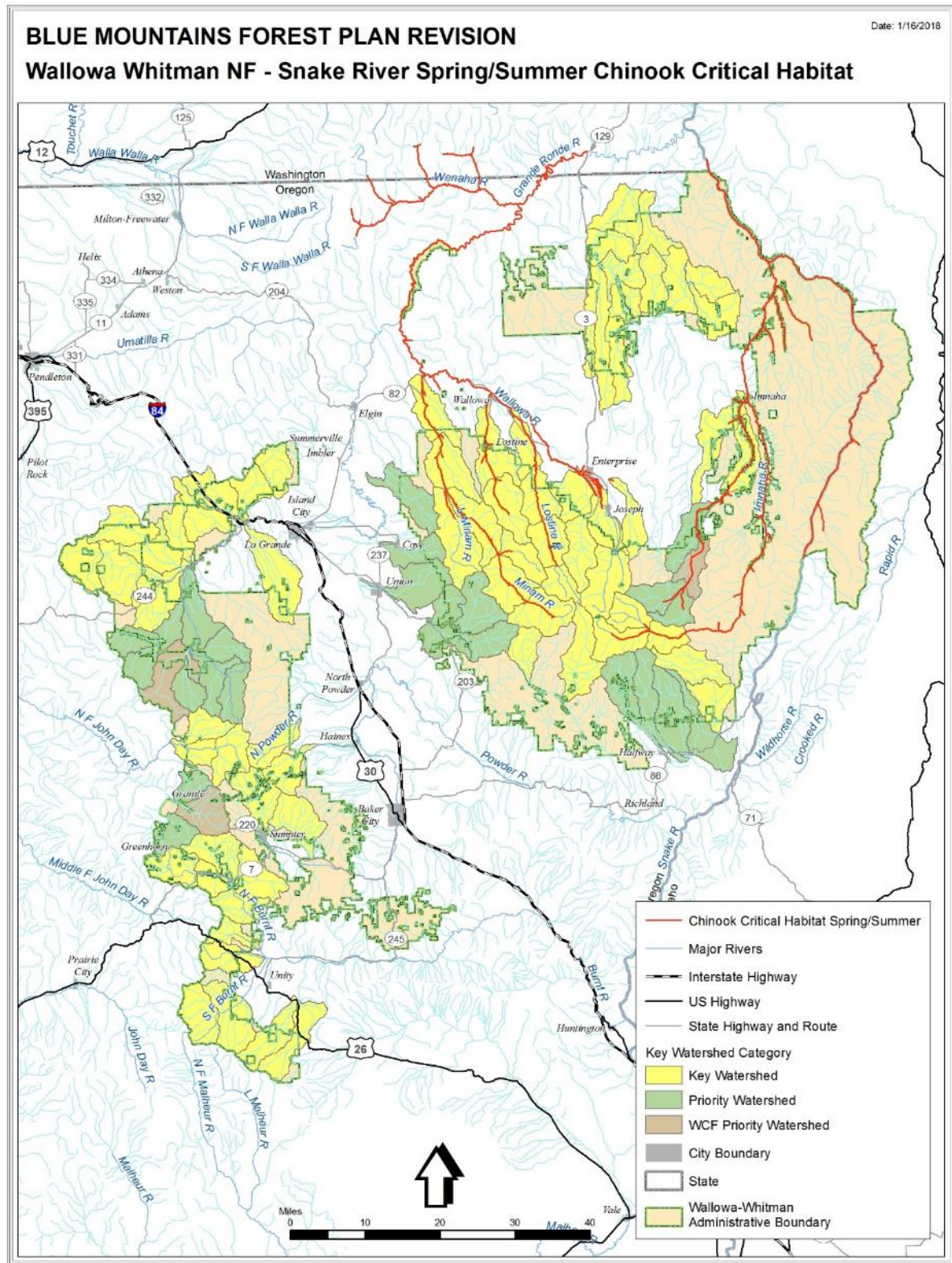


Figure 44. Snake River spring/summer Chinook Salmon Designated Critical Habitat for the Wallowa Whitman NF

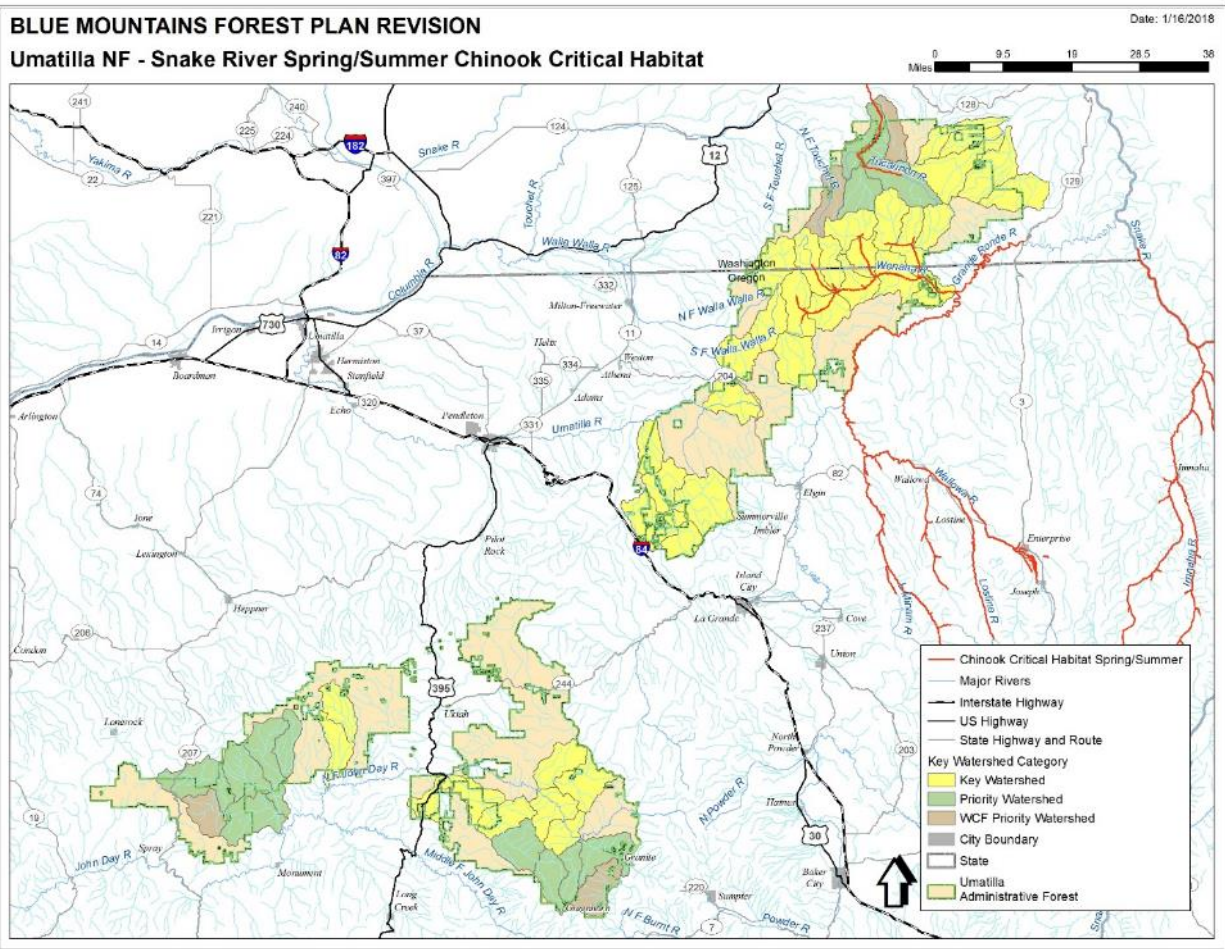


Figure 45. Snake River spring/summer Chinook salmon Designated Critical Habitat for the Umatilla NF

Physical and biological Features (PBFs) for Snake River Spring/Summer Chinook Salmon

Within the designated critical habitat areas, the PBFs for chinook salmon are those physical and biological features that are essential to the conservation of a given species, including space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, and rearing of offspring; and habitats that are protected from disturbance or are representative of the historical geographical and ecological distribution of a species. Recently new critical habitat regulations (81 FR 7214) replace the term PCEs with physical and biological features (PBFs). The term PCE is replaced with PBF throughout the rest of this document.

The specific PBFs include:

- **Freshwater spawning sites** with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.
- **Freshwater rearing sites** with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality, and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

- **Freshwater migration** corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.
- **Estuarine areas** free of obstruction with water quality water quantity and salinity conditions supporting juvenile and adult physiological transitions between fresh and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels and juvenile and adult forage (including aquatic invertebrates and fishes) supporting growth and maturation. The estuarine areas factor is not assessed for the planning area. There are no estuarine areas within the planning area
- **Nearshore marine areas** free of obstruction with water quality and quantity conditions and forage (including aquatic invertebrates and fishes) supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels. The nearshore marine areas factor is not assessed for the planning area. There are no nearshore marine areas within the planning area
- **Offshore marine areas** with water quality conditions and forage (including aquatic invertebrates and fishes) supporting growth and maturation. The offshore marine areas factor is not assessed for the planning area. There are no offshore marine areas within the planning area

Critical habitat includes the stream channels within the designated stream reaches and has a lateral extent as defined by the bankfull elevation on one bank to the bankfull elevation on the opposite bank. Bankfull elevation is the level at which water begins to leave the channel and move into the floodplain and is reached at a discharge that generally has a recurrence interval of 1 to 2 years on the annual flood series. If bankfull elevation is not evident on either bank, the ordinary high-water line must be used to determine the lateral extent of critical habitat. The lateral extent of designated lakes is defined by the perimeter of the waterbody as mapped on standard 1:24,000 scale topographic maps. The Forest Service assumes in many cases this is the fullpool level of the waterbody. In areas where only one side of the waterbody is designated (where only one side is excluded), the mid-line of the waterbody represents the lateral extent of critical habitat.

Adjacent shoreline riparian areas, bluffs, and uplands are not designated as critical habitat. However, it should be recognized that the quality of marine and freshwater habitat along streams, lakes, and shorelines is intrinsically related to the character of these adjacent features, and that human activities which occur outside of the designated critical habitat can have major effects on physical and biological features of the aquatic environment.

Activities that cause adverse effects to critical habitat are evaluated to determine if they are likely to “destroy or adversely modify” critical habitat by no longer serving the intended conservation role for the species or retaining those PBFs that relate to the ability of the area to at least periodically support the species. Activities that may destroy or adversely modify critical habitat are those that alter the PBFs to such an extent that the conservation value of critical habitat is appreciably reduced.

Each of the three PBFs to be assessed under this biological assessment is addressed by habitat feature (in bold), the matrix pathway (in parentheses), and the matrix indicators as described below:

1. **Freshwater spawning sites**

Substrate (Habitat Element) – addressed by the

Sediment/Turbidity/Substrate Embeddedness indicator

Water Quality (Flow/Hydrology) – addressed by the Temperature, Sediment/Turbidity/Substrate Embeddedness and Chemical Contamination and Nutrients indicator

Water Quantity (Flow/Hydrology) – addressed by the Change in Peak/Base Flows and Drainage Network indicator

Freshwater rearing sites

Floodplain Connectivity (Channel Condition and Dynamics) – addressed by Floodplain Connectivity.

Forage – Habitat Element)– addressed by the Substrate/Embeddedness, Large Woody Debris, Pool Frequency, Pool Quality, Off Channel Habitat, and Refugia indicator. (Watershed Condition) – addressed by Riparian Reserves.

Natural Cover – (Habitat Element)– addressed by the Substrate/Embeddedness, Large Woody Debris, Pool Frequency, Pool Quality, OffChannel Habitat, and Refugia indicator. (Watershed Condition) – addressed by Riparian Reserves.

Water Quality (Flow/Hydrology) – addressed by the Temperature, Sediment/Turbidity/Substrate Embeddedness and Chemical Contamination and Nutrients indicator

Water Quantity (Flow/Hydrology) – addressed by the Change in Peak/Base Flows and Drainage Network indicator

2. Freshwater migration

Free of Artificial Obstruction (Habitat Access) – addressed by the Physical Barrier indicator

Natural Cover – (Habitat Element)– addressed by the Substrate/Embeddedness, Large Woody Debris, Pool Frequency, Pool Quality, Off-Channel Habitat, and Refugia indicator. (Watershed Condition) – addressed by Riparian Reserves.

Water Quality – (Flow/Hydrology) – addressed by the Temperature, Sediment/Turbidity/Substrate Embeddedness and Chemical Contamination and Nutrients indicator

Water Quantity – (Flow/Hydrology) – addressed by the Change in Peak/Base Flows and Drainage Network indicator

The PBFs addressed above and the habitat features associated with the PBFs appropriate for this Plan for Snake River spring /summer Chinook salmon are the same for Snake River fall Chinook salmon, Snake River Basin steelhead and Middle Columbia River steelhead. These will not be repeated for these species in the following sections.

Factors of Decline/Threats

The final rule listing spring/summer Chinook salmon identifies the factors of decline for this species (57 FR 14653). A summary of each factor of decline, including a brief discussion of the Forest Service' influence over each factor is included below:

The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Outside Forest Service influence: The final rule addresses effects to habitat or range within the context of hydropower development, identifying factors such as blockage and inundation of habitat, turbine-related mortality, and increased delay of juvenile migration. Also noted are increased predation on juvenile salmon in reservoirs and increased delay of adults on their way to spawning grounds. Additionally, increased predator populations due to ideal foraging areas created by impoundments are identified as contributing to decline.

Within some level of Forest Service influence: Water withdrawal and storage, irrigation diversions, siltation and pollution from sewage, farming, grazing, logging, and mining are also listed in the rule as degrading Snake River spring/summer chinook salmon habitat. These factors are within the control of the Forest Service when they are initiated by the Forest Service, occur on NFS land, or require a permit or authorization from the Forest Service.

Hydropower development in the Columbia River Basin has resulted in migration blockage and inundation of habitat, predator populations have increased due to hydroelectric development that has created ideal foraging areas, and water withdrawal and storage, irrigation diversions, grazing, logging, mining and other activities have modified and destroyed habitat and curtailed the range of these species. Ocean and river harvest, and inadequate regulatory mechanisms are other factors affecting Chinook salmon abundance.

Construction of dams on the Snake River inundated spring Chinook spawning habitat and prevented upstream passage to primary production areas for this species in the upper Snake River because fish passage facilities at the dams proved to be inadequate. The distribution of Snake River spring Chinook has been dramatically reduced and now represents only a fraction of its former range.

Over Utilization for Commercial, Recreational, Scientific, or Educational Purposes

Outside Forest Service influence: Historical combined ocean and river harvests were noted in the rule as reaching levels of 80-90 percent. Current levels have been greatly curtailed due to efforts to protect runs. The Forest Service is not involved establishing fishery harvest regulations.

Within some level of Forest Service influence: Over utilization for other purposes that could require a Forest Service permit (for example scientific or educational purposes) were not specifically identified in the rule as contributing to the decline.

Disease or Predation

Outside Forest Service influence: The final rule acknowledges an increase in predation due to hydroelectric development that created ideal foraging areas. An increase in predation by pinnepeds has been noted for all northwest salmonid fisheries. The rule notes that the extent to which predation is a factor in decline is unknown.

Within some level of Forest Service influence: Not applicable; these factors are beyond the control or discretion of the Forest Service.

The Inadequacy of Existing Regulatory Mechanisms

Outside Forest Service influence: Not applicable; the Forest Service, as a Federal agency, has discretion and control over laws and programs that could influence the abundance and survival of anadromous fish populations. However, these would not be just specific to the planning area, but would be agency-wide.

Within some level of Forest Service influence: The final rule notes that, as of 1992, a wide variety of federal laws and programs have affected the abundance and survival of anadromous fish populations in the Columbia River. However, they had not prevented the decline of the species at the time of the rule.

Other Natural or Man-Made Factors Affecting Its Continued Existence

Outside Forest Service influence: Natural factors – Drought is identified as the principal natural condition that may have contributed to spring/summer Chinook salmon decline at the time of the rule.

Manmade factors - The final rule concludes that, under the circumstance of low abundance, hatchery programs have contributed to the further decline of wild Snake River spring/summer Chinook salmon through the taking of fish for broodstock programs, behavioral, and genetic interactions, competition, predation, and the spread of disease.

Within some level of Forest Service influence: Not applicable; the Forest Service does not have discretion over, nor control of, hatchery or artificial propagation programs.

The threats and limiting factors affecting Snake River spring/summer Chinook salmon and steelhead operate across all stages of the life cycle. The threats to the species listed in the Snake River Recovery Plan for spring/summer salmon and steelhead that are tied to the listing threats and factors for decline are described as tributary habitat, predation, competition, disease and exposure to toxic pollutants, and climate change.

The primary tributary habitat limiting factors that will be addressed in this Revised Forest Plan include:

- Impaired fish passage
- Reduced stream complexity
- Excess fine sediment
- Elevated summer water temperatures
- Diminished streamflow during critical periods
- Reduced floodplain connectivity and function
- Degraded riparian conditions

Table 35. Tributary habitat limiting factors for Snake River spring/summer Chinook salmon populations.

Population	Primary Tributary Habitat Limiting Factors						
	Stream Complexity	Excess Sediment	Passage Barriers	Altered/ Low Flows	Water Quality/ Temperature	Riparian Condition	Floodplain Connectivity
Lower Snake River MPG							
Tucannon River	√	√	√	√	√	√	√
Asotin Creek	√	√	√	√	√	√	√
Grande Ronde/ Imnaha Rivers MPG							
Wenaha River	√	√	√	√	√	√	√
Minam River	√	√	√	√	√	√	√
Lostine/ Wallowa R.	√	√	√	√	√	√	√
Lookingglass Creek	√	√	√	√	√	√	√
Catherine Creek	√	√	√	√	√	√	√
Up. Grande Ronde R.	√	√	√	√	√	√	√
Imnaha River	√	√	√	√	√	√	√
Big Sheep Creek	√	√	√	√	√	√	√
South Fork Salmon River MPG							
Little Salmon River	√	√	√	√	√	√	√
South Fork Salmon R.	√	√	√	√	√	√	√
Secesh River	√	√	√	√	√	√	√
East Fork Salmon R.	√	√	√	√	√	√	√
Middle Fork Salmon River MPG							
Chamberlain Creek	√	√	√	√	√	√	√
Big Creek	√	√	√	√	√	√	√
Lower MF Salmon R.	√	√	√	√	√	√	√
Camas Creek	√	√	√	√	√	√	√
Loon Creek	√	√	√	√	√	√	√
Upper MF Salmon R.	√	√	√	√	√	√	√
Sulphur Creek	√	√	√	√	√	√	√
Bear Creek	√	√	√	√	√	√	√
Marsh Creek	√	√	√	√	√	√	√

Upper Salmon River MPG							
North Fork Salmon R.	√	√	√	√		√	
Lemhi R.	√	√	√	√	√	√	
Up. Salmon R. L. Main	√	√	√	√	√	√	√
Pahsimeroi R.	√	√	√	√	√	√	
East Fork Salmon R.	√	√	√	√	√	√	
Yankee Fk Salmon R.	√					√	√
Valley Creek	√		√	√	√	√	√
Up. Salmon R. U. Main	√	√	√	√	√	√	
Panther Creek	√		√	√			

Snake River Fall Chinook Salmon (*Oncorhynchus tshawytscha*)

Distribution/Abundance

Historical accounts describe fall Chinook salmon in the lower 169 miles of the Lower Snake River and in the Tucannon, Clearwater, Selway, Grande Ronde, and Imnaha Rivers (Van Dusen 1903; Chapman 1940; Schoning 1947; Parkhurst 1950; Fulton 1968). Although spawning habitat in this stretch of the river was described as extensive (Parkhurst 1950; Fulton 1968), confirmed accounts of spawning are lacking (Connor et al. 2016). Accounts of fall Chinook salmon use of Lower Snake River tributaries are also limited. In the late 1800s, approximately 408,500 to 536,180 fall Chinook salmon are believed to have returned annually to the Snake River (Connor et al. 2016). The number of fall Chinook salmon returning to the Snake River began to decline toward the end of the 19th century. Annual catches of fall Chinook salmon at the time ranged from 3,000 to nearly 10,000 tons (Fulton 1968, as cited in Waples et al. 1991). Chapman and Chandler (2003) estimated a peak commercial harvest of 80 percent of the returning adults. This rate of harvest resulted in a steady decline in adult abundance. Escapement estimates indicate that the population continued to decline throughout the 1970s. Irving and Bjornn (1981) estimated that the mean number of fall Chinook salmon returning to the Snake River declined from an annual return high of 47,600 in the period between 1938 and 1947 to 29,000 during the 1950s. Although the four lower Snake River dams had fish passage facilities, returns of adult fall Chinook salmon to the Snake River declined to very small numbers: an average of 12,720 from 1964 through 1968; 3,416 from 1969 through 1974; and 610 from 1975 through 1980 (Waples et al. 1991). Only about 78 natural-origin adults (Lavoy and Mendel 1996) returned to the Snake River in 1990, which precipitated the ESA-listing of the species and triggered implementation of actions to improve passage at the dams (along with other actions to reverse the species' decline).

Today, Snake River fall Chinook salmon spawn primarily in the 100-mile reach of the Lower Snake River downstream of Hells Canyon Dam. Snake River basin fall Chinook salmon are also found in the Tucannon, Grande Ronde and Imnaha rivers. Both species distribution and DCH in the Tucannon River are limited to reaches over 30 miles downstream of NFS lands, in the lowermost 17 miles of the river and the draft fall Chinook salmon Recovery Plan (NMFS 2015) considers the Tucannon MaSa to be unoccupied, due to scarcity of natural-origin spawners. Designated Critical Habitat extends in the Imnaha River Wild and Scenic River (WSR) nearly to the Big Sheep Creek confluence where the planning area adjoins the Hells Canyon NRA, based on GIS information available from National Marine Fisheries Service, although the species does not extend upstream past the town of Imnaha, downstream of the planning area, per the draft Recovery Plan (Figure 4-6). Lower reaches of the Tucannon, Grande Ronde and Imnaha Rivers used by spring/summer Chinook salmon are also used by Snake River fall Chinook salmon. Those river segments are identified in Figures 42 and 43 as receiving use by both Snake River spring/summer and fall Chinook salmon. Fall Chinook salmon DCH extends upstream in the planning area through the Grande Ronde River WSR, bordered intermittently by one or both of the Umatilla and Wallowa-Whitman national forests, to a short distance below the confluence of the Wallowa River

(Figure 46 and Figure 47), according to GIS information available from National Marine Fisheries Service. Core spawning habitat extends upstream in the Grande Ronde to a short distance upstream of the Wenaha River confluence, per the draft Recovery Plan (Figure 4-6), though incidental spawning individuals have been observed on occasion upstream through the area encompassed by DCH.(Figure 46 and Figure 47).

Viability of SRB fall Chinook salmon is primarily influenced by factors outside Forest Service control: mortality associated with upstream and downstream passage over multiple mainstem dams in the Snake and Columbia Rivers, cyclical ocean conditions, commercial, tribal, and recreational harvest, and interbreeding with nonnative hatchery stock. Indirect and cumulative effects from the Revised Forest Plan in the Wild and Scenic River (WSR) management allocations and associated suitable uses (recreational floating and associated land management activities may occur but would likely be limited in extent, duration and intensity (see Table 20 for Suitable Uses). Direct effects to fall Chinook would be infrequent and very short term, based on passing disturbance by river rafters and due to sparse spawning use of habitat upstream of Troy, Oregon in the Grande Ronde. Suitable uses in management allocations higher in the occupied watersheds upslope of the WSR corridors would be subject to ARCS direction for RMAs or to more restrictive management direction (e.g. Wenaha-Tucannon Wilderness) as appropriate wherever tributary RMAs might otherwise be affected. Based on the above information, direct, indirect and cumulative effects of the revised forest plans for the Umatilla and Wallowa-Whitman National Forests May Affect, but are Not Likely to Adversely Affect SRB fall Chinook salmon in the action area.

Designated Critical Habitat

Critical habitat was designated for Snake River fall Chinook salmon in 1993 [Federal Register, December 28, 1993 (58 FR 68543).] (Figure 46 and Figure 47). Critical habitat includes all river reaches presently or historically accessible to the species, and adjacent riparian zones, except reaches above impassable natural falls. The Federal Register designation of critical habitat specifically defines geographic areas and essential habitat elements. National Marine Fisheries has provided GIS mapping information regarding the extent of fall Chinook salmon DCH in and adjacent to the planning area, which the Forest Service is using to facilitate this consultation (Figure 46 and Figure 47). Table 36 displays pertinent information about fall Chinook DCH in the planning area. For similar reasons to those given above, indirect and cumulative effects of the revised forest plans for the Umatilla and Wallowa-Whitman National Forests May Affect, but are Not Likely to Adversely Affect SRB fall Chinook salmon DCH in the planning area.

BLUE MOUNTAINS FOREST PLAN REVISION

Date: 1/16/2018

Wallowa Whitman NF - Snake River Fall Chinook Critical Habitat

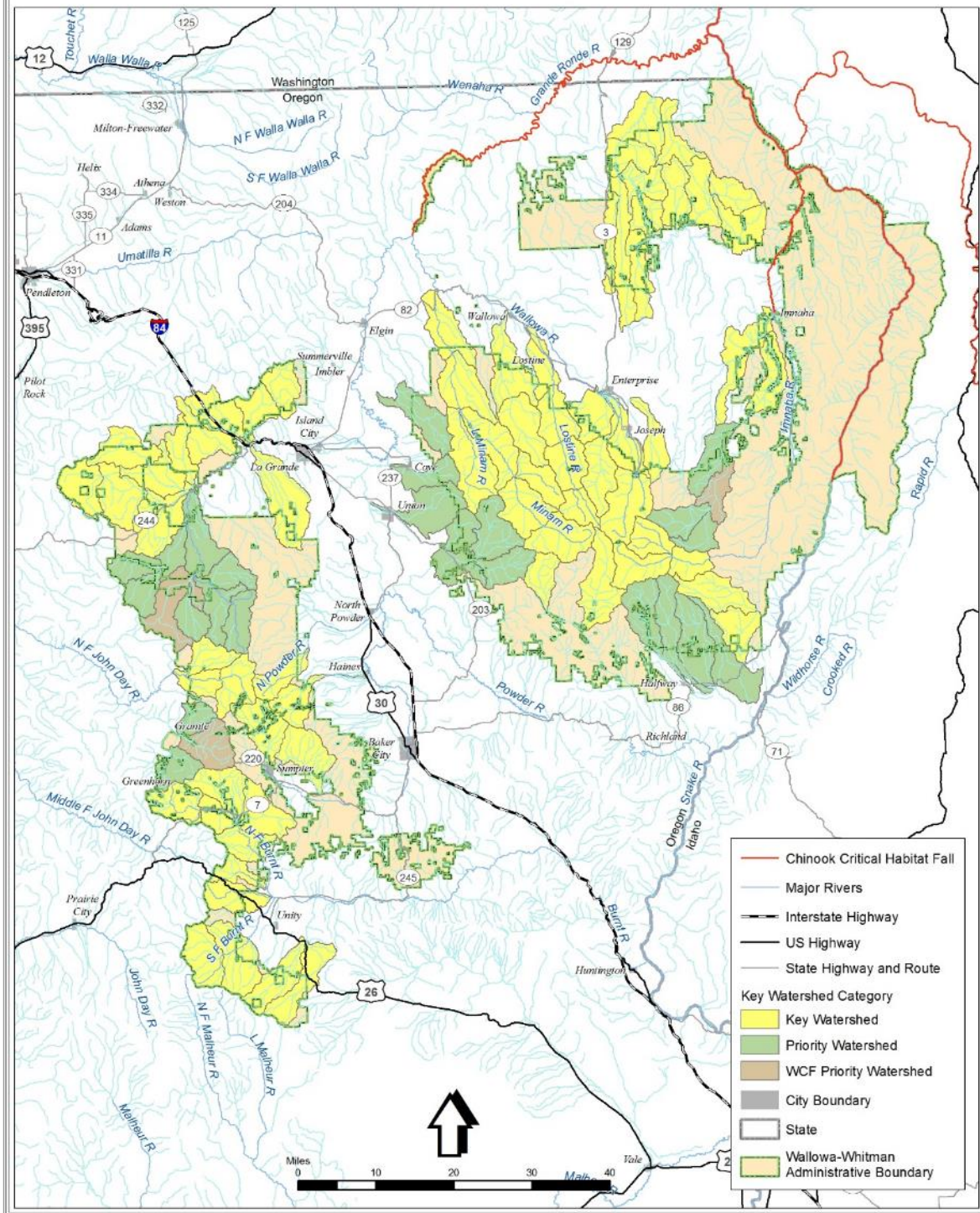


Figure 46. Snake River fall Chinook Salmon Designated Critical Habitat for the Wallowa Whitman NF

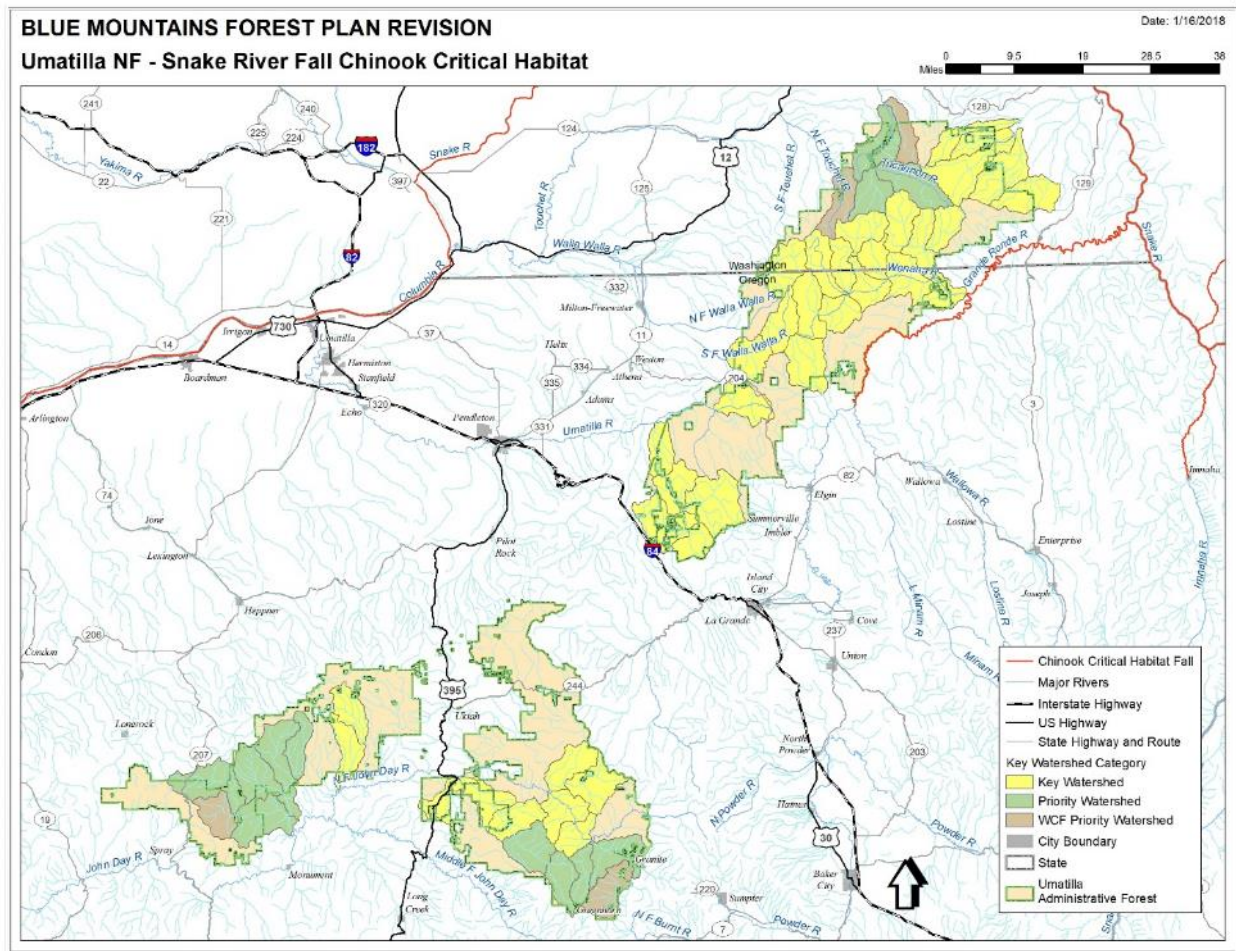


Figure 47. Snake River fall Chinook salmon Designated Critical Habitat for the Umatilla NF

Table 36. Designated critical habitat for Snake River fall Chinook salmon for the planning area

Umatilla National Forest (UNF)	Subbasin	Watershed	Subwatershed	Category	Total Miles
Total UNF	Upper Grande Ronde	Grossman Creek-Grande Ronde	Bear Creek-Grande Ronde River	WSR	3.37
			Clear Creek-Grande Ronde River	WSR	1.22
			Sickfoot Creek-Grande Ronde River	WSR	0.14
				WSR	4.73
Wallowa-Whitman National Forest (WNF)	Lower Grande Ronde	Bear Creek	Bear Creek-Grande Ronde River	WSR	6.61
	Lower Grande Ronde	Grossman Creek-Grande Ronde		WSR	5.26
			Clear Creek-Grande Ronde River		
	Lower Grande Ronde	Grossman Creek-Grande Ronde	Sickfoot Creek-Grande Ronde River	WSR	0.26
	Hells Canyon*	Getta Creek-Snake River	Big Canyon Creek-Snake River	HNRA	2.90
	Hells Canyon*	Granite Creek-Snake River	Butte Creek-Snake River	HNRA	8.02

	Lower Snake-Asotin*	Cherry Creek-Snake River	Cache Creek-Snake River	HNRA	5.00
	Hells Canyon*	Getta Creek-Snake River	Corral Creek-Snake River	HNRA	4.40
	Hells Canyon*	Wolf Creek-Snake River	Dry Creek-Snake River	HNRA	5.86
	Hells Canyon*	Wolf Creek-Snake River	Dug Bar-Snake River	HNRA	5.01
	Lower Snake-Asotin*	Cherry Creek-Snake River	Eureka Bar-Snake River	HNRA	3.41
	Imnaha*	Lower Imnaha River	Fence Creek-Imnaha River	HNRA	1.65
	Lower Snake-Asotin*	Cherry Creek-Snake River	Jim Creek-Snake River	HNRA	7.35
	Hells Canyon*	Getta Creek-Snake River	Kurry Creek-Snake River	HNRA	2.61
	Hells Canyon*	Getta Creek-Snake River	Salt Creek-Snake River	HNRA	3.38
	Hells Canyon*	Getta Creek-Snake River	Sand Creek-Snake River	HNRA	5.65
	Hells Canyon*	Granite Creek-Snake River	Sluice Creek-Snake River	HNRA	10.24
	Hells Canyon*	Granite Creek-Snake River	Somers Creek-Snake River	HNRA	5.23
	Imnaha River*	Lower Imnaha River	Thorn Creek-Imnaha River	HNRA	7.83
	Salmon River*	Deer Creek-Salmon River	Wapshilla Creek-Salmon River	HNRA	0.65
WNF Total (in the planning area)					12.13

* Hells Canyon NRA, managed under the Coordinated Management Plan.

The critical habitat designation identifies those physical and biological features (PFBs) of the habitat that are essential to the conservation of fall Chinook salmon and that may require special management consideration or protection. Table 37 discloses tributary primary limiting factors for Snake River fall Chinook salmon, per the Recovery Plan.

Table 37. Tributary habitat limiting factors for Snake River fall Chinook salmon populations.

Population	Primary Tributary Habitat Limiting Factors						
	Habitat quantity/diversity	Excess sediment	Altered/Low Flows	Water Quality/Temperature	Riparian Condition	Entrainment	Uncertain
Tucannon MaSa	√	√					
Grande Ronde MaSa	√	√	√	√	√		
Imnaha MaSa							√

For more information in relation to limiting factors and specific Oregon and Southeast Washington Snake River populations, visit the below websites to view the Snake River fall Chinook salmon draft Recovery Plan.

http://www.nmfs.noaa.gov/pr/recovery/plans/proposed_snake_river_fall_chinook_recovery_plan_october_2015.pdf

http://www.nmfs.noaa.gov/pr/recovery/plans/2015_snakeriverfallchinookappendices.pdf

Middle Columbia River Steelhead (*Oncorhynchus mykiss*)

Distribution and Abundance

Within the planning area, spawning and rearing steelhead occur in a wide range of streams across the John Day, Walla Walla and Umatilla River Basins (Table 38) (Figure 48, Figure 49, and Figure 50). The John Day River basin supports the largest naturally spawning native group of steelhead in the region. This MPG does not meet viability criteria due to out-of-system hatchery strays, low abundance in the Middle Fork John Day River, and low abundance and productivity in the South Fork John Day River.

The Umatilla/Walla Walla MPG does not meet viability criteria due to abundance/productivity and spatial structure/diversity.

Middle Columbia River (MCR) steelhead and designated critical habitats are present in all three Blue Mountains national forests. In the North Fork John Day subbasin, the Umatilla and Wallowa-Whitman national forests administer separate but adjoining portions of MCR steelhead habitat in the subbasin.

BLUE MOUNTAINS FOREST PLAN REVISION **Malheur NF - Fish Distribution for Steelhead**

Date: 4/2/2017

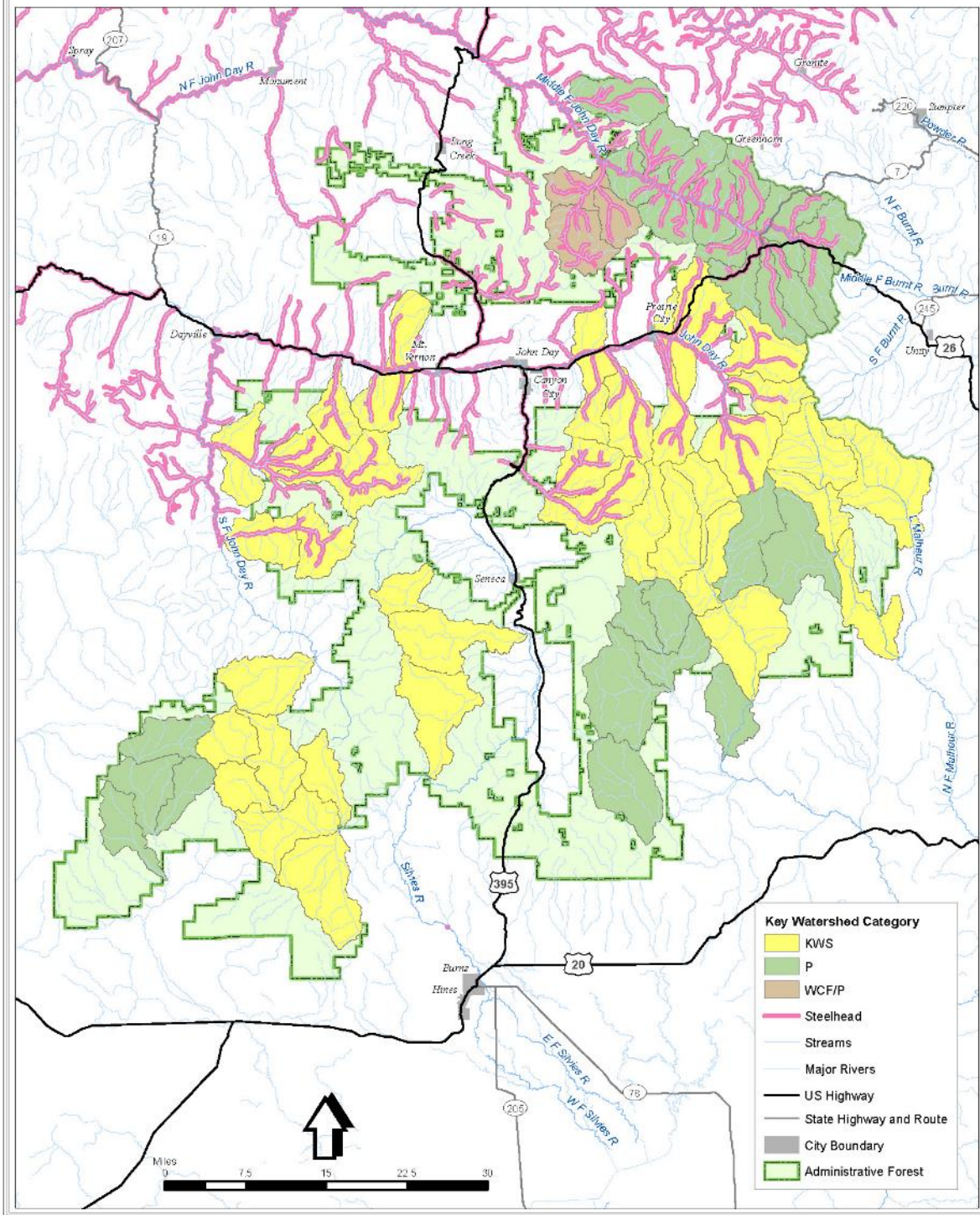


Figure 48. Middle Columbia River steelhead distribution for the Malheur NF.

BLUE MOUNTAINS FOREST PLAN REVISION

Date: 4/2/2017

Wallowa Whitman NF - Fish Distribution for Steelhead

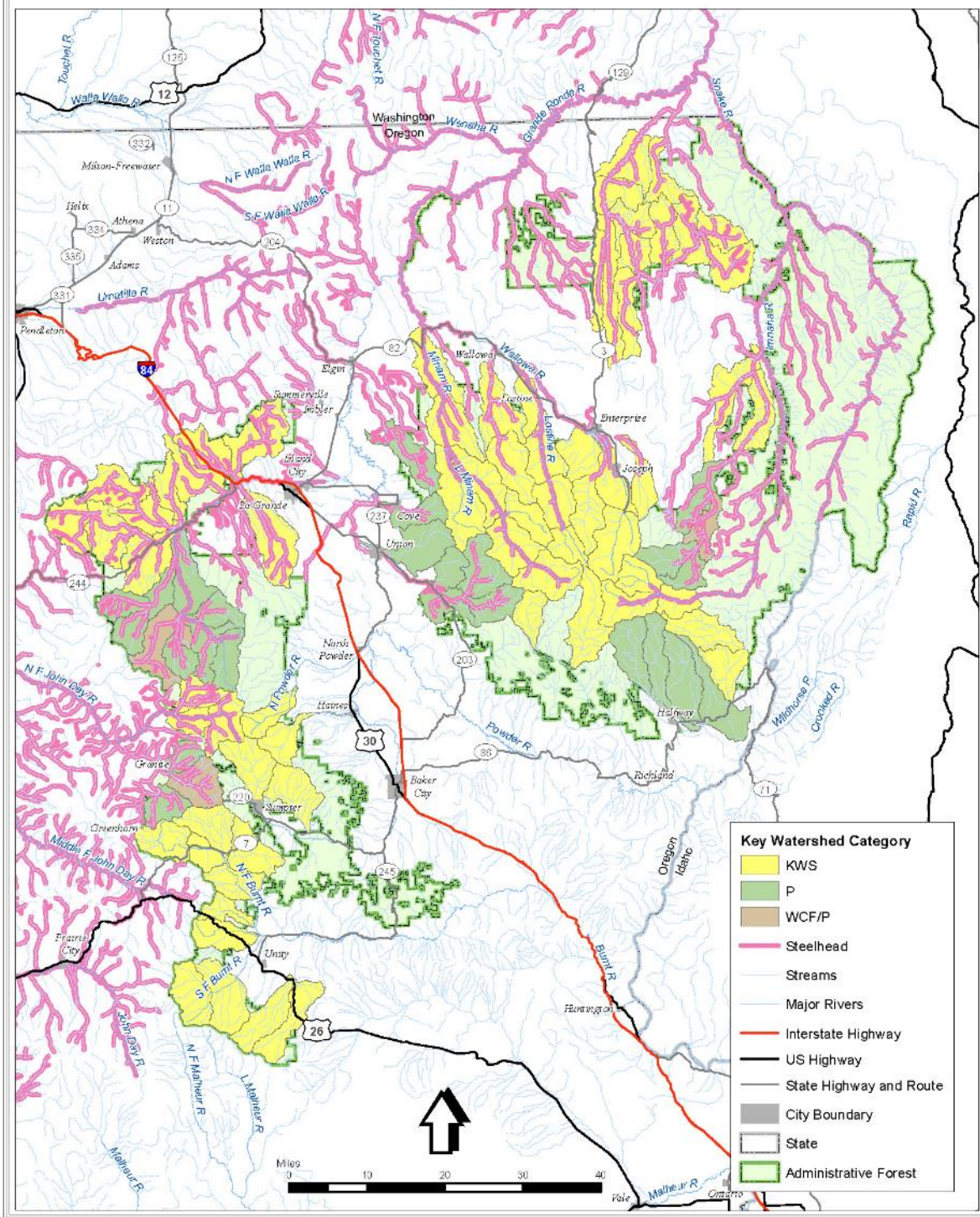


Figure 49. Middle Columbia River steelhead distribution for the Wallowa Whitman NF.



Forest	Subbasin	Watershed	Subwatershed	Category	Total
Malheur National Forest (MNF)	Middle Fork John Day	Big Creek-Middle Fork John Day River	Big Creek	P	18.68
		Bridge Creek-Middle Fork John Day River	Bridge Creek	P	7.72
			Clear Creek	P	9.92
			Dry Fork	P	4.23
			Mill Creek-Middle Fork John Day River	P	13.06
			Squaw Creek	P	4.84
			Summit Creek	P	7.96
		Camp Creek-Middle Fork John Day River	Balance Creek-Middle Fork John Day River	P	13.11
			Big Boulder Creek	P	13.08
			Granite Boulder Creek-Middle Fork John Day River	P	24.83
			Lick Creek	WCF/P	7.45

Forest	Subbasin	Watershed	Subwatershed	Category	Total
			Little Boulder Creek-Middle Fork John Day River	P	21.07
			Lower Camp Creek	WCF/P	11.96
			Upper Camp Creek	WCF/P	14.99
			Vinegar Creek-Middle Fork John Day River	P	24.45
	Upper John Day	Canyon Creek	East Fork Canyon Creek	KWS	16.64
			Upper Canyon Creek	KWS	19.47
		Fields Creek-John Day River	Fields Creek	KWS	12.01
		Grub Creek-John Day River	Castle Creek-John Day River	KWS	10.73
			Indian Creek	KWS	16.97
			Strawberry Creek-John Day River	KWS	27.75
		Laycock Creek-John Day River	Dry Creek-John Day River	KWS	20.38
		Middle South Fork John Day River	Lower Deer Creek	KWS	12.02
			Upper Deer Creek	KWS	11.52
		Murderers Creek	Headwaters Murderers Creek	KWS	27.54
			Lower Murderers Creek	KWS	4.89
			Upper Murderers Creek	KWS	16.13
		Reynolds Creek-John Day River	Dads Creek-John Day River	KWS	16.46
			Deardorff Creek	KWS	7.38
			Headwaters John Day River	KWS	18.49
			Reynolds Creek	KWS	12.36
MNF Total					448.09
Umatilla National Forest (UNF)	North Fork John Day	Big Creek-North Fork John Day River	Big Creek	KWS	6.96
			Corral Creek-North Fork John Day River	KWS	17.31
			Glade Creek-North Fork John Day River	KWS	12.60
			Meadow Creek	KWS	17.69
		Desolation Creek	Headwaters Desolation Creek	P	8.70
			Lower Desolation Creek	KWS	12.30
			Middle Desolation Creek	KWS	22.84
			Upper Desolation Creek	P	22.69
		Granite Creek	Clear Creek	WCF/P	18.80
			Lake Creek	P	10.27
			Lower Granite Creek	P	23.85
		Potamus Creek-North Fork John Day River	Ellis Creek-Potamus Creek	KWS	14.68
			Potamus Creek	KWS	11.92
			West Fork Meadow Brook	KWS	9.36
		Wall Creek	Little Wall Creek	P	14.36

Forest	Subbasin	Watershed	Subwatershed	Category	Total
			Lower Big Wall Creek	P	21.17
			Skookum Creek-Little Wall Creek	P	26.98
			Swale Creek	P	16.26
			Upper Big Wall Creek	WCF/P	9.23
			Wilson Creek	P	22.37
	Umatilla	Headwaters Umatilla River	North Fork Umatilla River	KWS	16.08
		Meacham Creek	Boston Canyon-Meacham Creek	KWS	14.23
			Butcher Creek-Meacham Creek	KWS	19.71
			Camp Creek-Meacham Creek	KWS	10.02
			East Meacham Creek	KWS	7.97
			North Fork Meacham Creek	KWS	17.57
	Walla Walla	Mill Creek-Walla Walla River	Upper Mill Creek	KWS	16.97
		Upper Touchet River	Upper North Fork Touchet River	KWS	13.92
		Upper Walla Walla River	Middle South Fork Walla Walla River	KWS	14.38
			Upper South Fork Walla Walla River	KWS	16.17
UNF Total					467.36
Wallowa-Whitman National Forest (WNF)	North Fork John Day	Granite Creek	Beaver Creek	P	11.35
			Bull Run Creek	WCF/P	14.68
			Upper Granite Creek	P	8.08
		Headwaters North Fork John Day River	Baldy Creek-North Fork John Day River	KWS	16.58
			Onion Creek-North Fork John Day River	KWS	11.96
			Trail Creek	KWS	16.38
WNF Total					79.03
Grand Total					994.48

5. National Forest System conditions based on model outputs, modified by habitat connectivity conditions associated with number and locations of culvert passage concerns in National Forest System lands relative to species habitat distribution.

Designated Critical Habitat

Critical habitat was designated on February 16, 2000 [65 FR 7764], but vacated (undesignated) by court order on April 30, 2002. On September 2, 2005, NMFS published a final rule (70 FR 52630) to designate critical habitat for MCR steelhead and 12 other ESUs/DPSs of salmon and steelhead. The final rule took effect on January 2, 2006. The proposed critical habitat designation identifies those physical and biological features (PFBs) of the habitat that are essential to the conservation of steelhead and that may require special management consideration or protection.

BLUE MOUNTAINS FOREST PLAN REVISION

Date: 6/6/2017

Malheur NF - Designated Critical Habitat for Steelhead

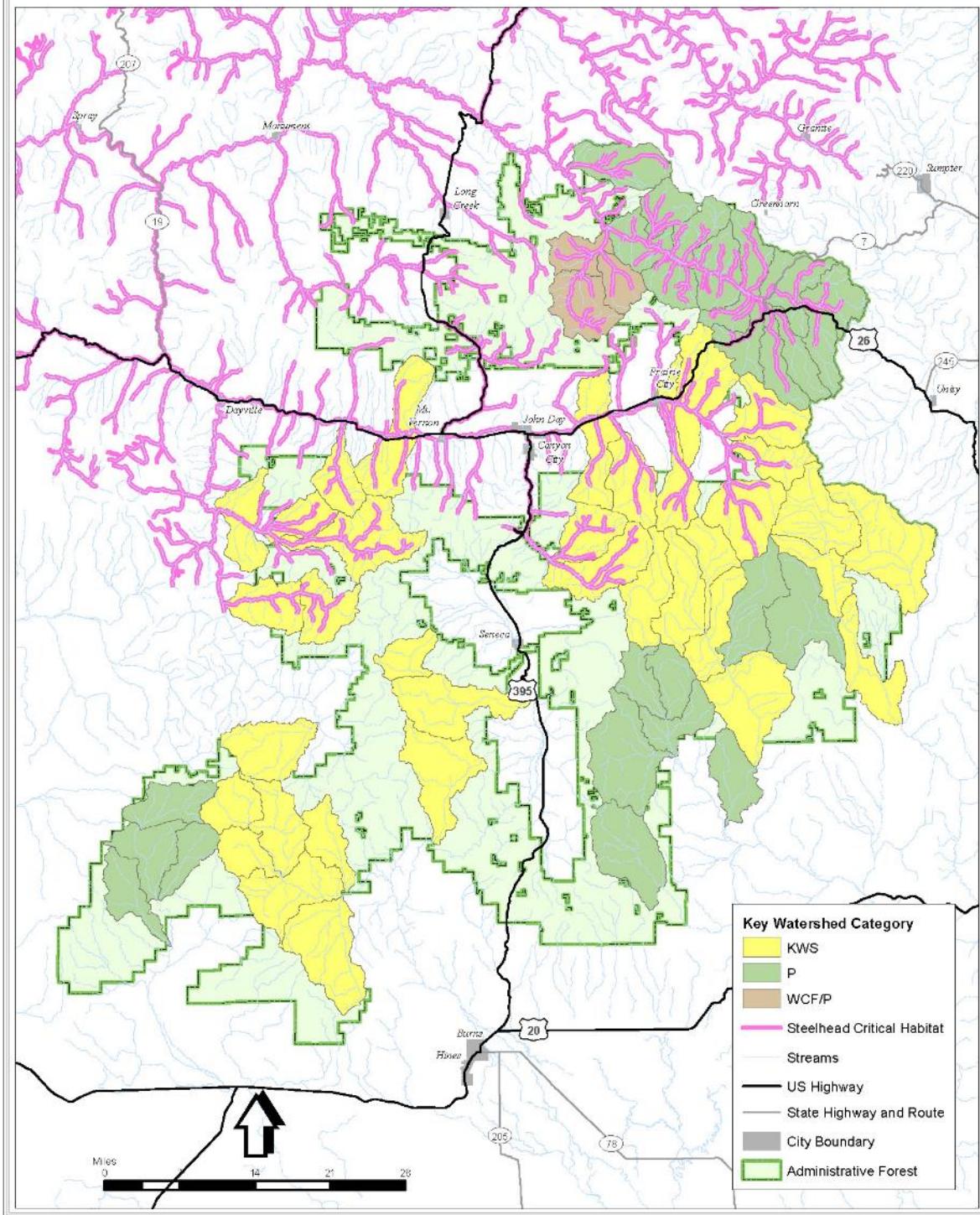


Figure 51. Middle Columbia River steelhead designated critical habitat for the Malheur NF

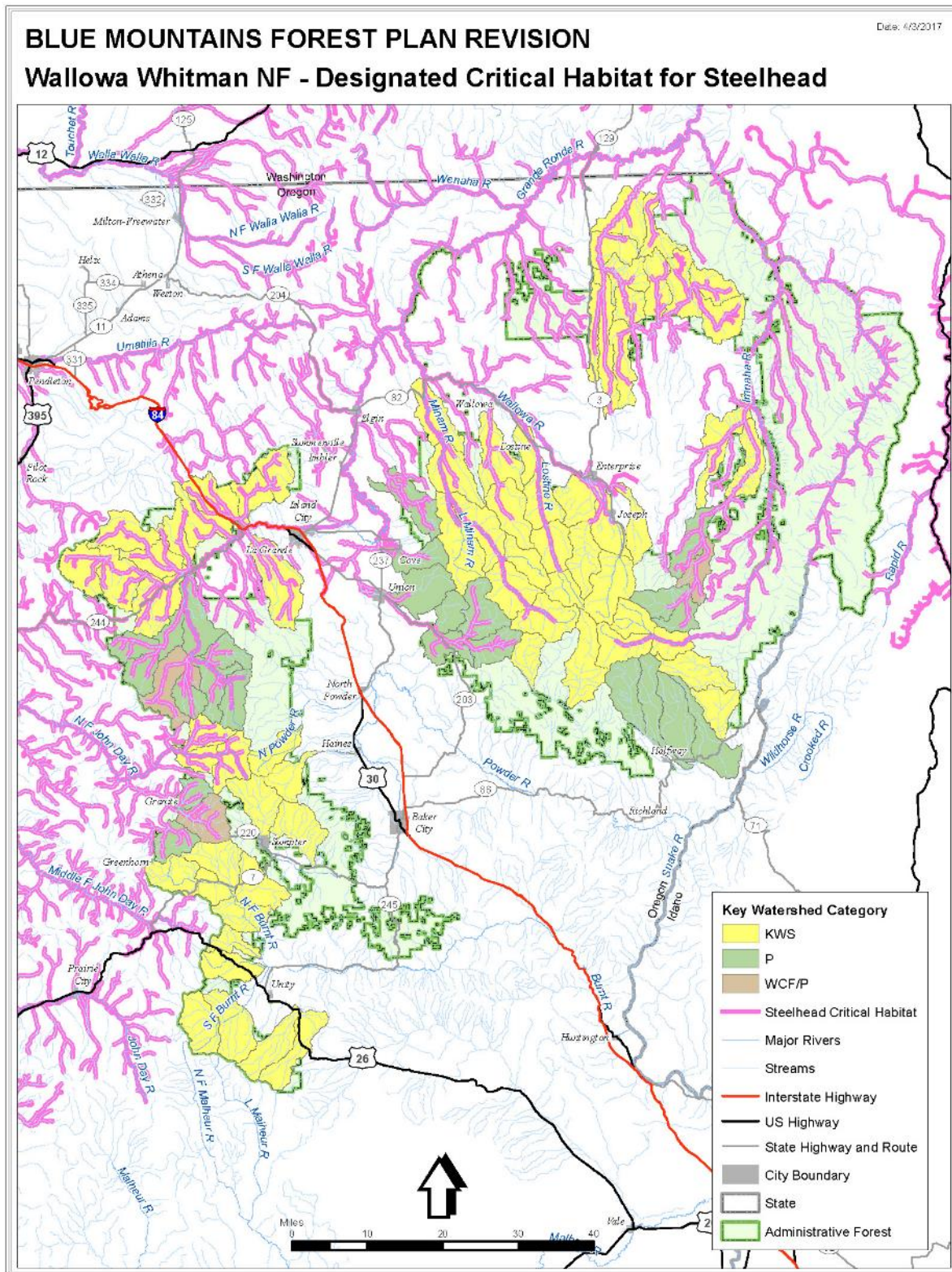


Figure 52. Middle Columbia River steelhead designated critical habitat for the Wallowa Whitman NF

BLUE MOUNTAINS FOREST PLAN REVISION
Umatilla NF - Designated Critical Habitat for Steelhead



Date: 4/3/2017

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Miles

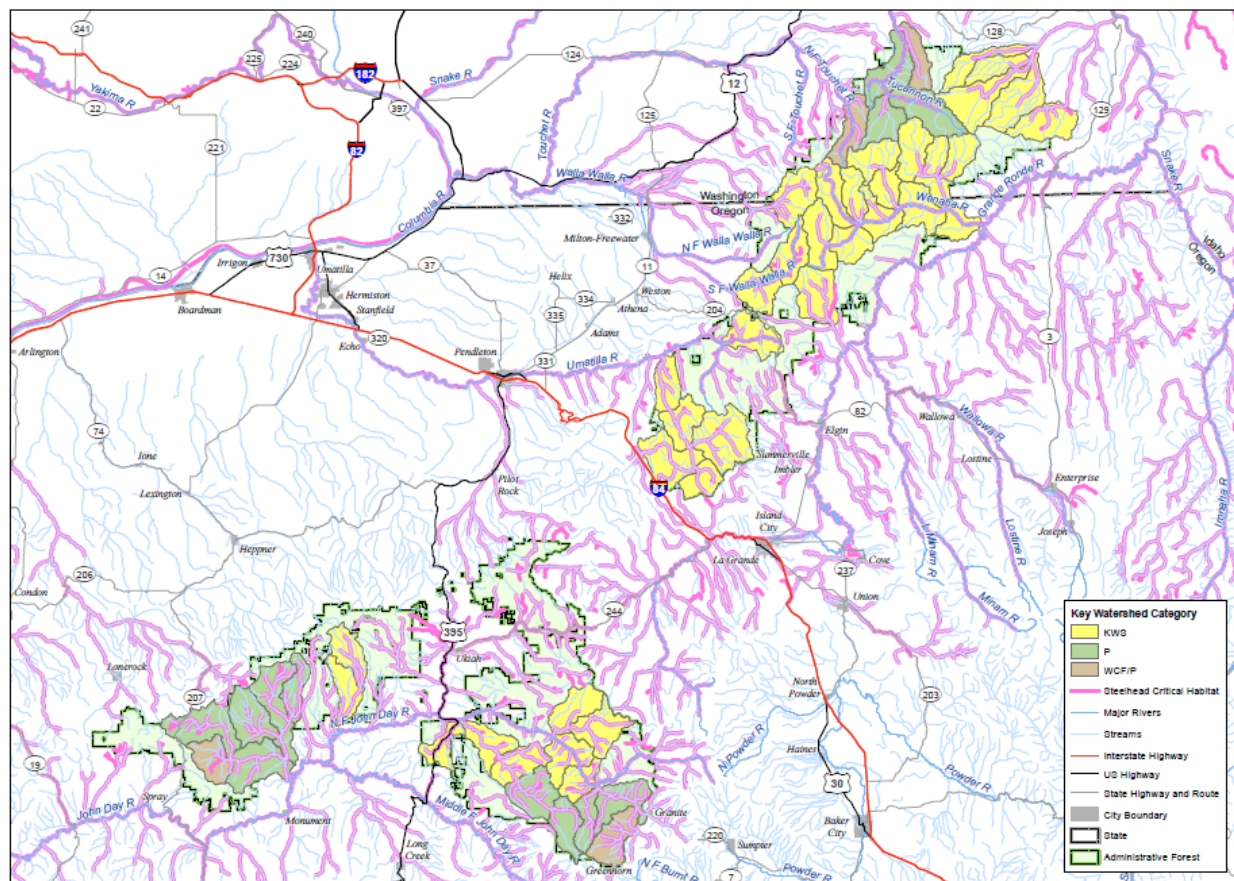


Figure 53. Middle Columbia River Steelhead Designated Critical Habitat for the Umatilla NF

Physical and biological Features (PBFs) for Middle Columbia Steelhead

Within the designated critical habitat areas, the PBFs for steelhead are those physical and biological features that are essential to the conservation of a given species, including space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, and rearing of offspring; and habitats that are protected from disturbance or are representative of the historical geographical and ecological distribution of a species.

The PBFs addressed above and the habitat features associated with the PBFs for Snake River spring/summer Chinook salmon appropriate for this Revised Forest Plan are the same for MCR Steelhead. These will not be repeated here.

Factors of Decline and Threats

The primary reasons leading to declines in steelhead numbers in the MCR and within the planning area (John Day and Umatilla/Walla Walla MPGs), are the destruction or modification of habitat, recreational over-utilization, and natural and human-made factors. These factors acted to reduce steelhead numbers in ways similar to those described above for Chinook salmon. The final rule listing MCR steelhead

identifies these factors of decline for this species (62 FR 57). A summary of each factor of decline, including a brief discussion of the Forest Service' influence over each factor is included below:

The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Outside Forest Service influence: Not applicable.

Within some level of FS influence: Forestry, agriculture, mining, and urbanization are listed in the final rule as factors that have degraded, simplified, and fragmented habitat. Water diversions for agriculture, flood control, domestic, and hydropower purposes are noted as having greatly reduced or eliminated historically accessible habitat. Loss of habitat complexity has also contributed to the decline of steelhead. Sedimentation from land use activities was specifically mentioned as a primary cause of habitat degradation in the range of this species. These factors are within the control of the Forest Service when they are initiated by the Forest Service, occur on NFS land, or require a permit or authorization from the Forest Service.

Over-utilization for Commercial, Recreational, Scientific, or Educational

Outside Forest Service influence: The final rule speaks to recreational fisheries and mentions the problem in the mainstem Columbia where listed steelhead migrate at the same time and are subject to the same fisheries as unlisted, hatchery produced steelhead, coho, and Chinook. The Forest Service is not involved establishing fishery harvest regulations.

Within some level of Forest Service influence: Over-utilization for other purposes that could require a Forest Service permit (for example scientific or educational purposes) were not specifically identified in the rule as contributing to the decline.

Disease or Predation

Outside Forest Service influence: The rule mentions a number of diseases, parasites, bacteria, and viruses that steelhead are exposed to that are known to affect steelhead. Increased predator populations exist because of introductions of non-native species and habitat modifications, increasing the level of predation experienced by salmonids in general. Pinniped predation is mentioned as well.

Within some level of Forest Service influence: The Forest Service may influence habitat for non-native species that prey on salmonids.

The Inadequacy of Existing Regulatory Mechanisms

Outside Forest Service influence: The final rule identifies state land management, Army Corps of Engineers, the Federal Clean Water Act, and the programs of these entities, as well as state hatchery and harvest programs, reaching conclusions about the ability of these to affect steelhead and their habitat. These entities and programs are outside the control or discretion of the Forest Service.

The Forest Service, as a Federal agency, has discretion and control over laws and programs that could influence the abundance and survival of anadromous fish populations. However, these would not be just specific to the planning area, but would be agency-wide.

Within some level of Forest Service influence: The rule identifies PACFISH as an attempt to provide a consistent approach for maintaining and restoring aquatic and riparian habitat conditions, which in turn were (at the time) expected to promote sustained natural production of anadromous fish. The rule notes that the long-term limitations of PACFISH had already (in 1997) resulted in lost conservation opportunities for threatened and proposed anadromous fish.

Other Natural or Man-Made Factors Affecting Its Continued Existence

Outside Forest Service influence: The final rule concludes that natural climatic conditions have exacerbated the problems associated with degraded and altered riverine and estuarine habitats. Drought is recognized as having reduced already limited spawning, rearing, and migration habitat.

The rule notes that hatchery programs, implemented in an attempt to mitigate the loss of habitat, have impacted native naturally reproducing stocks through competition, genetic introgression, and disease transmission and may reduce the production and survival of naturally reproducing steelhead.

Within some level of Forest Service influence: Not applicable; the Forest Service does not have discretion over, or control of hatchery or artificial propagation programs.

The threats and limiting factors affecting MCR steelhead operate across all stages of the life cycle. The threats to the species listed in the MCR steelhead ESA Recovery Plan that are tied to the listing threats and factors for decline are described as tributary habitat, predation, competition, disease and exposure to toxic pollutants, and climate change.

The primary tributary habitat limiting factors that will be addressed in this Revised Forest Plan include:

- Impaired fish passage
- Reduced stream complexity
- Excess fine sediment
- Elevated summer water temperatures
- Diminished streamflow during critical periods
- Reduced floodplain connectivity and function
- Degraded riparian conditions

For the John Day MPG and all five populations within degraded floodplain and degraded channel structure (key habitat quantity and habitat diversity), altered sediment routing, water quality (temperature) and altered hydrology are limiting factors. For the Lower and Upper Mainstem and South Fork populations, passage obstructions in some smaller tributaries are also significant.

For the Umatilla/Walla Walla MPG and all three populations, water quality (temperature), sediment, blocked and impaired fish passage, degraded floodplain and channel structure (key habitat quantity and habitat diversity), and hydrologic alterations are limiting factors

On the lower Umatilla River, six major irrigation diversions withdraw enough water to dewater the river in mid-summer. The McKay Dam blocks fish passage to 108 miles of historically accessible habitat. Bennington Dam east of the City of Walla Walla on Mill Creek, a tributary of the Walla Walla River is a significant passage obstruction. The Mill Creek flood control channel through Walla Walla is also a significant passage obstruction.

Table 39. Key limiting factors and common characteristics used to describe them

Key Limiting Factors	Common Characteristics	Life Stages Affected
Degraded floodplain connectivity and function	Loss of off-channel habitat and floodplain connectivity, seasonal wetlands, wet meadows, side channels habitat; loss of connected and functional hyporheic zone.	egg-to-smolt survival, smolt migration, adult migration, pre-spawning
Degraded channel structure and complexity	Loss of pool frequency and quantity, large wood debris; channel straightening and confinement; simplified habitat; loss of spawning	egg-to-smolt survival, smolt migration, adult migration, pre-spawning

Key Limiting Factors	Common Characteristics	Life Stages Affected
	habitat structure, redd diversity; loss of sinuosity, insufficient instream complexity and roughness.	
Degraded riparian area and LWD recruitment	Degraded riparian condition; loss of vegetation, shade, overhead cover, terrestrial food sources; unstable or eroding stream banks.	egg-to-smolt survival, smolt migration, adult migration, pre-spawning
Altered hydrology	Higher peak flows, lower low flows; intermittent flow; increased stream energy; significant flow fluctuations on weekly, daily or hourly basis; dewatered channel.	egg-to-smolt survival, smolt migration, adult migration, pre-spawning
Degraded water quality	High water temperatures, high level of chemical contaminants, nutrients, oxygen, pathogens, pH, toxic mine waste.	egg-to-smolt survival, smolt migration, adult migration, pre-spawning
Altered sediment routing (degraded stream substrate)	Sedimentation; high levels of suspended sediment, turbidity, sediment load; increased fine sediments in spawning gravel; unnatural level of course-grained sediments; embedded substrate; contaminated sediment.	egg-to-parr survival
Impaired fish passage	Artificial barriers or obstructions, total or partially, obstructing habitat access (culverts, irrigation diversions, dams, seasonal push-up dams, unscreened diversions, and entrainment in irrigation diversions etc.).	smolt migration, adult migration, juvenile upstream migration due to thermal stress, water availability

For more information in relation to limiting factors and specific Oregon populations, visit the below website to view the Middle Columbia River Steelhead Recovery Plan.

http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_Planning_and_implementation/middle_columbia/middle_columbia_river_steelhead_recovery_Plan.html

Snake River Steelhead (*Oncorhynchus mykiss*)

Distribution and Abundance

Snake River Basin (SRB) steelhead and designated critical habitats are present within two of the three Blue Mountains national forests (Table 40) (Figure 54 and Figure 55). The Malheur NF provides no habitat for SRB steelhead. The Umatilla NF provides the majority of habitat on NFS lands for some populations (e.g., the Tucannon subbasin). The entire Imnaha subbasin is within the Wallowa-Whitman NF. The Umatilla and Wallowa-Whitman NFs provide approximately equal portions of other subbasins. In the lower Grande Ronde subbasin, the Umatilla NF includes lands draining the west side of the subbasin (Wenaha River watershed), and the Wallowa-Whitman NF includes lands draining the east side of the subbasin (Joseph Creek watershed), which support two different populations of SRB steelhead within the subbasin.

Snake River steelhead spawning areas are well isolated from other steelhead populations and include the highest elevations for spawning (up to 2000m) as well as the longest migration distance from the ocean (up to 1500 kilometers). Snake River steelhead are summer steelhead, meaning they enter fresh water in a sexually immature condition and require several months to mature and spawn. They are often further

classified into A-run and B-run groups based on migration timing, ocean age, and adult size. A-run steelhead are believed to occur throughout the Snake River basin. B-run fish are thought to be produced (in the planning area) only in the Snake River within the Hells Canyon National Recreation Area.

Counts of fish passage at Lower Granite Dam and redd counts conducted annually document declines in steelhead numbers. In general, Snake River steelhead abundance declined sharply in the early 1970s, rebuilt modestly from the mid-1970s through the 1980s, and declined again during the 1990s.

Total (hatchery + natural) run size for Snake River steelhead has increased since the 1970s, but the increase has resulted from increased production of hatchery fish and there has been a severe recent decline in natural run size. Downward trends and low parr densities indicate a particularly severe problem for B-run steelhead, the loss of which would substantially reduce life history diversity within the evolutionary significant unit (ESU).

BLUE MOUNTAINS FOREST PLAN REVISION

Date: 4/3/2017

Wallowa Whitman NF - Fish Distribution for Steelhead

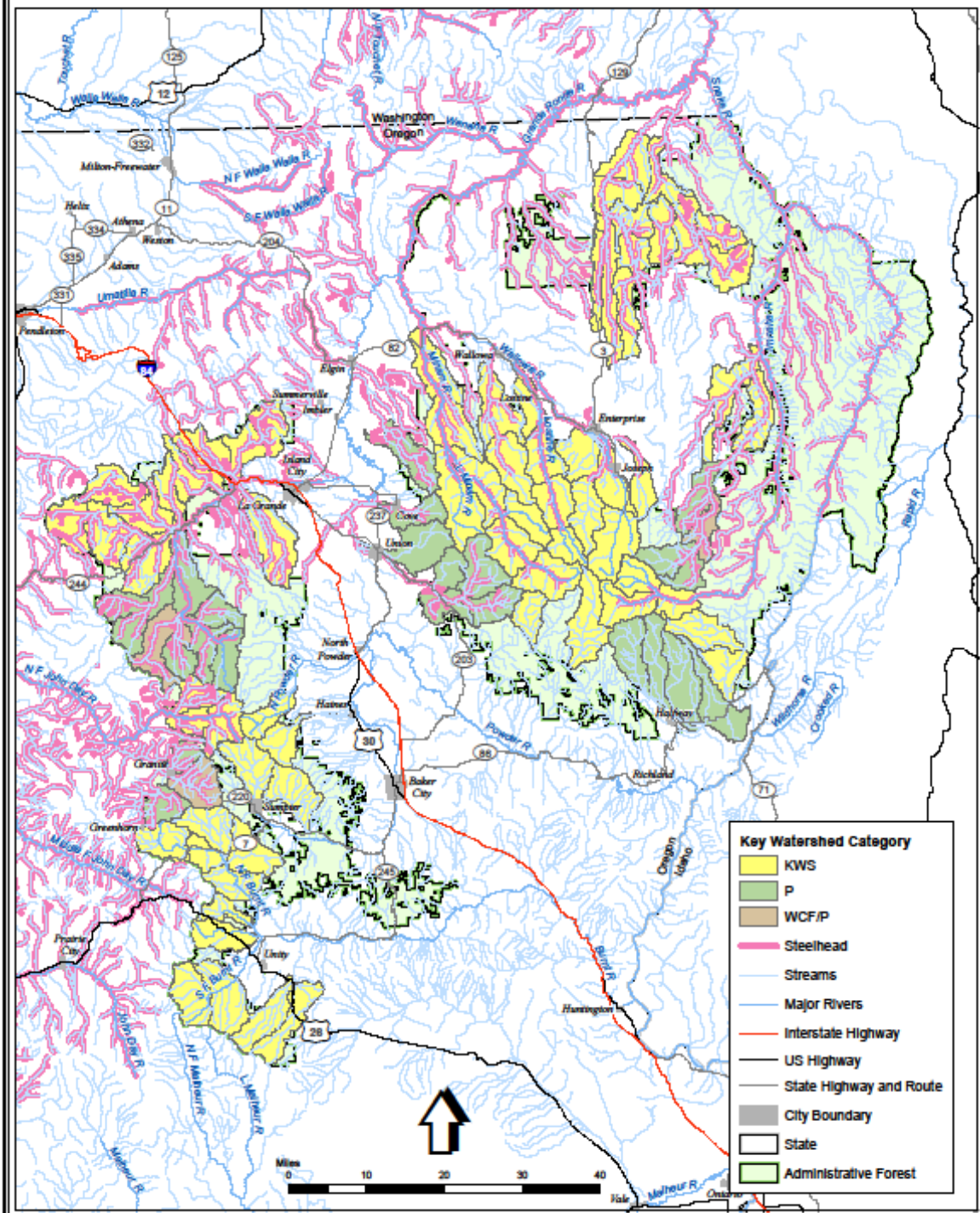


Figure 54. Snake River Steelhead Distribution for the Wallowa Whitman NF

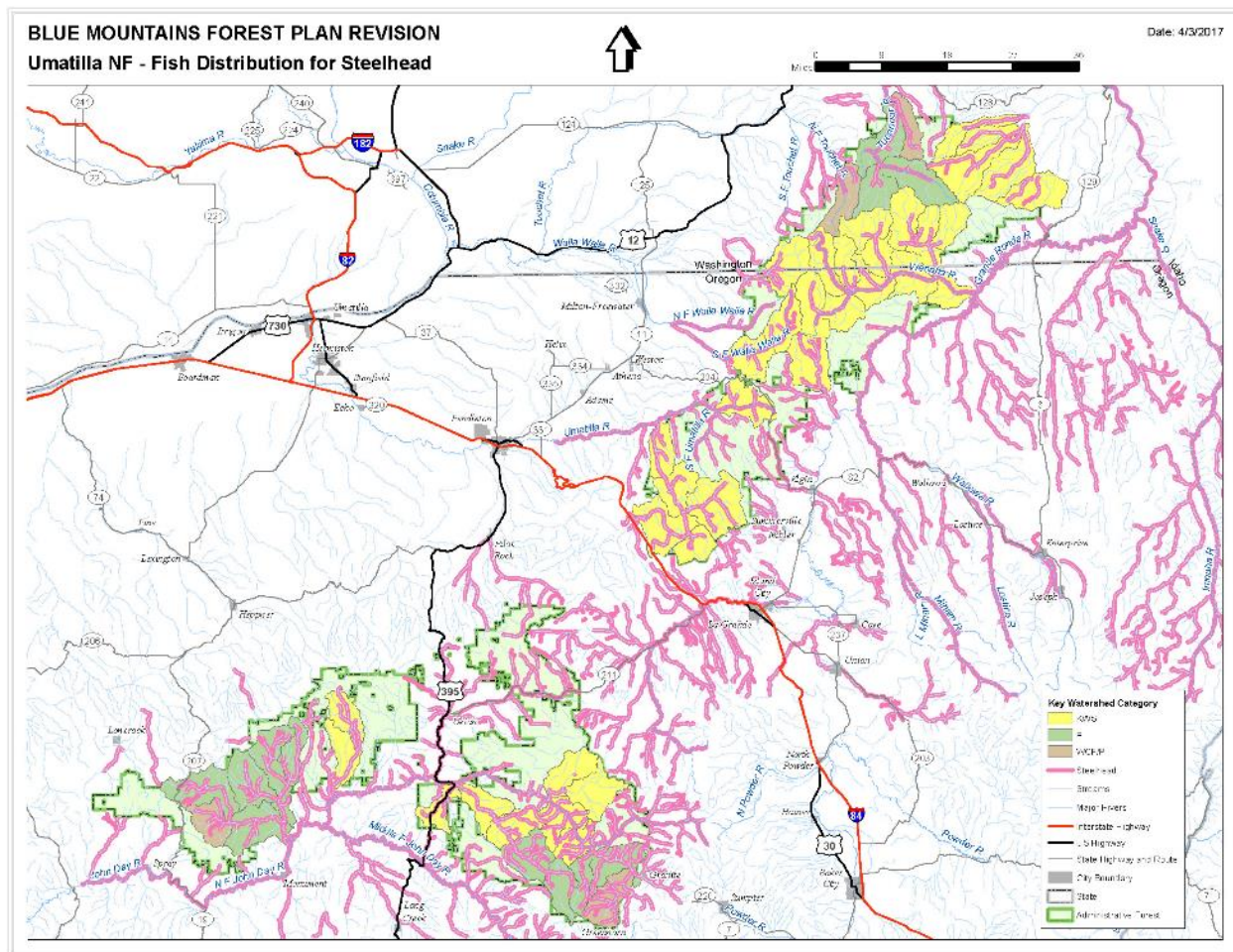


Figure 55. Snake River Steelhead Distribution for the Umatilla NF

Table 40. Snake River steelhead designated critical habitat for the planning area

Forest	Subbasin	Watershed	Subwatershed	Category	Total
Umatilla National Forest (UNF)	Lower Grande Ronde	Wenaha River	Beaver Creek	KWS	6.16
			Cross Canyon-Wenaha River	KWS	8.07
			Dry Gulch-Wenaha River	KWS	6.64
			First Creek	KWS	4.28
			Lower Butte Creek	KWS	7.15
			Lower Crooked Creek	KWS	11.02
			Lower South Fork Wenaha River	KWS	5.93
			North Fork Wenaha River	KWS	13.72
			Rock Creek-Wenaha River	KWS	11.39
			Upper Butte Creek	KWS	1.93

Forest	Subbasin	Watershed	Subwatershed	Category	Total
			Upper Crooked Creek	KWS	3.34
			Upper South Fork Wenaha River	KWS	8.83
	Lower Snake-Asotin	George Creek-Asotin Creek	Charley Creek	KWS	9.52
			Lick Creek	KWS	3.66
			North Fork Asotin Creek	KWS	13.33
			South Fork Asotin Creek	KWS	8.82
			Upper George Creek	KWS	12.75
	Lower Snake-Tucannon	Upper Tucannon River	Cummings Creek	WCF/P	8.76
			Headwaters Tucannon River	P	8.79
			Little Tucannon River-Tucannon River	P	14.86
			Panjab Creek	P	3.92
	Upper Grande Ronde	Lookingglass Creek	Little Lookingglass Creek	KWS	23.74
UNF Total					196.61
Wallowa-Whitman National Forest (WNF)	Imnaha	Lower Big Sheep Creek	Lower Little Sheep Creek-Big Sheep Creek	KWS	14.69
		Upper Big Sheep Creek	Carrol Creek-Big Sheep Creek	P	18.55
			Lick Creek	P	6.41
			Salt Creek-Big Sheep Creek	P	3.96
			Steer Creek-Big Sheep Creek	KWS	12.97
			Tyee Creek-Big Sheep Creek	WCF/P	10.72
		Upper Imnaha River	North Fork Imnaha River	KWS	0.28
	Imnaha		Rock Creek-Imnaha River	KWS	5.71
			South Fork Imnaha River	KWS	5.87
			Bare Creek – Imnaha River	HCNRA	0.09
			Chalk Creek- Imnaha River	HCNRA	5.90
			Crazyman Creek- Imnaha River	HCNRA	10.15
			Deer Creek- Imnaha River	HCNRA	12.84
			Dry Creek- Imnaha River	HCNRA	17.62
			Rock Creek –Imnaha River	HCNRA	2.30
			Summit Creek – Imnaha River	HCNRA	13.65
			Thorn Creek – Imnaha River	HCNRA	15.15
			Fence Creek- Imnaha River	HCNRA	5.47
	Snake River		Big Canyon- Snake River	HCNRA	3.32
			Butte Creek – Snake River	HCNRA	10.37

Forest	Subbasin	Watershed	Subwatershed	Category	Total
	Snake River		Cache Creek – Snake River	HCNRA	7.59
			Corral Creek – Snake River	HCNRA	6.51
			Dry Creek – Snake River	HCNRA	6.89
			Dug Bar Snake River	HCNRA	7.48
			Eureka Bar – Snake River	HCNRA	3.41
			Jim Creek Snake River	HCNRA	7.39
			Kurry Creek Snake River	HCNRA	3.79
			Sommers Creek – Snake River	HCNRA	6.69
	Lower Grande Ronde	Lower Joseph Creek	Broady Creek	HCNRA	2.91
	Snake River		Cook Creek	HCNRA	0.60
			Deep Creek	HCNRA	
	Imnaha		Freezeout Creek	HCNRA	7.04
			Granite Creek	HCNRA	5.33
	Imnaha		Gumboot Creek	HCNRA	9.86
	Lower Grande Ronde	Lower Joseph Creek	Horse Creek	HCNRA	5.70
	Imnaha		Lick Creek	HCNRA	4.95
	Lower Grande Ronde	Lower Joseph Creek	Lower Cottonwood Creek	HCNRA	1.13
	Imnaha		Lower Cow Creek	HCNRA	10.91
			Lower Grouse Creek	HCNRA	2.09
	Imnaha		Lower Horse Creek	HCNRA	14.49
	Imnaha		Upper Horse Creek	HCNRA	17.25
	Imnaha		Upper Cow Creek	HCNRA	13.47
	Imnaha		Upper Lightning Creek	HCNRA	15.83
	Lower Grande Ronde	Chesnimnus Creek	Devils Run Creek	KWS	9.03
			Middle Chesnimnus Creek	KWS	17.48
			Peavine Creek	KWS	12.66
			Upper Chesnimnus Creek	KWS	15.36
		Lower Joseph Creek	Broady Creek	KWS	9.01
			Peavine Creek-Joseph Creek	KWS	10.98
			Rush Creek-Joseph Creek	KWS	15.60
		Upper Joseph Creek	Cougar Creek-Joseph Creek	KWS	8.15
			Davis Creek	KWS	9.61
			Elk Creek	KWS	11.45
			Lower Swamp Creek	KWS	22.17
			Sumac Creek-Joseph Creek	KWS	10.75

Forest	Subbasin	Watershed	Subwatershed	Category	Total
	Upper Grande Ronde	Beaver Creek-Grande Ronde River	Rock Creek	KWS	31.01
			Spring Creek	KWS	12.92
		Five Points Creek-Grande Ronde River	Lower Five Points Creek	KWS	11.52
			Pelican Creek	KWS	19.24
			Upper Five Points Creek	KWS	10.11
		Indian Creek-Grande Ronde River	Upper Indian Creek	P	24.25
		Lower Catherine Creek	Mill Creek	P	8.53
		Meadow Creek	Dark Canyon Creek	KWS	9.62
			Lower McCoy Creek	KWS	16.81
			Lower Meadow Creek	KWS	28.80
			Middle Meadow Creek	KWS	21.04
			Upper McCoy Creek	KWS	11.41
			Upper Meadow Creek	KWS	12.20
		Upper Catherine Creek	Little Catherine Creek	P	0.69
			Little Creek	P	8.11
			Milk Creek-Catherine Creek	P	12.43
			North Fork Catherine Creek	P	12.10
			South Fork Catherine Creek	P	13.33
		Upper Grande Ronde River	Chicken Creek	P	11.75
			Limber Jim Creek	P	8.12
			Little Fly Creek	P	10.01
			Lower Fly Creek	P	8.45
			Meadowbrook Creek-Grande Ronde River	P	13.33
			Sheep Creek	WCF/P	18.61
			Tanner Gulch-Grande Ronde River	P	7.15
			Upper Fly Creek	P	11.53
			Warm Springs Creek-Grande Ronde River	P	17.37
	Wallowa	Bear Creek	Lower Bear Creek	KWS	18.39
			Upper Bear Creek	KWS	7.13
		Lostine River	Lake Creek-Lostine River	KWS	6.81
			Lower Lostine River	KWS	9.99
			Silver Creek-Lostine River	KWS	8.75
			Upper Lostine River	KWS	0.02
		Minam River	Chaparral Creek-Minam River	KWS	13.24

Forest	Subbasin	Watershed	Subwatershed	Category	Total
			China Cap Creek-Minam River	KWS	8.88
			Little Minam River	KWS	5.29
			Lower Minam River	KWS	13.63
			North Minam River	KWS	0.79
			Trout Creek-Minam River	KWS	16.46
			Upper Minam River	KWS	6.24
		Upper Wallowa River	Hurricane Creek	KWS	7.53
			Spring Creek	KWS	2.35
			Upper Prairie Creek	KWS	2.24
			Wallowa Lake-Wallowa River	KWS	12.80
WNF Total					1020.18
Grand Total					1,216.79

Designated Critical Habitat

Critical habitat was designated for Snake River steelhead on September 2, 2005 (70 FR 52630). (Figure 56 and Figure 57)

BLUE MOUNTAINS FOREST PLAN REVISION

Date: 4/2/2017

Wallowa Whitman NF - Designated Critical Habitat for Steelhead

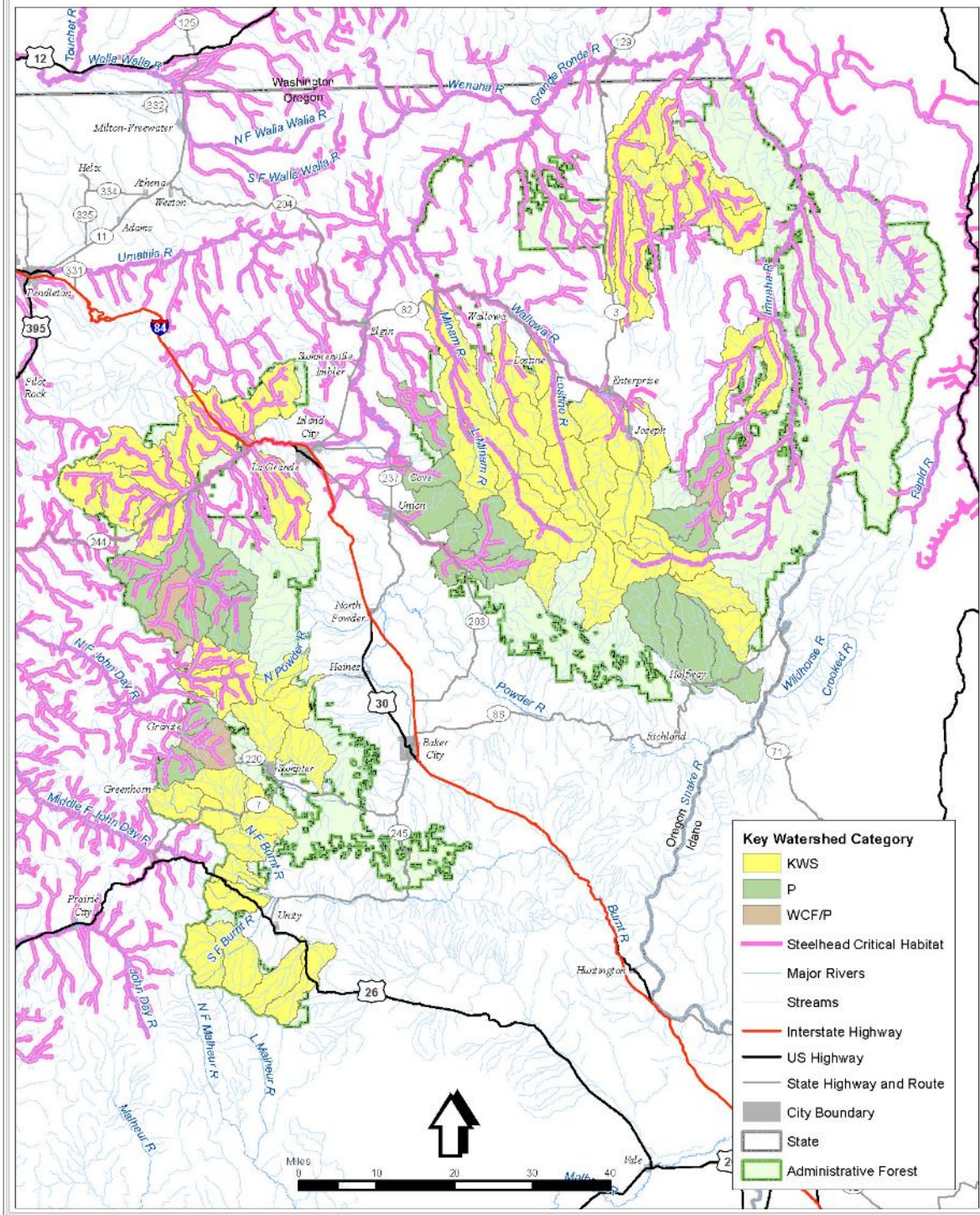


Figure 56. Snake River steelhead designated critical habitat for the Wallowa Whitman NF.

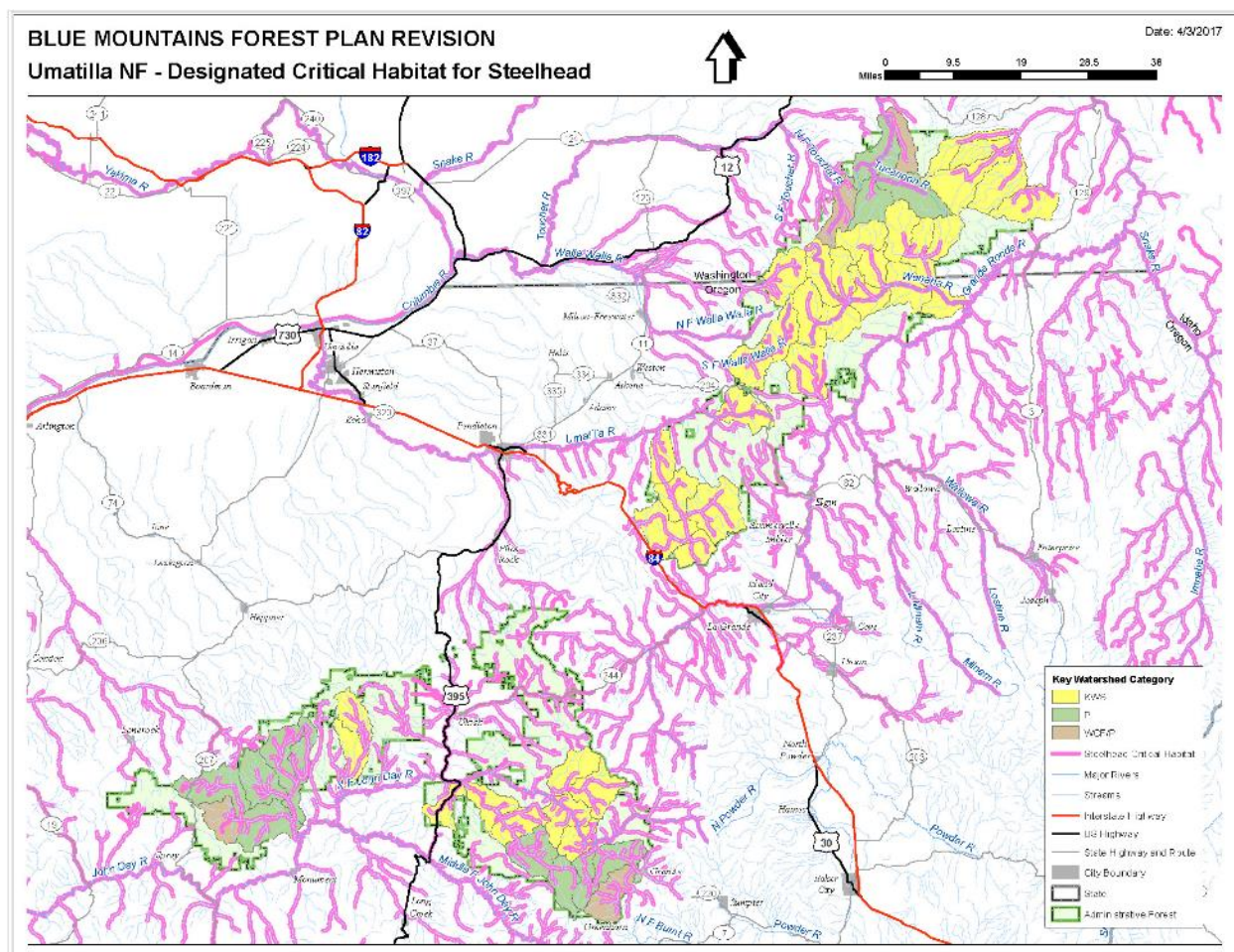


Figure 57. Snake River steelhead designated critical habitat for the Umatilla NF.

Physical and biological Features (PBFs) for Snake River Steelhead

Within the designated critical habitat areas, the PBFs for steelhead are those physical and biological features that are essential to the conservation of a given species, including space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, and rearing of offspring; and habitats that are protected from disturbance or are representative of the historical geographical and ecological distribution of a species.

The PBFs addressed above and the habitat features associated with the PBFs for Snake River spring/summer Chinook salmon appropriate for this Revised Forest Plan are the same for Snake River steelhead. These will not be repeated here.

Factors of Decline and Threats

The primary reasons leading to declines in steelhead numbers in the Snake River basin, and within the planning area, are the destruction or modification of habitat, recreational over-utilization, and natural and human-made factors. These factors acted to reduce steelhead numbers in ways similar to those described above for Chinook salmon. The final rule listing Snake River steelhead identifies these factors of decline

for this species (62 FR 43937). A summary of each factor of decline, including a brief discussion of the Forest Service' influence over each factor is included below:

The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Outside Forest Service influence: Not applicable

Within some level of Forest Service influence: Forestry, agriculture, mining, and urbanization are listed in the final rule as factors that have degraded, simplified, and fragmented habitat. Water diversions for agriculture, flood control, domestic, and hydropower purposes are noted as having greatly reduced or eliminated historically accessible habitat. Loss of habitat complexity has also contributed to the decline of steelhead. Sedimentation from land use activities was specifically mentioned as a primary cause of habitat degradation in the range of this species. These factors are within the control of the Forest Service when they are initiated by the Forest Service, occur on National Forest System land, or require a permit or authorization from the Forest Service.

Over Utilization for Commercial, Recreational, Scientific, or Educational

Outside Forest Service influence: The final rule speaks to recreational fisheries and mentions the problem in the mainstem Columbia River where listed steelhead migrate at the same time and are subject to the same fisheries as unlisted, hatchery produced steelhead, coho, and chinook. The FS is not involved establishing fishery harvest regulations.

Within some level of Forest Service influence: Over utilization for other purposes that could require a Forest Service permit (for example scientific or educational purposes) were not specifically identified in the rule as contributing to the decline.

Disease or Predation

Outside Forest Service influence: The rule mentions a number of diseases, parasites, bacteria, and viruses that steelhead are exposed to that are known to affect steelhead. Increased predator populations exist because of introductions of non-native species and habitat modifications, increasing the level of predation experienced by salmonids in general. Pinniped predation is mentioned as well.

Within some level of Forest Service influence: The Forest Service may influence habitat for non-native species that prey on salmonids.

The Inadequacy of Existing Regulatory Mechanisms

Outside Forest Service influence: The final rule identifies state land management, Army Corps of Engineers, the Federal Clean Water Act, and the programs of these entities, as well as state hatchery and harvest programs, reaching conclusions about the ability of these to affect steelhead and their habitat. These entities and programs are outside the control or discretion of the Forest Service.

The Forest Service, as a Federal agency, has discretion and control over laws and programs that could influence the abundance and survival of anadromous fish populations. However, these would not be just specific to the planning area, but would be agency-wide.

Within some level of Forest Service influence: The rule identifies PACFISH as an attempt to provide a consistent approach for maintaining and restoring aquatic and riparian habitat conditions, which in turn were (at the time) expected to promote sustained natural production of anadromous fish. The rule notes that the long-term limitations of PACFISH had already (in 1997) resulted in lost conservation opportunities for threatened and proposed anadromous fish.

Other Natural or Man-Made Factors Affecting Its Continued Existence

Outside Forest Service influence: The final rule concludes that natural climatic conditions have exacerbated the problems associated with degraded and altered riverine and estuarine habitats. Drought is recognized as having reduced already limited spawning, rearing, and migration habitat.

The rule notes that hatchery programs, implemented in an attempt to mitigate the loss of habitat, have impacted native naturally reproducing stocks through competition, genetic introgression, and disease transmission and may reduce the production and survival of naturally reproducing steelhead.

Within some level of Forest Service influence: Not applicable; the Forest Service does not have discretion over, or control of hatchery or artificial propagation programs.

The threats and limiting factors affecting Snake River steelhead operate across all stages of the life cycle. The threats to the species listed in the Snake River Recovery Plan for steelhead that are tied to the listing threats and factors for decline are described as tributary habitat, predation, competition, disease and exposure to toxic pollutants, and climate change.

The primary tributary habitat limiting factors that will be addressed in this Revised Forest Plan include:

- Impaired fish passage
- Reduced stream complexity
- Excess fine sediment
- Elevated summer water temperatures
- Diminished streamflow during critical periods
- Reduced floodplain connectivity and function
- Degraded riparian conditions

Table 41. Limiting factors and common characteristics used to describe them

Limiting Factor	Common Characteristics	Life Stages Affected
Impaired riparian condition	Loss, degradation, or impairment of riparian conditions important for production of food organisms and organic material, shading, bank stabilizing by roots, nutrient and chemical mediation, control of surface erosion, and production of large-sized woody material.	Egg-to-smolt survival, smolt migration, adult migration, pre-spawning
Reduced floodplain connectivity	Loss, degradation, or impairment of floodplain connectivity; access to previously available habitats (seasonal wetlands, off-channel habitat, side channels); and a connected and functional hyporheic zone. This factor includes reduced overwinter habitat and channel habitat.	Egg-to-smolt survival, smolt migration, adult migration, pre-spawning
Reduced stream habitat quantity/complexity	Loss of structure (wood, boulders, etc.); poor hydrologic function; inadequate quantity or depth of pools; inadequate spawning substrate; and loss of instream roughness, channel morphology, and habitat complexity.	Egg-to-smolt survival, smolt migration, adult migration, pre-spawning
Altered hydrology/water quantity	Changes in the hydrograph that alter the natural pattern of flows over the seasons, causing	Egg-to-smolt survival, smolt migration, and adult migration

Limiting Factor	Common Characteristics	Life Stages Affected
	inadequate flow, scouring flow, or other flow conditions that inhibit the development and survival of salmonids.	
Impaired water quality	Impaired water quality due to abnormal temperature, dissolved oxygen, nutrients from agricultural runoff, heavy metals, pesticides, herbicides and other contaminants (toxic pollutants).	Egg-to-smolt survival, smolt migration, and adult migration
Excess fine sediment	Excessive fine sediment that reduces spawning gravel or increases embeddedness. This is caused by excess fine sediment input to streams and enhanced by inadequate sediment routing.	Egg-to-parr survival
Reduced channel structure/ stability	Loss, degradation, or impairment of channels and streambanks; loss of side and braided channels; a lack of suitable riffles and functional pool distribution.	Egg-to-smolt survival, smolt migration, and adult migration
Impaired fish passage	The total or partial human-caused blockage to previously accessible habitat that eliminates or decreases migration ability or alters the range of conditions under which migration is possible. This may include seasonal or periodic total migration blockage. This includes dams, culverts, thermal barriers, seasonal push up dams, unscreened diversions, and entrainment in irrigation diversions.	Smolt migration, adult migration, and juvenile upstream migration due to thermal blockage or water availability

For more information in relation to limiting factors and specific Oregon Snake River populations, visit the below website to view the Snake River Steelhead Recovery Plan.

http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_Planning_and_implementation/snake_river/snake_river_sp-su_chinook_steelhead.html

Columbia River Basin Bull Trout (*Salvelinus confluentus*)

Distribution and Abundance

The Columbia River bull trout DPS is represented by relatively widespread subpopulations that have declined in overall range and numbers of fish. Bull trout presently occur in about 45 percent of their historical range in the interior Columbia Basin. Declining trends and habitat loss have been documented across their range. Numerous extirpations of local subpopulations have been reported throughout the Columbia River Basin. The Snake River basin is considered a bull trout stronghold by the USFWS, as it is a large area of contiguous habitats.

Within recovery units, the USFWS has identified core areas for recovery. Within the planning area there are 16 core areas identified and one historically occupied core area (Eagle Creek). These recovery units are the major units identified by the USFWS for managing recovery efforts.

Columbia River Basin (CRB) bull trout are found in all the planning area subbasins except for the Burnt River (NWPPC 2004), the Oregon Closed Basins, and the South Fork Crooked River subbasin in the south end of the planning area (Figure 58, Figure 59, and Figure 60). Bull trout core populations (Whitsel et al. 2004) have been generally identified at the subbasin level.

In the Columbia River Basin, and within the Revised Forest Plan, bull trout habitat overlaps with that of the other listed fishes and extends beyond that, higher up in some watersheds and above barriers. Bull trout have more specific habitat requirements compared to other salmonids (Rieman and McIntyre 1993). Water temperature, cover, channel form and stability, valley form, substrates, and migration corridors act to influence bull trout distribution and abundance. Bull trout exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993).

Bull trout exist as a variety of life history forms, freshwater migratory and headwater resident, within the planning area. Migratory bull trout move between their natal streams and larger bodies of freshwater, such as lakes, reservoirs and mainstem rivers, where they can grow much larger than the residents that remain in small colder headwaters as adults. The migratory life history is still present in most of the populations associated with Blue Mountains national forests, but some headwater resident populations have been isolated and are very small due to historical land use impacts. Connectivity among such resident populations is no longer provided by migratory individuals, and these populations are at heightened risk of long-term extirpation.

BLUE MOUNTAINS FOREST PLAN REVISION **Malheur NF - Fish Distribution for Bull Trout**

Date: 4/2/2017

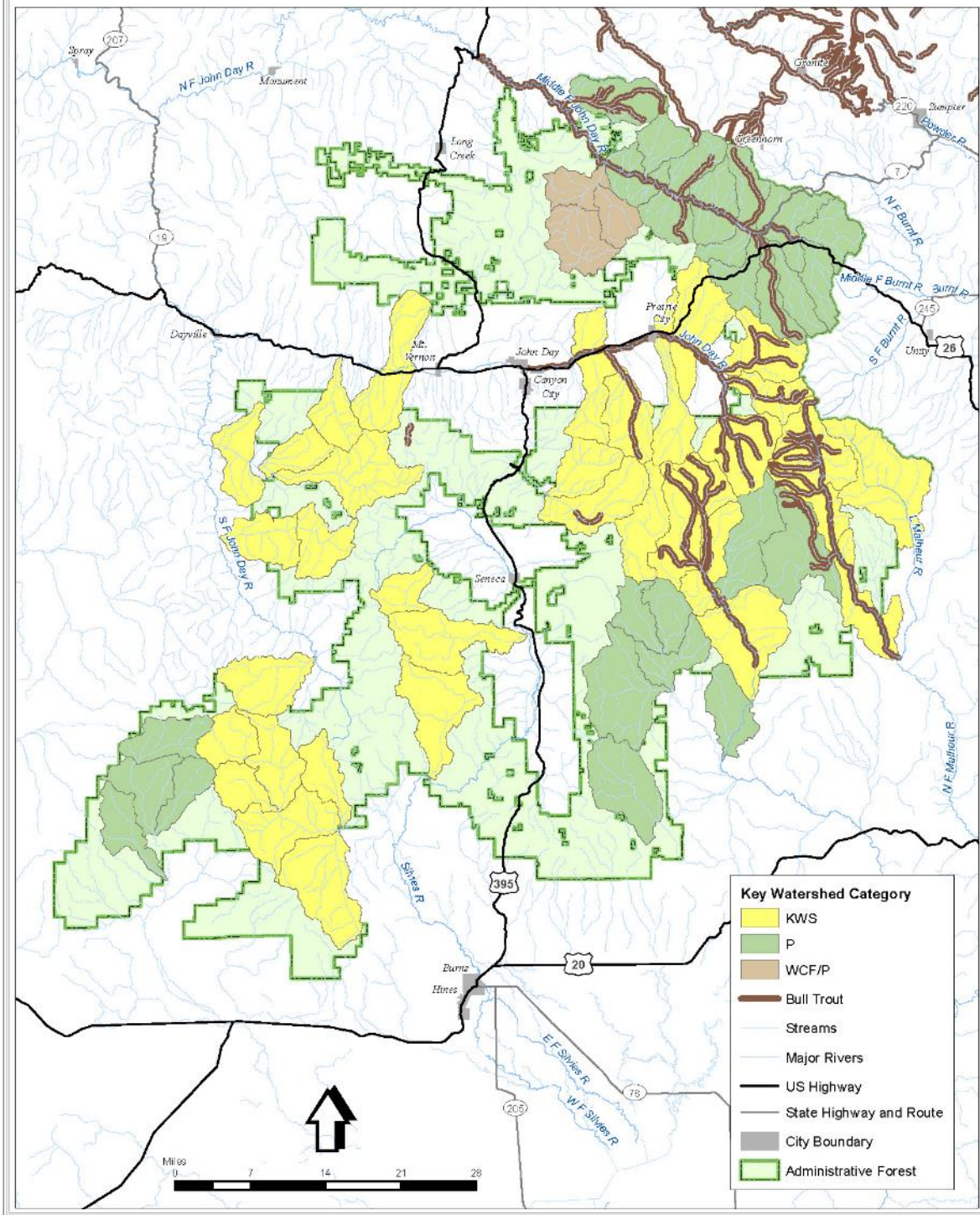


Figure 58. Bull trout distribution for the Malheur NF

BLUE MOUNTAINS FOREST PLAN REVISION

Date: 4/2/2017

Wallowa Whitman NF - Fish Distribution for Bull Trout

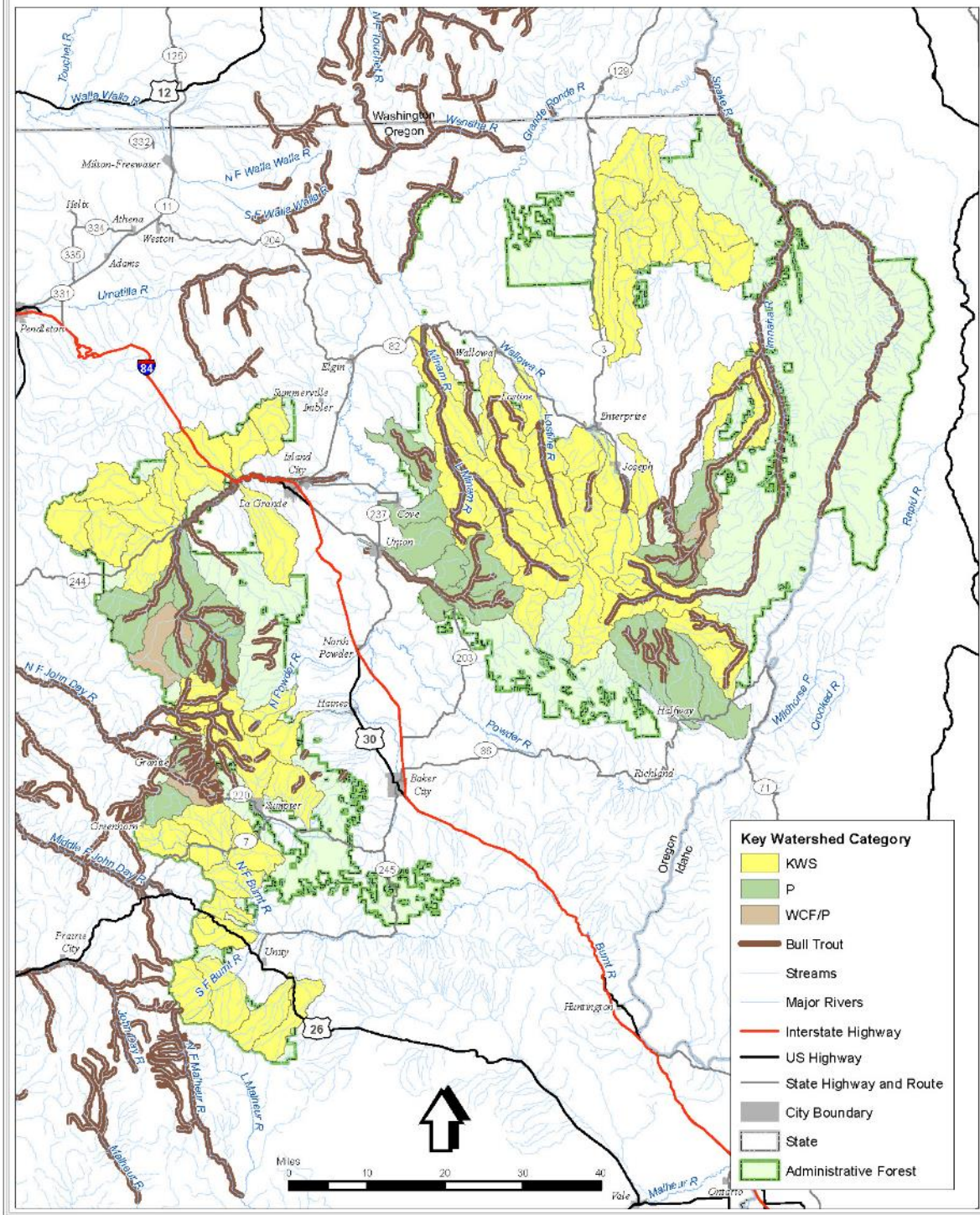


Figure 59. Bull trout distribution for the Wallowa Whitman NF

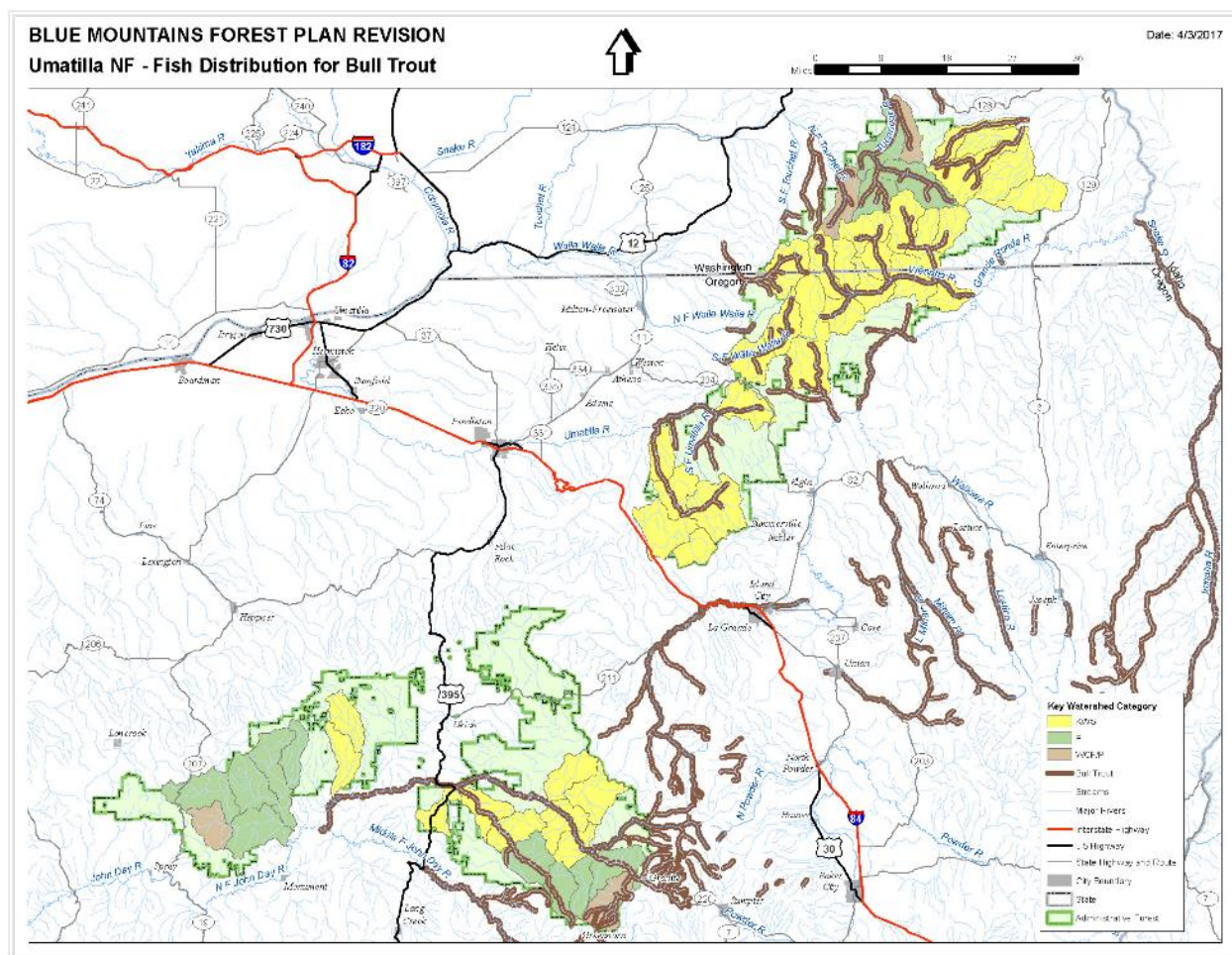


Figure 60. Bull trout distribution for the Umatilla NF

Table 42. Bull Trout designated critical habitat for the planning area

Forest	Subbasin	Watershed	Subwatershed	Category	Total (miles)
Malheur National Forest (MNF)	Middle Fork John Day	Big Creek-Middle Fork John Day River	Big Creek	P	16.02
			Bridge Creek	P	0.13
		Camp Creek-Middle Fork John Day River	Clear Creek	P	12.65
			Mill Creek-Middle Fork John Day River	P	0.39
			Balance Creek-Middle Fork John Day River	P	7.05
			Granite Boulder Creek-Middle Fork John Day River	P	15.36
			Little Boulder Creek-Middle Fork John Day River	P	6.72
			Lower Camp Creek	WCF/P	0.03
	Upper John Day	Grub Creek-John Day River	Vinegar Creek-Middle Fork John Day River	P	11.21
			Castle Creek-John Day River	KWS	3.40
			Indian Creek	KWS	11.84

Forest	Subbasin	Watershed	Subwatershed	Category	Total (miles)
			Strawberry Creek-John Day River	KWS	2.30
			Laycock Creek-John Day River	KWS	4.33
			Reynolds Creek-John Day River	KWS	3.12
			Deardorff Creek	KWS	9.62
			Headwaters John Day River	KWS	24.22
			Reynolds Creek	KWS	16.52
	Upper Malheur	Headwaters Malheur River	Big Creek	KWS	17.58
			Bosonberg Creek-Malheur River	P	12.84
			Cliff Creek-Malheur River	KWS	11.23
			Lake Creek	P	25.16
			Summit Creek	P	14.18
		Upper North Fork Malheur River	Crane Creek	P	7.11
			Elk Creek-North Fork Malheur River	P	10.70
			Skagway Creek-North Fork Malheur River	P	13.89
			Swamp Creek-North Fork Malheur River	P	19.19
MNF Total					284.30
Umatilla National Forest (UNF)	Lower Grande Ronde	Wenaha River	Beaver Creek	KWS	1.58
			Cross Canyon-Wenaha River	KWS	7.84
			Dry Gulch-Wenaha River	KWS	6.64
			First Creek	KWS	1.33
			Lower Butte Creek	KWS	7.16
			Lower Crooked Creek	KWS	7.77
			Lower South Fork Wenaha River	KWS	5.93
			North Fork Wenaha River	KWS	11.73
			Rock Creek-Wenaha River	KWS	7.24
			Upper Butte Creek	KWS	3.61
			Upper Crooked Creek	KWS	5.32
			Upper South Fork Wenaha River	KWS	5.44
	Lower Snake-Asotin	George Creek-Asotin Creek	Charley Creek	KWS	6.87
			Lick Creek	KWS	0.02
			North Fork Asotin Creek	KWS	18.68
			South Fork Asotin Creek	KWS	14.41
			Upper George Creek	KWS	9.42
	Lower Snake-Tucannon	Upper Tucannon River	Cummings Creek	WCF/P	9.56
			Headwaters Tucannon River	P	17.31
			Little Tucannon River-Tucannon River	P	14.87

Forest	Subbasin	Watershed	Subwatershed	Category	Total (miles)
			Panjab Creek	P	20.94
	North Fork John Day	Big Creek-North Fork John Day River	Big Creek	KWS	10.07
			Corral Creek-North Fork John Day River	KWS	7.03
			Glade Creek-North Fork John Day River	KWS	3.88
		Desolation Creek	Headwaters Desolation Creek	P	8.76
			Lower Desolation Creek	KWS	9.27
			Middle Desolation Creek	KWS	4.89
			Upper Desolation Creek	P	7.03
		Granite Creek	Clear Creek	WCF/P	20.91
			Lake Creek	P	0.04
			Lower Granite Creek	P	9.59
		Potamus Creek-North Fork John Day River	West Fork Meadow Brook	KWS	2.86
	Umatilla	Headwaters Umatilla River Meacham Creek	North Fork Umatilla River	KWS	12.33
			Boston Canyon-Meacham Creek	KWS	9.00
			Butcher Creek-Meacham Creek	KWS	3.18
			Camp Creek-Meacham Creek	KWS	6.01
			North Fork Meacham Creek	KWS	11.16
	Upper Grande Ronde	Lookingglass Creek	Little Lookingglass Creek	KWS	5.86
	Walla Walla	Mill Creek-Walla Walla River	Upper Mill Creek	KWS	14.13
		Upper Touchet River	Upper North Fork Touchet River	KWS	18.08
		Upper Walla Walla River	Middle South Fork Walla Walla River	KWS	7.14
			Upper South Fork Walla Walla River	KWS	12.13
UNF Total					367.04
Wallowa-Whitman National Forest (WNF)	Brownlee Reservoir	Pine Creek	Clear Creek	P	23.76
			East Pine Creek	P	27.32
			Fish Creek-Pine Creek	P	19.08
			Lake Fork Creek	KWS	24.74
			Lower North Pine Creek	KWS	18.88
			Upper Pine Creek	P	24.22
	Imnaha	Lower Big Sheep Creek	Lower Little Sheep Creek-Big Sheep Creek	KWS	10.23
		Upper Big Sheep Creek	Carrol Creek-Big Sheep Creek	P	5.68
			Lick Creek	P	10.48
			Salt Creek-Big Sheep Creek	P	10.34
			Steer Creek-Big Sheep Creek	KWS	12.97

Forest	Subbasin	Watershed	Subwatershed	Category	Total (miles)
	Upper Imnaha River		Tyee Creek-Big Sheep Creek	WCF/P	8.26
		Upper Imnaha River	North Fork Imnaha River	KWS	6.81
			Rock Creek-Imnaha River	KWS	5.71
			South Fork Imnaha River	KWS	10.77
			Bare Creek – Imnaha River	HCNRA	0.09
			Chalk Creek- Imnaha River	HCNRA	5.89
			Crazyman Creek – Imnaha River	HCNRA	4.01
			Deer Creek – Imnaha River	HCNRA	12.76
			Dry Creek – Imnaha River	HCNRA	13.33
			Fence Creek – Imnaha River	HCNRA	4.13
			Rock Creek – Imnaha River	HCNRA	2.30
			Summit Creek – Imnaha River	HCNRA	8.71
			Thorn Creek – Imnaha River	HCNRA	11.13
	Snake River		Big Canyon Creek – Snake River	HCNRA	2.90
			Butte Creek Snake River	HCNRA	7.94
			Cache Creek Snake River	HCNRA	5.29
			Corral Creek Snake River	HCNRA	4.40
			Dry Creek Snake River	HCNRA	6.66
			Dug Bar Snake River	HCNRA	7.47
			Eureka Bar Snake River	HCNRA	3.41
			Jim Creek Snake River	HCNRA	7.36
			Kurry Creek Snake River	HCNRA	2.61
			Salt Creek Snake River	HCNRA	3.38
			Sand Creek Snake River	HCNRA	5.56
			Sluice Bar Snake River	HCNRA	10.28
			Sommers Creek Snake River	HCNRA	5.23
			Granite Creek	HCNRA	1.12
	Brownlee	Pine	Lake Fork Creek	HCNRA	1.60
	Imnaha		Lick Creek	HCNRA	5.19
			Lower Little Sheep Creek – Big Sheep Creek	HCNRA	0.04
			Lower North Pine Creek	HCNRA	6.60
			Sheep Creek	HCNRA	1.59
	North Fork John Day	Granite Creek	Bull Run Creek	WCF/P	15.38
			Upper Granite Creek	P	11.84
		Headwaters North Fork John Day River	Baldy Creek-North Fork John Day River	KWS	18.68
			Onion Creek-North Fork John Day River	KWS	12.14
			Trail Creek	KWS	8.51

Forest	Subbasin	Watershed	Subwatershed	Category	Total (miles)
	Powder	Eagle Creek	East Fork Eagle Creek	KWS	15.03
			West Eagle Creek	KWS	9.45
		North Powder River	Upper North Powder River	KWS	10.29
		Upper Powder River	Cracker Creek	KWS	20.93
			Deer Creek	KWS	10.21
	Upper Grande Ronde	Beaver Creek-Grande Ronde River	Spring Creek	KWS	0.00
		Five Points Creek-Grande Ronde River	Lower Five Points Creek	KWS	8.80
			Upper Five Points Creek	KWS	9.16
		Indian Creek-Grande Ronde River	Upper Indian Creek	P	17.79
		Upper Catherine Creek	Little Catherine Creek	P	0.03
			Little Creek	P	0.03
			Milk Creek-Catherine Creek	P	4.56
			North Fork Catherine Creek	P	11.38
			South Fork Catherine Creek	P	12.80
			Chicken Creek	P	7.43
		Upper Grande Ronde River	Limber Jim Creek	P	10.24
			Little Fly Creek	P	5.32
			Lower Fly Creek	P	8.45
			Meadowbrook Creek-Grande Ronde River	P	17.63
			Sheep Creek	WCF/P	12.44
			Tanner Gulch-Grande Ronde River	P	7.04
			Upper Fly Creek	P	0.01
			Warm Springs Creek-Grande Ronde River	P	13.87
	Wallowa	Bear Creek	Lower Bear Creek	KWS	19.60
			Upper Bear Creek	KWS	9.33
		Lostine River	Lake Creek-Lostine River	KWS	7.52
			Lower Lostine River	KWS	9.99
			Silver Creek-Lostine River	KWS	8.71
		Minam River	Chaparral Creek-Minam River	KWS	13.24
			China Cap Creek-Minam River	KWS	8.88
			Little Minam River	KWS	18.62
			Lower Minam River	KWS	10.26
			North Minam River	KWS	1.28
			Trout Creek-Minam River	KWS	8.06
			Upper Minam River	KWS	7.36
		Upper Wallowa River	Hurricane Creek	KWS	8.57
			Wallowa Lake-Wallowa River	KWS	10.74

Forest	Subbasin	Watershed	Subwatershed	Category	Total (miles)
			West Fork Wallowa River-Wallowa River	KWS	1.32
WNF Total					793.34
Grand Total					1,444.68

Designated Critical Habitat

Critical habitat for the Columbia River DPS of bull trout pursuant to the ESA was designated in 2010 (81 FR 7214) (Figure 61, Figure 62, and Figure 63). Critical habitat includes bull trout habitat across the species' range in Idaho, Montana, Oregon, and Washington. Twenty-five critical habitat sub units (CHSU) have been delineated. The areas designated as critical habitat constitute the best assessment of areas essential to the conservation of the Klamath and Columbia River distinct population segments of bull trout. The critical habitat designation identifies those physical and biological features (PFBs) of the habitat that are essential to the conservation of bull trout and that may require special management consideration or protection.

Malheur NF - Designated Critical Habitat for Bull Trout

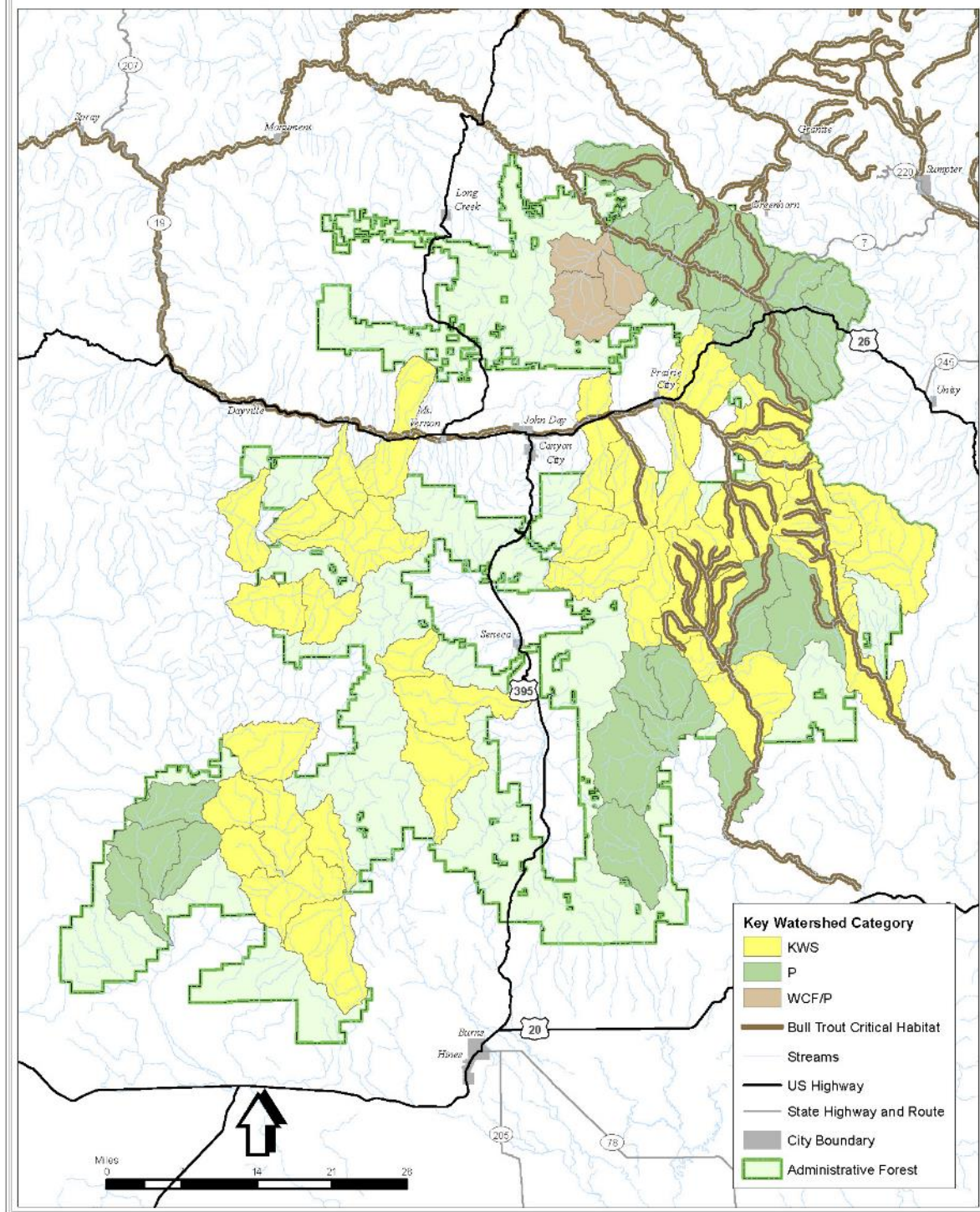


Figure 61. Bull trout designated critical habitat for the Malheur NF

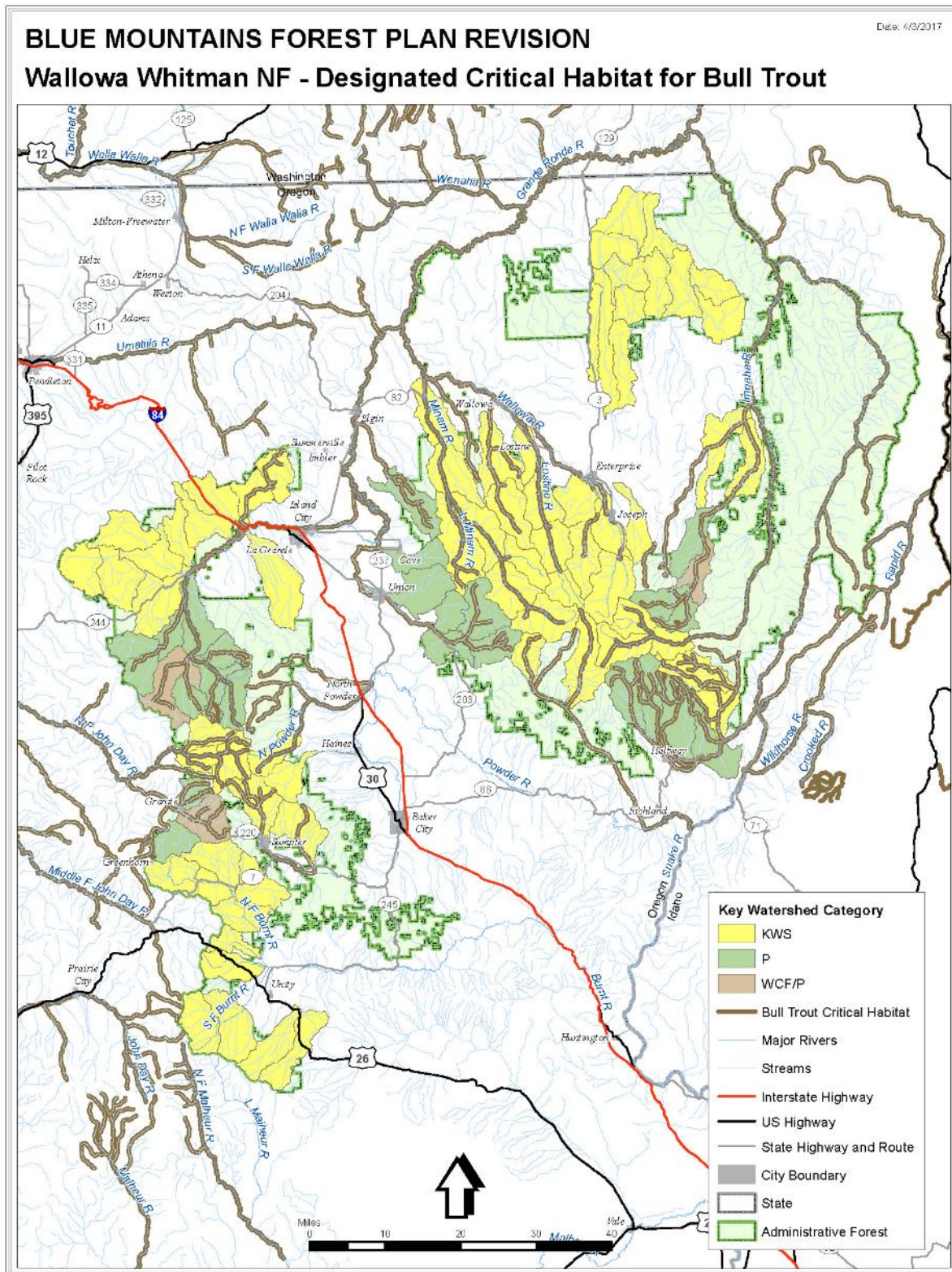


Figure 62. Bull trout designated critical habitat for the Wallowa Whitman NF

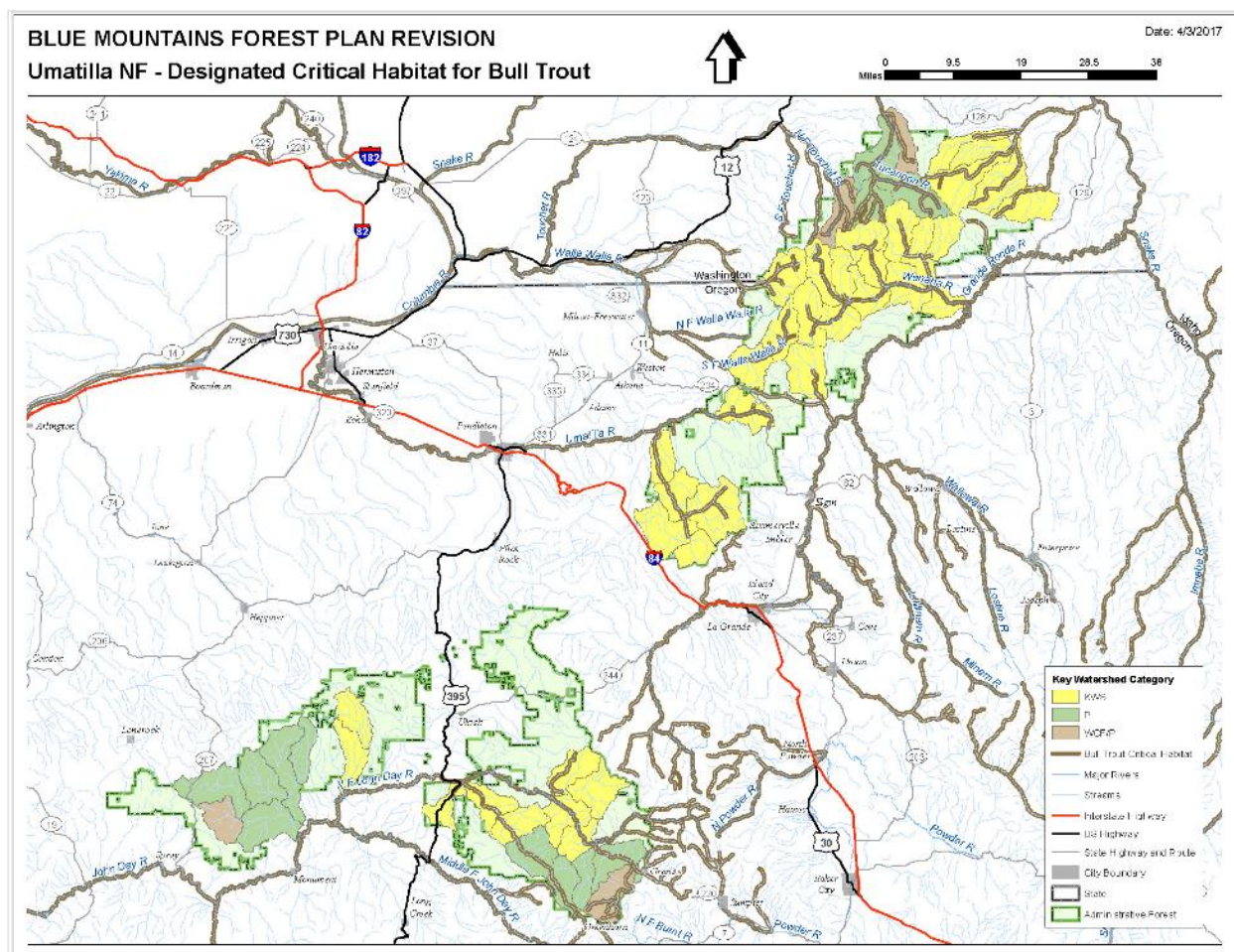


Figure 63. Bull trout designated critical habitat for the Umatilla NF

Physical and biological Features (PBFs) for Bull Trout

Within the designated critical habitat areas, the PBFs for bull trout are those habitat components that are essential for the primary biological needs of foraging, reproducing, rearing of young, dispersal, genetic exchange, or sheltering. Based on current knowledge of the life history, biology, and ecology of this species and the characteristics of the habitat necessary to sustain its essential life-history functions, we have determined that the following PBFs are essential for the conservation of bull trout. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.

- Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.
- An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
- Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks, and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.

- Water temperatures ranging from 2 °C to 15 °C (36 °F to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.
- In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the year, and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.
- A natural hydrograph, including peak, high, low, and base flows within historical and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.
- Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
- Sufficiently low levels of occurrence of non-native predatory (e.g., lake trout, walleye, northern pike, and smallmouth bass); interbreeding (i.e., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

The revised PBF's are similar to those previously in effect under the 2005 designation. The most significant modification is the addition of a ninth PBF to address the presence of nonnative predatory or competitive fish species. Although this PBF applies to both the freshwater and marine environments, currently no non-native fish species are of concern in the marine environment, though this could change in the future.

Note that only PBFs 2, 3, 4, 5, and 8 apply to marine nearshore waters identified as critical habitat. Also, lakes and reservoirs within the critical habitat units (CHUs) also contain most of the physical and biological features necessary to support bull trout, with the exception of those associated with PBFs 1 and 6. Additionally, all except PBF 6 apply to foraging, migration, and overwintering (FMO) habitat designated as critical habitat.

Critical habitat includes the stream channels within the designated stream reaches and has a lateral extent as defined by the bankfull elevation on one bank to the bankfull elevation on the opposite bank. Bankfull elevation is the level at which water begins to leave the channel and move into the floodplain and is reached at a discharge that generally has a recurrence interval of 1 to 2 years on the annual flood series. If bankfull elevation is not evident on either bank, the ordinary high-water line must be used to determine the lateral extent of critical habitat. The lateral extent of designated lakes is defined by the perimeter of the waterbody as mapped on standard 1:24,000 scale topographic maps. The Forest Service assumes in many cases this is the fullpool level of the waterbody. In areas where only one side of the waterbody is designated (where only one side is excluded), the mid-line of the waterbody represents the lateral extent of critical habitat.

In marine nearshore areas, the inshore extent of critical habitat is the mean higher high-water (MHHW) line, including the uppermost reach of the saltwater wedge within tidally influenced freshwater heads of estuaries. The MHHW line refers to the average of all the higher high-water heights of the two daily tidal levels. Marine critical habitat extends offshore to the depth of 10 meters (33 feet) relative to the mean lower low-water (MLLW) line (zero tidal level or average of all the lower low-water heights of the two daily tidal levels). This area between the MHHW line and minus 10 meters MLLW line (the average extent of the photic zone) is considered the habitat most consistently used by bull trout in marine waters based on known use, forage fish availability, and ongoing migration studies, and captures geological and

ecological processes important to maintaining these habitats. This area contains essential foraging habitat and migration corridors such as estuaries, bays, inlets, shallow subtidal areas, and intertidal flats.

Adjacent shoreline riparian areas, bluffs, and uplands are not designated as critical habitat. However, it should be recognized that the quality of marine and freshwater habitat along streams, lakes, and shorelines is intrinsically related to the character of these adjacent features, and that human activities that occur outside of the designated critical habitat can have major effects on physical and biological features of the aquatic environment.

Activities that cause adverse effects to critical habitat are evaluated to determine if they are likely to “destroy or adversely modify” critical habitat by no longer serving the intended conservation role for the species or retaining those PBFs that relate to the ability of the area to at least periodically support the species. Activities that may destroy or adversely modify critical habitat are those that alter the PBFs to such an extent that the conservation value of critical habitat is appreciably reduced. The Forest Service’ evaluation must be conducted at the scale of the entire critical habitat area designated, unless otherwise stated in the final critical habitat rule. Thus, adverse modification of bull trout critical habitat is evaluated at the scale of the final designation, which includes the critical habitat designated for the Klamath River, Jarbidge River, Columbia River, Coastal-Puget Sound, and Saint Mary-Belly River population segments. However, the FWS consider all 32 CHUs to contain features or areas essential to the conservation of the bull trout (75 FR 63898:63901, 63944). Therefore, if a proposed action would alter the physical and biological features of critical habitat to an extent that appreciably reduces the conservation function of one or more critical habitat units for bull trout, a finding of adverse modification of the entire designated critical habitat area may be warranted (75 FR63898:63943).

Factors of Decline and Threats

The final rule listing bull trout identifies the factors of decline for this species (63 FR 31647). A summary of each factor of decline, including a brief discussion of the Forest Service’ influence over each factor is included below:

The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Outside Forest Service influence: Not applicable.

Within some level of Forest Service influence: The final rule listing bull trout identifies dams, forest management practices, livestock grazing, agriculture, and agricultural diversions, and mining as activities that degrade and continue to threaten bull trout and their habitat. Under subheadings for dams, Forest management practices, livestock grazing, agricultural practices, road construction and maintenance, mining, and residential development, the rule details the specifics of habitat degradation from these activities. These factors are within the control of the Forest Service when they are initiated by the Forest Service, occur on NFS land, or require a permit or authorization from the Forest Service.

In the planning area, bull trout passage and migration are prevented or inhibited at some hydroelectric, flood-control, or irrigation dams. The long lasting adverse effects from past timber management activities and roads are a continuing threat to bull trout because of their effect on habitat conditions. Although Forest practices have been altered recently to improve protection of aquatic resources, the consequences of past activities continue to affect bull trout and their habitat.

Over-utilization for Commercial, Recreational, Scientific, or Educational

Outside Forest Service influence: Although restrictive fishing regulations have been instituted by states, with observations of increased numbers of adult bull trout in some areas seen as a result, illegal harvest

and incidental harvests still continue to threaten bull trout. The rule concludes that over-harvest historically likely contributed to the decline of Columbia River bull trout.

Within some level of Forest Service influence: Not applicable; the Forest Service is not involved establishing fishery harvest regulations.

Disease or Predation

Outside Forest Service influence: Disease or predation was not thought to be a major factor affecting bull trout.

Within some level of Forest Service influence: Not applicable; these factors are beyond the control or discretion of the Forest Service.

The Inadequacy of Existing Regulatory Mechanisms

Outside Forest Service influence: The final rule notes that Federal laws designed to conserve fishery resources, maintain water quality, and protect aquatic habitat have not prevented past and ongoing habitat degradation.

Within some level of Forest Service influence: The rule discusses the NFMA, existing Forest Plans, ICBEMP, PACFISH, and INFISH, as well as other entities and their programs outside of the Forest Service, such as the CWA, state regulations, and conservation planning efforts. The general conclusion is that these have not adequately protected salmonid habitat on Federal lands, and recovery of degraded lands has not occurred as predicted. Policies put in place to address anadromous fish concerns and other efforts have not been successful at removing threats to bull trout.

The Forest Service, as a Federal agency, has discretion and control over laws and programs that could influence the abundance and survival of anadromous fish populations. However, these would not be just specific to the planning area, but would be agency-wide.

Other Natural or Man-Made Factors Affecting Its Continued Existence

Outside Forest Service influence: The bull trout final rule concludes that negative effects of interactions with introduced non-native species may be the most pervasive threat to bull trout in the Columbia Basin.

Within some level of Forest Service influence: The bull trout final rule identifies introductions of non-natives that compete or hybridize with bull trout, fragmentation and isolation of subpopulations due to habitat changes caused by human activities, and subpopulation extirpations due to naturally occurring events (droughts and floods) as factors affecting the continued existence of bull trout.

The Forest Service has some control and discretion over some aspects of human activities that could contribute to declines associated with fragmentation and isolation. These factors are within the control of the Forest Service when they are initiated by the Forest Service, occur on NFS land, or require a permit or authorization from the Forest Service.

Summary

Based on our most recent status review (USDI Fish and Wildlife Service 2008), historical habitat loss and fragmentation, interaction with nonnative species, and fish passage issues are widely regarded as the most significant primary threat factors affecting bull trout. The order of those threats and their potential synergistic effects vary greatly by core area and among local populations, and is described in greater detail in the recovery unit implementation plans (RUIPs) for each of the six recovery units included in this recovery plan. In some core areas within their extant range, bull trout experience no major threats and

maintain healthy populations throughout most or all available habitat; some bull trout core areas experience limited but significant threats, but still retain strong populations in most available habitat; and some continue to experience severe and systemic threats and harbor relatively small populations that have been reduced to a limited portion of available habitat.

For more information specific to threats in relation to core areas please visit the USFWS web site: <https://www.fws.gov/pacific/bulltrout/Planning.html>

Effects of the Action on Listed and Critical Habitat

Under section 7(a)(2) of the ESA, "effects of the action" refers to the direct and indirect effects of an action on the species or critical habitat, with the effects of other activities interrelated or interdependent with that action. Indirect effects are those caused by the action and are later in time, but still are reasonably certain to occur (50 CFR 402.02).

For purposes of consultation under Section 7 of the ESA, the "action area" is defined by 50 CFR 402.02 as "all areas to be affected directly or indirectly by the proposed action and not merely the immediate area involved in the action."

The Revised Forest Plan includes plan components; desired conditions, objectives, suitability of areas, special areas, monitoring, and standards and guidelines that promote 'passive' restoration of aquatic habitat. The effects discussion will assess the contribution implementing the Revised Forest Plan will meet the national forests' obligation to further the conservation of threatened, endangered, and proposed species (ESA Section 7 (a)(1)); and assess the potential future effects implementing the plan may have on threatened, endangered, and proposed (TEP) species and critical habitat (ESA Section 7 (a)(2)).

The Revised Forest Plan will have no direct effects as it is a programmatic action that is not tied to a specific place or location and does not authorize site-specific projects. Forest Plans influence what might or might not be proposed in the future and the nature of those actions.

The Revised Forest Plan, through the designation of management areas (MAs), identifies what types of management activities will be emphasized on different portions of the forests. The decision, or 'Federal action' to designate the MAs will have no direct effects on listed fish species or their critical habitat. The Revised Forest Plan components describe the management intent and sideboards placed on management activities either Forest-wide or specific to a MA. The Revised Forest Plan components include the Blues ARCS that will replace the current direction provided by PACFISH and INFISH. This BA assesses the MAs and plan components, in particular the plan components contained in the Blues ARCS, for their conservation value to listed species and potential effects (indirect effects of the Revised Forest Plan) to listed species that may occur during future implementation of the Revised Forest Plan. Because the Revised Forest Plan is programmatic in nature and does not authorize any actions, no take can be specifically reasonably certain to occur by adopting the Revised Forest Plan; and any future land management activities that occur through implementing the Revised Forest Plan will be subject to ESA section 7(a)(2) consultation; the Revised Forest Plan is considered a *framework programmatic action* (80 FR 26832).

This section will address the Blues ARCS effects first and then the plan components and program areas specifically not addressed in the effects analysis of the Blues ARCS.

The Blues ARCS, with a more comprehensive set of desired conditions, standards and guidelines, and objectives than included in PACFISH and INFISH, is expected to be more effective at restoring ecologically healthy watersheds, riparian, and aquatic habitats. Appendix B provides a detailed side-by-side comparison of PACFISH and INFISH with the Blues ARCS.

The Blues ARCS addresses important aspects of Recovery Plans for Snake River steelhead, Chinook salmon, Mid-Columbia River Steelhead and Columbia River Basin bull trout. The Blues ARCS also provides the basis for long-term viability of the species providing for protection for the freshwater life history stages and the habitat that support those life history stages.

Blue Mountains Aquatic and Riparian Conservation Strategy (Blues ARCS) Effects

The Blues ARCS was developed based upon the U.S. Forest Service ARCS and is consistent with the Interior Columbia Deputy Team's documents; *Interior Columbia Strategy, A Strategy For Applying The Knowledge Gained By The Interior Columbia Ecosystem Management Project To The Revision Of Forest and Resource Management Plans* and *A Framework for Incorporating the Aquatic and Riparian Component of the Interior Columbia Basin Strategy into BLM and Forest Service Plan Revisions*. The Blues ARCS Plan components, including desired conditions, standards and guidelines, objectives, the designation of riparian management areas and key watersheds, the identification of suitable uses within RMAs, and monitoring provide a comprehensive approach for conserving and recovering populations of the listed species within the planning area and meeting the Clean Water Act. Consistent with the ARCS, the Blues ARCS has been developed to maintain and restore healthy watersheds, riparian areas and stream channels that are resilient to natural disturbance. Natural disturbances such as wildfire, large storms and subsequent floods, hillslope failures, landslides, debris flows, and channel migration create a mosaic of habitat conditions over time and space that native fish populations have adapted to. The Blues ARCS also was developed recognizing that streams and aquatic ecosystems are linked to the dynamics of both the riparian and upland communities, and the watershed and physical processes that shape them.

The Blues ARCS has five specific sections that provide protection and restoration guidance for listed fish and their habitats. These sections of the Blues ARCS are assessed for their contribution to reducing threats and providing conservation measures to listed fish and their habitats.

Desired Conditions

The Forest-wide desired conditions, standards and guidelines are to work in concert with the Plan components for key watersheds and RMAs to establish the general direction and sideboards for managing for healthy watersheds and contribute to the viability of native aquatic and riparian species during Revised Forest Plan implementation.

The desired conditions stated in the Revised Forest Plan provide a comprehensive description of the intent of the Revised Forest Plan to provide for the ecological integrity of watersheds, riparian, and aquatic habitats; a goal of the Revised Forest Plan. To be consistent with Revised Forest Plan desired conditions, a project or activity, when assessed at the appropriate spatial scale described in the Revised Forest Plan (each desired condition specifies the scale to be assessed at; subwatershed, watershed, and subbasin), must be designed to meet one or more of the following conditions:

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

All management activities implemented during the life of the Revised Forest Plan must be designed to maintain desired conditions when within them and/or move toward them.

PACFISH and INFISH contains eight goals that established an expectation of the characteristics of healthy, functioning watersheds, riparian areas, and associated fish habitats. Since the quality of water and fish habitat in aquatic systems is inseparably related to the integrity of upland and riparian areas within the watershed, PACFISH and INFISH identified eight Goals for watershed, riparian, and stream channel conditions. These goals were to:

1. Maintain or restore water quality, to a degree that provides for stable and productive riparian and aquatic ecosystems
2. Maintain or restore stream channel integrity, channel processes, and the sediment regime (including the elements of timing, volume, and character of sediment input and transport) under which the riparian and aquatic ecosystems developed.
3. Maintain or restore instream flows to support healthy riparian and aquatic habitats, the stability and effective function of stream channels, and the ability to route flood discharges
4. Maintain or restore natural timing and variability of the water table elevation in meadows and wetlands.
5. Maintain or restore diversity and productivity of native and desired non-native plant communities in riparian zones.
6. Maintain or restore riparian vegetation, to:
 - a. Provide an amount and distribution of large woody debris characteristic of natural aquatic and riparian ecosystems;
 - b. Provide adequate summer and winter thermal regulation within the riparian and aquatic zones; and
 - c. Help achieve rates of surface erosion, bank erosion, and channel migration characteristic of those under which the communities developed.
7. Maintain or restore riparian and aquatic habitats necessary to foster the unique genetic fish stocks that evolved within the specific geo-climatic region.
8. Maintain or restore habitat to support populations of well-distributed native and desired non-native plant, vertebrate, and invertebrate populations that contribute to the viability of riparian-dependent communities.

The Revised Forest Plan desired conditions collectively replace the PACFISH and INFISH goals listed above. The crosswalk found in Appendix B illustrates that each goal is replaced with multiple desired conditions. For example, the Revised Forest Plan replaces PACFISH/INFISH goal #2 (maintain or restore stream channel integrity, channel processes, and the sediment regime under which the riparian and aquatic ecosystems developed) with 17 desired conditions that address connectivity, aquatic habitat, woody debris, surface erosion, and more. It also includes a desired condition to address climate change (aquatic habitat function DC-8) that the original strategies did not include.

The Revised Forest Plan desired conditions for riparian management areas, riparian function stream channel function water quality, water use, federally listed species, aquatic habitat function, soil quality, roads and trails, hydrologic function, wetland function, groundwater dependent ecosystem function, invasive species, and species diversity are described fully with the intent of providing protection to listed fish species and their designated critical habitat to a greater degree than the goals of PACFISH and INFISH (refer to crosswalk in Appendix B).

For example, Federally Listed Species DC-1 is an important, overarching desired condition that states the Revised Forest Plan should recover or delist federally listed species through direction for management activities to improve the conservation of listed species and designated habitat. This desired condition also

states critical habitat components (PBFs) are protected and restored to achieve species recovery. This and other desired conditions go beyond what is in the interim PACFISH/INFISH strategies and reinforces our agencies Section 7(a) (1) responsibility of furthering the conservation of endangered and threatened species.

In addition to the Federal Listed Species DC-1, the Revised Forest Plan includes other key desired conditions that have no direct counterpart goals in PACFISH/INFISH and are a benefit to Chinook, steelhead, and bull trout conservation. These include:

- ***Aquatic Habitat Function DC-1:*** Aquatic habitats contribute to ecological conditions capable of supporting self-sustaining populations of native species, and diverse plant, invertebrate, vertebrate aquatic and riparian-dependent species;
- ***Aquatic Habitat Function DC-5:*** Native fish species have access to historically occupied aquatic habitats and connectivity between habitats allows for the interaction of local populations;
- ***Aquatic Habitat Function DC-8:*** Aquatic and riparian ecosystems are resilient to the effects of climate change and other major disturbances;
- ***Species Diversity DC-2:*** Population strongholds for the fish surrogate species provide high quality habitat and support expansion and recolonization of species to adjacent unoccupied habitats;
- ***Wetland Function and Groundwater-dependent Ecosystem Function DC-5:*** Vegetation is composed of the anticipated cover of plant species associated with the site environment; hydric species are present and are not replaced by upland species. Livestock herbivory and trampling are not adversely affecting sites; and
- ***Water Quality DC-2:*** The quality of water within and emanating from the national forests is sufficient to provide for state-designated beneficial uses, including human uses and meets applicable local, state, and tribal water quality criteria. This desired condition provides additional protection through the standards and guidelines to implement the desired conditions over and above PACFISH and INFISH.

As described previously, when a project is developed it must meet one or more set of conditions when determining how to maintain or move toward desired conditions. One of these conditions state that a project can adversely affect the progress toward or maintenance of one or more desired conditions in the short-term. While a decision maker must weigh the risk of short-term effects to achieve longer term desired conditions, their decisions must also be consistent with other Revised Forest Plan components. Specially, RMA-1S and WM-1S state that if aquatic or other pertinent conditions are within those desired conditions then they must be maintained. This guidance also states that when the baseline is outside of desired conditions, projects must restore or not retard attainment of desired conditions to the degree that project contributes to it. When short-term effects occur, a project must demonstrate how these effects will help support and not diminish long-term recovery of watershed function desired conditions and federally listed species.

Key watersheds are intended to provide high-quality habitat or water for rare aquatic and riparian species, and/or provide high-quality drinking water to municipal water sources. RMAs are also areas where aquatic and riparian-dependent resources receive primary emphasis and management activities must be designed to benefit those resources. In these areas, projects must be designed to provide high-quality habitat for aquatic species, other aquatic or riparian resources. This means aquatic resource desired conditions must be emphasized over others unless those desired conditions help to achieve the intent of the key watershed or RMA.

Riparian Management Areas

The Revised Forest Plan RMAs are similar to PACFISH and INFISH riparian habitat conservation areas (RHCAs) in that this management area (MA) overlays all other MAs. As a result, RMA plan components apply anywhere there are aquatic (streams, lakes, ponds, wetlands, etc.) features and unstable or potentially unstable terrain. RMAs are used as the primary framework (coarse filter) to provide for riparian and aquatic ecosystem diversity by conserving ecological processes at the landscape and watershed scales; a goal of the Revised Forest Plan.

It needs to be emphasized that RMAs are not “no-touch” buffers. It is fully expected that the majority of management activities (e.g., the exclusion of livestock grazing), especially those designed to benefit aquatic and riparian-dependent resources and move the landscape towards desired conditions, are allowed and encouraged within them. A wide range of management activities, involving highly-varied prescriptions, are expected to occur within RMAs. However, management activities must be designed to meet applicable standards and guidelines. Management is guided by seven desired conditions specific to RMAs as well as eleven other desired conditions (Wetland DC-1 and 2; Groundwater Dependent Ecosystems DC-1 and 3; Stream Channel Function DC-2, 4, 5, 8, and 10; and Aquatic Function DC-6 and 7). Management is also guided by 35 standards and 32 guidelines that address a boarder array of management activities than the PACFISH and INFISH strategies. These strategies contained 40 PACFISH and 39 INFISH standards and guidelines (strategies did not distinguish between standards and guidelines).

For example, two key standards (WM-1S and RMA-1S) improve upon the concept of not retarding attainment of RMOs under the PACFISH and INFISH strategies. As described previously, the Blues ARCS replaces RMOs with a set of desired conditions. When projects are developed, interdisciplinary teams (IDTs) must first determine what the baseline conditions are within the project planning area to see if they are within or outside of desired conditions. If aquatic or other pertinent conditions are within those desired conditions then they must be maintained. In other words, project effects would cause no change to the existing conditions relative to their range or the concepts described in desired condition statements. So to be consistent with RMA DC-2, project effects would need to ensure they didn’t impact key riparian processes and conditions so they would operate outside of natural disturbance regimes. Another example is how a project would **not** be consistent with these standards if adverse effects caused existing condition to go into a different condition status (e.g., properly functioning to functioning at risk) as defined by the matrix of pathways and indictors, or if they did not meet the intent of a desired condition statement. Such actions would change existing conditions to one that is measurably worse and thus would not maintain those desired condition. When the baseline is not within desired conditions, projects must restore or not retard attainment of desired conditions to the degree that project contributes to it. Short-term adverse effects from project activities may occur when they support or do not diminish long-term recovery of watershed function desired conditions. For example, in a range allotment where bank stability is impaired/functioning at risk, IDTs should evaluate if current grazing along the greenline is not allowing development of deep rooted plants to hold the banks together, leading to the impaired condition. If the IDT found that grazing was causing the impairment, then recommendations to change grazing practices would be made to the decision maker so these indicators can trend toward properly functioning conditions over time. If corrections were not made, then the project would not meet the intent of the two standards because grazing would be measurably slowing the natural rate of recovery and thus retarding attainment of desired conditions. Short-term adverse effects from projects may occur when they support or do not diminish long-term recovery of watershed function desired conditions and federally listed species. This acknowledges that short-term adverse project effects may be acceptable to move toward desired conditions and recovery of listed aquatic species. However, short-term effects need to be evaluated and weighed carefully in relation to the environmental baseline and status of the local fish populations before

project-specific actions are authorized. Decision makers must determine if the risk of short-term habitat and species effects are acceptable. Will these adverse effects be of an acceptable duration given current baseline conditions to eventually achieve improved watershed conditions and self-sustaining natural processes? Determining short-term effects to individual parameters for the sake of long-term recovery of overall watershed function will be determined on project-by-project based upon best-available science and professional judgement by Forest hydrology and fisheries specialists.

Finally, there can be some situations where Forest Service has limited authorities (e.g., Alaska National Interest Lands Conservation Act {ANILCA}, the General Mining Act of 1872, valid state water rights, etc.) to completely avoid effects that retard attainment of desired conditions. In those cases, project effects shall be minimized to the greatest extent possible within our agencies' authorities.

Specific standards and guidelines used to guide management actions to achieve the above desired conditions and outcomes are described further in Section 4.3 Program Direction under individual programs.

The Blues RMA delineation follows the ARCS approach to riparian area management. Relatively large default RMAs are established to protect and restore water quality, and provide for a wide range of aquatic and terrestrial habitats, species, and critical ecological processes. As stated in the ARCS, the scientific basis for the size of the RMAs was originally established in FEMAT (1993). Everest and Reeves (2007) later concluded that there was no scientific evidence that either the default vegetation prescriptions or the options for watershed analysis in the NWFP (USDA and USDI 1994) provide more protection than necessary to meet stated riparian management goals.

The designated widths of Revised Forest Plan RMAs are similar to the PACFISH and INFISH RHCAs with two notable differences: 1) lakes and natural ponds RMA widths are at least 300 feet compared to PACFISH and INFISH riparian width of 150 feet; and 2) RMA widths for all seasonally flowing or intermittent streams, wetlands, seeps, and springs less than one acre are at least 100 feet; compared to the existing INFISH direction of 100 feet in priority watersheds, and 50 feet in non-priority watersheds. The increase in RMAs, compared to the PACFISH and INFISH direction recognizes the importance of these areas for maintaining watershed function and protecting downstream aquatic habitat as well as associated riparian dependent species.

Reeves et al. (2016) provide a review of the current science surrounding riparian functions and processes. As they state, and described in USDA and USDI (1994), most of the key ecological processes needed to be maintained within RMAs occur within a distance equal to one site potential tree height from a stream or the floodplain (when present), including the beneficial effects of root strength for bank stability, litter fall, shading to moderate water temperature, and delivery of coarse wood to streams. Most of the moderating effects of sediment delivery to streams from overland erosion that may be produced by upland management activities generally occurs within a distance of one site potential tree. Similarly, an extensive literature review by Sweeney and Newbold (2014) of stream side buffers and concluded, overall, buffers equal to or greater than 30 meters (98 feet) wide are needed to protect the physical, chemical, and biological integrity of small streams. Sweeney and Newbold (2014) also found that sediment trapping was approximately 65 and approximately 85 percent for a 10- and 30-meter buffer, respectively, concluding that the increased sediment removal attained by wider buffers may be a small fraction of the total sediments (by mass), but probably a large fraction of the finer silts and clays, which are typically released from narrow buffers in concentrations high enough to impair water quality.

As explained in Reeves et al. (2016), the extension of the riparian reserve boundary in the Northwest Forest Plan (as can likely be said for PACFISH/INFISH), from one site-potential tree-height to two on fish-bearing streams, was to protect and enhance the microclimate of the riparian ecosystem within the

first tree-height. Reeves et al. (2016) conclude, in some cases, one-site potential tree buffer may be enough to ameliorate increases in microclimate due to management activities, especially timber harvest. There are also concerns for decreasing the extent of the riparian reserves and the effects on stream temperatures (Reeves et al. 2016).

As described in the ARCS section of this BA, RMA boundaries can only be changed when completing watershed analysis. It is unlikely that watershed analysis will be conducted only for the sake of adjusting RMA widths. Therefore, adjustments to RMA are likely to occur infrequently and default boundaries would remain in place. In the rare circumstances where watershed analysis is completed with the intent of changing RMA boundaries, the analysis must consider the important ecological processes (active stream channel, extent of riparian vegetation, site potential tree height, stream shade, etc.). In these situations default RMA boundaries will likely be maintained or expanded upon closer examination of floodplain widths, outer edge of riparian vegetation, or other factors. However, in the unlikely event that boundaries are reduced to better reflect these factors, then ESA-listed fish and their critical habitats will still be given a high level of protection through forest plan guidance (e.g., WM-1S, RMA-1S, TM-1S) and priority emphasis will still be given to aquatic and riparian dependent species as part of any RMA adjustment.

Given the above, plus the uncertainties, and that at a minimum an approximately 100 foot distance is needed to filter most but not all sediment delivered to streams via overland flow, the RMAs in the Revised Forest Plan, with the associated desired conditions, standards, and guidelines, plus standards and guidelines for specific management activities and programs, represent a precautionary approach for managing RMAs to protect fish habitat water quality and critical habitat PBFs. The RMAs will be equally as protective as the RHCAs of PACFISH and INFISH and allow for careful management within RMAs to achieve riparian, aquatic, and landscape scale desired conditions while protecting the important ecological processes.

The Revised Forest Plan increases the RMAs along all non-fish bearing intermittent streams than currently designated by PACFISH and INFISH. All the ecological functions for which the RMAs are established for fish-bearing streams also apply to intermittent streams (Reeves et al. 2016). The RMA width of 100 feet or one site potential tree, plus protection of landslide prone areas, should be protective of those ecological functions.

The Revised Forest Plan RMAs, including the desired conditions, standards, and guidelines, are designed to protect and restore the important watershed and ecological processes necessary to provide naturally functioning aquatic habitat. Collectively, these standards and guidelines substantially reduce management impacts and help address limiting factors (e.g., excess sediment, reduced floodplain connectivity, impaired fish passage, reduced stream complexity, and degraded riparian areas) in tributary habitat identified in the steelhead trout, Chinook, and bull trout recovery plans. As such, RMAs are expected directly support critical habitat PBFs. The RMA plan components should, by guiding forest management activities to maintain natural ecological process on each Forest, contribute to providing high water quality to listed species critical habitat downstream of the Forest boundaries.

The PACFISH and INFISH strategies adopted riparian management objectives (RMOs) within RHCAs to provide criteria against which attainment or progress toward attainment of the riparian goals would be measured. RMOs provided conditions which land managers would strive to achieve as they conducted management activities across the landscape in the absence of ecosystem analysis. RMOs were not intended to establish a ceiling for what constitutes good habitat conditions. However, RMOs did provide a benchmark so management actions would not reduce habitat quality and a way to gage inconsistency with the purpose of the interim direction.

The Blues ARCS does not contain RMOs. Instead the Revised Forest Plan will use watershed condition indicators (WCIs) within the 1996 National Marine Fisheries Service (NMFS) and 1998 U.S. Fish and

Wildlife Service (USFWS) matrix of pathways and indicators (MPIs) in drainages that support listed or proposed fish and/or their designated/proposed critical habitat. The Revised Forest Plan will also use either the 12 core indicators within the Forest Service watershed condition framework (WCF) and/or the MPIs within drainages that do not support listed or proposed fish species. Like RMOs, WCIs do not to establish a ceiling for what constitutes good watershed and aquatic conditions. However, they do provide quantitative and qualitative diagnostic criteria to assist in evaluating attainment or progress towards aquatic and riparian desired conditions, and compliance with key standards and guidelines. Measurable WCIs provide a benchmark by which changes to landscape conditions resulting from management activities and natural processes can be measured over time. Attainment of these desired conditions is expected to result in diverse and complex habitats capable of providing the combination of habitat features important for the life-history requirements of the native fish communities, including ESA listed fish, and the dynamic ecological processes that sustain them over time. This approach is outlined in Attachment B of Appendix A.

Management of RMAs will need to show progress toward the desired conditions. Any management within RMAs would have to be designed specifically for the benefit of aquatic and riparian dependent resources.

Watershed Analysis

As described Section 2.5 (ARCS), watershed analysis will be updated or conducted prior to:

- Implementation of substantial aquatic or terrestrial restoration programs or projects in potential WCF priority watersheds;
- Proposed timber salvage or construction of facilities in RMAs;
- Construction of permanent system roads in RMAs; and
- Proposed changes to RMA widths must be supported by a watershed analysis. It is expected that RMA widths will not be less than described in the designating riparian management areas section.

Watershed analysis within the Blue Mountains has been completed on 3.6 million of 5.5 million (83 percent) of the administered acres. Of the 1.8 million acres without watershed analysis, 859,500 (16 percent) acres are within wilderness or inventoried roadless areas where there is less active management. While most of the three forests are covered by watershed analyses, it is recognized the assessment are dated and may no longer characterize some current conditions. It is anticipated that some older watershed analyses will have narrowly focused updates based on the above criteria. Updates should refine critical components that do not address current issues, resource conditions, science and policy, and/or reflect contemporary management opportunities.

For example, watershed analysis will be updated or developed when substantial aquatic or terrestrial restoration programs occur in WCF priority watersheds. At this time, nine subwatersheds (Tyee-Big Sheep and Sheep creeks in the Imnaha subbasin; Lick, Lower and Upper Camp creeks in the Middle Fork John Day subbasin; Clear and Upper Big Wall creeks in the North Fork John Day subbasin; Cummings Creek in the Walla Walla subbasin; and Bull Run Creek in the North Fork John Day subbasin) have been identified as WCF priorities. Once all essential projects are completed within these areas, another set of priority subwatersheds will be selected and watershed analysis completed. While completion of essential projects and development of new WFC priority subwatersheds is funding dependent, it is possible that 15-30 (assuming one every two years) areas could have WFC related watershed analyses.

Watershed analysis should lead to more informed Watershed Restoration Action Plans (WRAPs) by identifying limiting factors and important areas and activities that could be taken or avoided to protect and restore watershed conditions. These products should help align restoration actions with relevant restoration/recovery plans (e.g., ESA-recovery plans and State restoration plans for impaired waters).

Like the PACFISH/INFISH strategies, RMA widths will be maintained unless modified by watershed analysis, which would provide the ecological basis for the change. One difference from PACFISH/INFISH is that the ARCS does not allow adjustments to RMA boundaries through a site-specific analysis. This will restrict the number of situations that adjustments to RMA widths are likely to occur.

The watershed analysis criteria above provides greater analysis requirements than the PACFISH and INFISH strategies. This is because the interim strategies only required watershed analysis when salvage logging and facility/road construction occurred in riparian habitat conservation areas (RHCAs) in priority watersheds. Watershed analysis will now be required in any watershed when the above activities occur in RMAs. This implies decision makers must weigh the investment to complete a new or focused analysis against the need to build roads and facilities, and complete salvage logging. There will likely need to be very compelling issues for management to consider, and as a result, it is anticipated these activities in RMAs will be infrequent. If a decision maker moves forward with watershed analysis, then this process should provide them information to put the management effects in context of current aquatic conditions, and allow them to avoid or minimize adverse effects to aquatic and riparian dependent resources in order to remain consistent with Revised Forest Plan guidance.

Key and Priority Watersheds

Key Watersheds - As described in Section 2.5, key watersheds serve as a broad-scale, long-term (multiple decades or more) strategic network of watersheds focused on the conservation and restoration of aquatic and riparian ecosystems and water quality. There are 170 key watersheds identified on the three national forests comprising 947,000 acres (57 percent) of the Malheur NF, 800,000 acres (57 percent) of the Umatilla NF and 1,270,000 acres (71 percent) of the Wallowa-Whitman NF. Key watersheds include almost all designated critical habitat for Snake River (939 miles) and Middle Columbia Steelhead (948.7 miles), Snake River spring/summer Chinook (354.6 miles), Snake River fall Chinook (12.1 miles; Grande Ronde River, Wallowa-Whitman National Forest) and Columbia River Bull trout (1,293.6 miles). All Snake River fall Chinook DCH within the planning area on the Umatilla and Wallowa-Whitman national forests lies within the Grande Ronde Wild and Scenic River management allocation and is managed accordingly.

Key watersheds either currently provide or will provide high quality habitat to serve as source areas for listed fish species or aquatic species of concern, and will provide high quality water important to these populations downstream and/or their habitats. Key watershed standards and guidelines, Forest-wide and RMA Revised Forest Plan components are expected to provide a high level of protection for riparian and watershed ecological processes that can contribute to providing habitat conditions for listed fish and their designated critical habitat. For example, impacts from new road constructions are minimized by standard KW-1S. This standard requires that when key watersheds and any other subwatersheds with ESA listed fish/critical habitat are functioning properly with respect to roads and trails, no net increase in system roads that affect hydrologic function will be allowed. In key watersheds and any other subwatersheds with ESA-listed fish or critical habitat that are functioning-at-risk (based on the WCF road and trail indicator) one mile of road must be removed for every new mile of road construction). In key watersheds or any other subwatersheds with ESA listed fish and their critical habitat that have impaired function 1.5 miles of road must be reduced for every new mile of road construction. Treatment priority shall be given to roads that pose the greatest relative ecological risks to riparian and aquatic ecosystems. Road-related risk reduction will occur prior to new road construction unless logistical restrictions require post-construction risk reduction. This standard only applies to the affected subwatershed when new system roads are proposed, and shall not be offset by reductions in open-road densities in other subwatersheds. This standard, coupled with a greater emphasis on road decommissioning and relocating problematic roads, will result in lower road densities and road related effects over the life of the plan.

Although the construction of new roads on national forests has decreased, this standard requires decision makers to weigh new, permanent access needs against removal of other system roads that are posing higher risks to aquatic resources. Since key watersheds comprise a high portion of each national forest and comprise most listed fish critical habitat on these forests, this requirement should result in a net road reduction of the most impactful roads in specific subwatersheds over the life of the Revised Forest Plan.

In addition to the standard regarding new road construction in key watersheds and Forest-wide and RMA standards and guidelines, there are two additional standards specific to key watersheds, KW-2S and KW-3S, that provide extra protection to key watersheds and other subwatersheds containing ESA-listed species or designated critical habitats from potential adverse effects of hydropower and other water developments.

Priority Watersheds - Priority watersheds are a subset of the key watersheds with the intention of prioritizing restoration over the life of the Revised Forest Plan (15 years). There are 70 priority watersheds identified across the three forests within the range of listed fish. Priority watersheds comprise approximately 30 percent of the Snake River spring/summer Chinook salmon critical habitat (105.6 miles), 40 percent of the Middle-Columbia Steelhead critical habitat (380.39 miles), 28 percent of the Snake River Steelhead critical habitat (261.7 miles), and 44 percent of the Bull Trout critical habitat (567.02 miles) within the key watershed network.

In addition to the protection or passive restoration benefits realized from standards and guidelines for key watersheds, active restoration will take place in a priority watersheds to contribute to the conservation of listed fish and their habitats. The priority watersheds were identified where active restoration could be focused in the short term to assist in meeting plan objectives. The approach to watershed restoration would continue to follow the approach where active restoration is focused to address all restoration needs that are politically, economically, and technically feasible before moving on to other watersheds or subwatersheds. Such a whole watershed approach is consistent with the findings of Roni et al. (2010) who found considerable restoration is needed to produce measurable changes in salmonid abundance at a watershed scale. This approach is also consistent with the intent of the priority watershed approach designated under the PACFISH/INFISH strategies whose objectives are to provide protection across the landscape where fish habitat would receive special attention and treatment.

The objectives, principally for key watersheds and priority watersheds that include listed fish and their habitats, include 90 - 105 miles of road maintenance, increasing aquatic habitat connectivity by replacing 155 culverts, improving watershed function by improving watershed function in 54 watersheds in the planning area, 110 sites where riparian function will be improved, improving riparian vegetation condition on 1800 acres, and restoring 421 miles of stream habitat. These objectives are identified by specific key watersheds.

WCF Priority Watersheds – These watersheds are subset of priority watersheds, wherein near-term (approximately 5 years) restoration actions are focused. Watershed restoration action plans (WRAPs) would be developed as informed by watershed analysis within these drainages to ensure limiting factors and important areas are protected and restored. At this time, nine subwatersheds have been identified as WCF priorities. These include: (1) Tyee-Big Sheep and Sheep creeks in the Imnaha subbasin; (2) Lick, Lower and Upper Camp creeks in the Middle Fork John Day subbasin; (3) Clear and Upper Big Wall creeks in the North Fork John Day subbasin; (4) Cummings Creek in the Walla Walla subbasin; and (5) Bull Run Creek in the North Fork John Day subbasin.

The Upper Tucannon River is a WCF priority watershed that overlaps the Tucannon River bull trout core area. The WRAP would need to identify opportunities to: (1) restore aggrading stream channels to restore flow, reduce subsurface flows, and increase channel stability; (2) relocate roads out of the floodplain or

stabilize them; (3) relocate campgrounds out of riparian areas to avoid impacts to bull trout habitat; (4) reduce stream temperatures by enhancing riparian area and correcting floodplain connectivity; (5) reduce and prevent erosion from identified problem locations on motorized access roads and from closed roads; and (6) remove permanent and seasonal barriers to bull trout migration as identified in the mid-Columbia bull trout recovery plan.

Another example is the Middle Fork of the John Day that has been identified as a major population group for steelhead trout. Lick, Lower and Upper Camp creeks containing 34.4 miles of steelhead critical habitat have been identified as priority WCF subwatersheds. WRAPs would need to develop restoration actions that address key actions and limiting factors as identified in the mid-Columbia steelhead recovery plan. These key actions include: (1) the loss of rearing habitat and floodplain channel connectivity; (2) causes of higher summer water temperatures; (3) causes of increased sediment and altered stream flows; and (4) passage and connectivity for both juvenile and adult life stages.

Within five years of signing the Revised Forest Plan, focused restoration should occur in these areas helping to improve and rebuild the ecological processes that create good aquatic and watershed conditions. Restoration in these areas should help to slowly secure and create larger blocks of connected refugia habitat that is crucial for listed and other aquatic species. Once all essential projects are completed in these WCF priority subwatersheds, another set of WCF priority subwatersheds will be selected from the overall pool of priority subwatersheds for focused investment. This process will repeat itself during the life of the Revised Forest Plan as restoration objectives and actions are completed. Table 5 indicates 16 subwatersheds on the Malheur, 14 subwatersheds on the Umatilla, and 24 subwatersheds on the Wallowa Whitman will be improved over the life of each plan. In time, as other WCF watersheds are restored, a more resilient network of subwatersheds should be created to serve as strong/anchor fish populations that contribute to long-term species recovery.

Watershed Protection and Restoration

Unlike the PACFISH/INFISH strategies that did not develop a restoration strategy, the ARCS commits to a long-term watershed protection and restoration program. Watershed protection or passive restoration will be accomplished in the planning area by implementing key standards and guidelines that minimize the risk of unintended effects. The use of BMPs and focused watershed analyses would also be used in conjunction with standards and guidelines to achieve desired conditions for water quality and fish habitat. RMA-1S, WM-1S, RE-3S, and RE-5S provide important protections and passive restoration to watershed function and riparian areas and aquatic resources within the RMAs. Specially, RE-3S requires not using mitigation or planned restoration as a substitute for preventing long-term watershed or habitat degradation, except where Forest Service authorization is limited; and RE-5S seeks to minimize adverse effects and not retard recovery of listed and proposed species and their habitat in the long-term in accordance with Forest Service authorities. These standards and guidelines provide criteria that will address threats and limiting factors for listed fish by preventing those threats from being realized, and will protect fish habitat within the planning area.

Active watershed restoration will be accomplished in priority watersheds, through increased investment over the near term (life of the Plan). Quantitative objectives for active watershed, riparian and aquatic habitat restoration are one of the key emphases as a way to accelerate achievement of desired conditions and meet ecological goals. Watershed restoration actions in priority watersheds would serve to recreate larger networks of connected high quality habitats within and between watersheds in each subbasin with identified key watersheds. This investment in the priority watershed network will accelerate recovery actions that will improve the habitat for listed species contributing to the conservation of the species, addressing the threats and limiting factors. The strength of the priority watershed network is that it centers on subwatersheds that contain listed fish and their designated critical habitat.

Over the longer term, watershed specific objectives for riparian and aquatic habitats would be integrated with watershed specific objectives for vegetation and fuels management. This integration would be done through watershed analysis and would likely contribute to restoration of the natural watershed function and processes at the watershed scale.

Recovery plans for Snake River and Mid-Columbia River anadromous salmonids and for the Columbia River bull trout (recovery plans) focus on restorative actions that overlap the Revised Forest Plan priority watershed network, centering on threats and limiting factors. This alignment is due to the selection of priority watersheds that focused on listed fish and their designated critical habitat and many of those same threats and limiting factors. Many of the objectives in the Revised Forest Plan are similar to recovery actions and will lead to a trend to achieving desired conditions in those watersheds as well as contributing to recovery goals for listed fish. Timeframes for implementing restoration actions in the Revised Forest Plan should help meet desired conditions

Additional active restoration actions will be identified through updated watershed analyses and watershed action plans, as identified in the watershed condition framework and through integrated project analysis. These restoration actions should align with the desired conditions and contribute to the trend of achieving the desired conditions. These restoration actions should also complement the recovery plans, their recovery goals, and the recovery actions identified within them. Collectively, passive and active restoration should help to meet Section 7(a)(1) of the ESA responsibilities by carrying out programs for the conservation of endangered and threatened species and avoiding/minimizing affected species.

Plan Components

This section addresses the effects on listed aquatic species related to the plan components, specifically those forest-wide desired conditions and the standards and guidelines that are connected to the desired conditions.

Management Areas

The management areas (MAs) are lands where general management intent is similar. The purpose of MAs is to provide consistent guidance for similar portions of NFS lands when implementing or continuing management activities. Forest-wide plan components apply within management areas. The plan components for the MAs provide an idea as to the amount and types of resource management programs that may be implemented within an MA, and therefore the potential magnitude and extent of the potential resource effects described in following sections.

The MAs and associated acres included within the planning area are displayed in Table 43 below. The suitability of management actions within specific management areas are also displayed in Table 44. The MAs that were considered especially relevant to the effects on listed fish species are the:

- Congressionally Designated Wilderness Areas (1A),
- Recommended Wilderness Areas (1B),
- Wilderness Study Areas (1C),
- Wild and Scenic Rivers (2A),
- Starkey Experimental Forest and Range (2I),
- Municipal Watersheds (2J),
- Backcountry (nonmotorized) (3A),
- Backcountry (motorized) (3B),
- General Forest (4A), and

Riparian Management Areas (4B).

Table 43. Management area designation, name, and acreage for each national forest (2F and 2G show miles). Figures in the table are rounded to the nearest 100 (acres) unless specifically noted as miles (nearest whole mile)

Management Area Designation and Name	Malheur	Umatilla	Wallowa-Whitman
1A – Congressionally Designated Wilderness Areas	82,600	304,200	372,900
1B – Recommended Wilderness Areas	26,600	31,900	12,000
1C – Wilderness Study Area	0	0	2,400
2A – Wild and Scenic River (Includes Designated, Eligible, and Suitable Rivers)	12,100	44,400	52,900
2B – Research Natural Areas	11,100	11,000	8,000
2C – Botanical Areas	100	900	1,000
2D – Geological Areas	200	400	0
2E – Historical Areas	34,000	1,200	2,300
2F – Scenic Byways and All-American Roads	13 miles	51 miles	85 miles
2G – Nationally Designated Trails	9 miles	30 miles	25 miles
2H – Scenic Areas	14,400	31,100	0
2I – Starkey Experimental Forest and Range	0	0	30,500
2J – Municipal Watersheds	500	20,200	24,500
3A – Backcountry (nonmotorized use)	47,200	49,700	31,700
3B – Backcountry (motorized use)	118,000	169,200	209,400
4A – General Forest	1,250,200	648,000	861,400
4B – Riparian Management Areas (300/150/100 foot buffer)	192,900	237,500	362,500
4B – Riparian Management Areas (within 4A)	149,500	119,900	190,100
5 – Developed Sites and Administrative Areas	2,200	7,500	7,700

Table 44. Suitability matrix for management areas for the Proposed Action.

Use or Activity	Management Area																	
	1A	1B	1C	2A ²	2B	2C	2D	2E	2F	2G ⁵	2H	2I	2J ⁴	3A	3B	4A	4B	5
Timber production	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	S	U	U
Timber harvest ³	U	U	U	S	U	S	S	S	S	S	S	S	S	S	S	S	S	S
Grazing (cattle and sheep)	S	S	S	S	U	U	S	S	S	S	S	S	U	S	S	S	S	U
Motor vehicle use (summer) ¹	U	U	U	U	U	S	S	S	S	U	S	S	U	U	S	S	S	S
Motor vehicle use (winter)	U	U	U	U	U	S	S	S	S	S	S	S	U	U	S	S	S	S

Use or Activity	Management Area																	
	1A	1B	1C	2A ²	2B	2C	2D	2E	2F	2G ⁵	2H	2I	2J ⁴	3A	3B	4A	4B	5
New Road construction	U	U	U	U	U	U	S	S	S	U	S	S	U	U	U	S	U	S
New Trail construction (for motor vehicle use)	U	U	U	U	U	U	S	S	S	U	S	S	U	U	S	S	U	S
Mechanical fuel treatment	U	U	U	U	U	U	S	S	S	S	S	S	S	S	S	S	S	S
Energy development (wind farms, utility corridors, pipelines, etc.)	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	S	U	S ⁶

S designates use or activity as suitable. Refer to desired conditions and standards and guidelines for each management area and/or use for specific guidance.

U designates use or activity as unsuitable. Refer to desired conditions and standards and guidelines for each management area and/or use for specific guidance.

1. Indicates suitable applies only to use or activity on roads, trails, and areas open to motor vehicle use that are in compliance with the Travel Management Rule (36 CFR 212).

2. Indicates not suitable for river segments classified as wild rivers, suitable for river segments classified as scenic and recreational rivers.

3. Vegetation in areas suitable for timber harvest shall not be subject to regularly scheduled timber production (regularly schedule timber harvest on suitable lands); since they are not part of our timber suitability landbase.

4. All activities in municipal watersheds are dependent on the agreement for management of the watershed between the Forest Service and the municipality.

5. Establishing legislation may influence whether motorized use is allowed.

6. Energy development is only suitable in designated utility corridors.

These MAs were analyzed to determine the potential effects due to the amount and types of management programs that may be expected to occur, and they represent changes to current Forest Plan management areas. The Revised Forest Plan includes recommended wilderness and wilderness study areas, but there is no change (proposed additional acres) in the designated wilderness. These MAs were included in the effects discussion because of the protective nature of wilderness to aquatic species and habitat. The riparian management areas (4B) overlay all the MAs.

The MAs are assessed within the context of listed fish distribution and key watershed designation relative to the threats to the listed species. MAs and the program areas will be assessed for their potential effect to listed fish and their designated critical habitat. Examples of location of the MAs and the distribution of listed fish are shown in Figure 64 and Figure 65.

BLUE MOUNTAINS FOREST PLAN REVISION **Malheur NF** **Management Areas & Fish Distribution for Steelhead**

Date: 4/6/2017

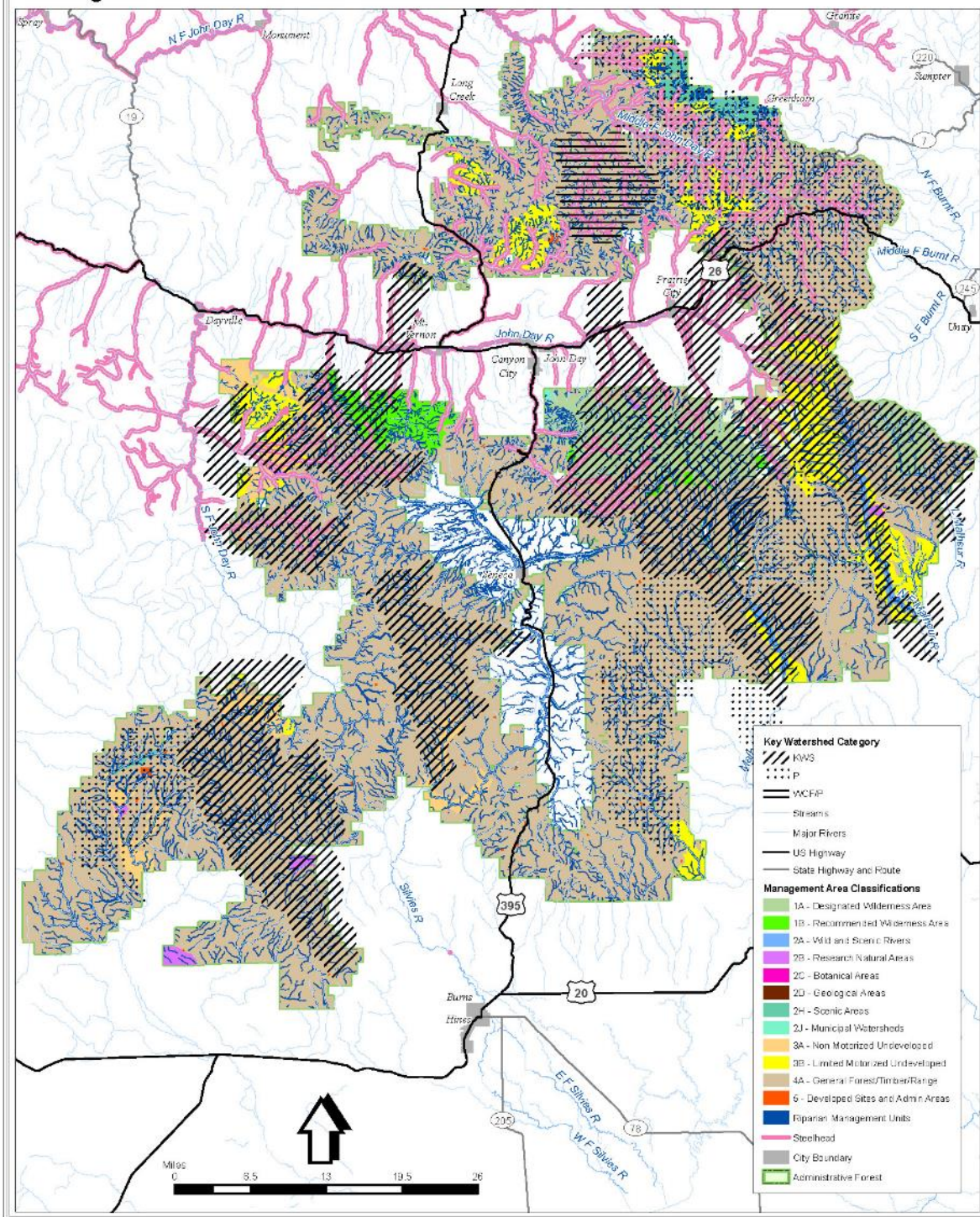


Figure 64. Example of Management Areas and their relation to Mid-Columbia River Steelhead Critical Habitat for the Malheur NF.

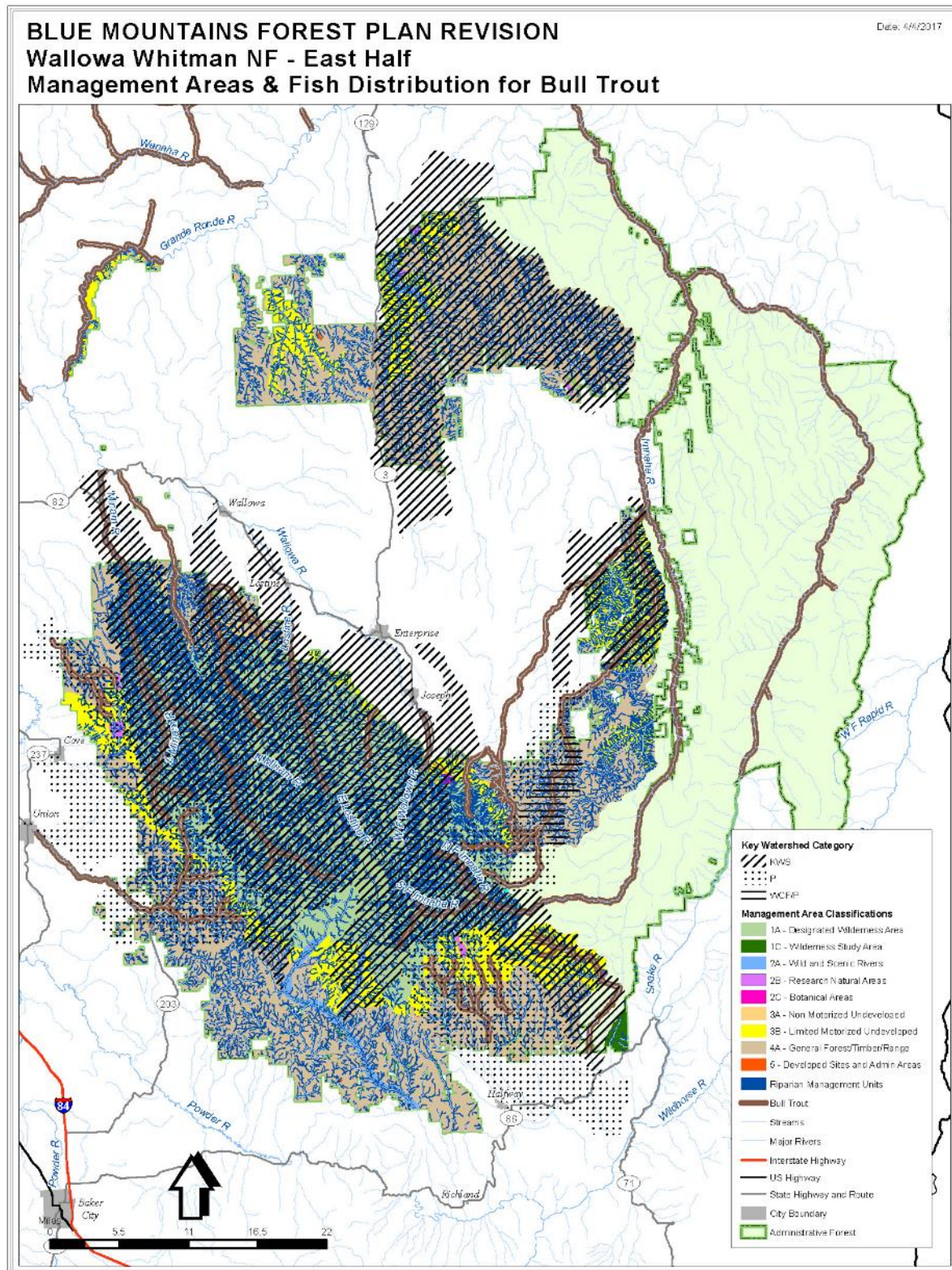


Figure 65. Example of Management Areas and their relation to Columbia River Bull trout Critical Habitat for the east half of the Wallowa Whitman NF.

Special Areas

Special areas are lands that have designations by Congress or another delegated authority. Special areas are designated because of their unique or special characteristics. Special areas establishment may occur at the national level either through legislation (Congressional designation) or at the regional or local level through administrative action (administrative designation). A Forest Plan may recommend the establishment of new special areas. This Revised Forest Plan provides direction for the following special areas: scenic byways and All-American roads, national designated trails, **eligible and suitable wild and scenic rivers**, scenic areas, botanical areas, geological areas, historical areas, **Starkey Experimental Forest and Range**, research natural areas, **and recommended and designated wilderness and wilderness study areas**. Those MAs bolded above are MAs that may have an effect on listed fish species or their designated critical habitat.

Wilderness Management Area Designations - MAs 1A, 1B, 1C

The Revised Forest Plan has designated new management areas. When the previous management area designations are assessed in terms of change in acres designated to new management designations there is an overall shift in areas of protected designations. When combined, the wilderness management area designations (1A, 1B, 1C) result in an increase in these designations by 2 percent on the Malheur, 1 percent on the Umatilla, and 1 percent on the Wallowa-Whitman national forests.

The small acre increases of these protected area designations will contribute to the conservation efforts of listed fish species by providing a high level of habitat protection, since the intent of wilderness is to preserve and protect areas in their natural condition. The effects of these increased acres will be fewer areas suitable for motorized access and associated uses that come with this access. This should result in **beneficial** effects to listed aquatic species and their designated habitats since most of these management designations are in watersheds that are functioning appropriately, albeit in subbasins that are mostly functioning at risk.

Within these MAs on the Malheur National Forest there are 86,100 acres in designated key watersheds in which there are 103 miles of steelhead habitat and 122 miles of bull trout habitat. A total of 12 miles of Designated Critical Habitat are encompassed within current Wilderness areas on the Malheur National Forest. On the Umatilla National Forest there are 285,900 acres in designated key watersheds within these MAs in which there are 217 miles of steelhead habitat, 106 miles of spring/summer Chinook habitat and 127 miles of bull trout habitat. There are 136 miles of bull trout designated Critical Habitat in current Wilderness areas on the Umatilla National Forest, indicating that some wilderness miles of Critical Habitat for the species are currently unused. On the Wallowa-Whitman National Forest, there are 115 miles of steelhead habitat in wilderness areas and 133 miles of bull trout habitat, including miles within the Hells Canyon Wilderness in the HCNRA. There are 179 miles of bull trout designated Critical Habitat within current Wilderness areas on the Wallowa-Whitman National Forest. This includes miles within the Hells Canyon Wilderness in the HCNRA.

Wild and Scenic Rivers – MA 2A

On the Malheur National Forest there are 12,100 acres in MA 2A of which 10,900 acres are in key watersheds supporting 41 miles of bull trout habitat. On the Umatilla National Forest, there are 44,600 acres of MA 2A of which 12,900 acres are in key watersheds supporting 32 miles of steelhead habitat, and 33 miles of bull trout habitat. The Wallowa-Whitman National forest has 52,900 acres in MA 2A

designation of which 15,200 acres are in key watershed status. These key watersheds support 40 miles of steelhead habitat, 14 miles of chinook habitat, and 19 miles of bull trout habitat.

Standards and guidelines that provide additional protection within this MA include the following, and how they relate to threats to the species.

MA2A-1G and MA2A-2S speak to the protection of riparian areas within the WSR corridors by limiting access to be consistent with Outstanding Remarkable Values (ORVs) and desired conditions, both of which include listed fish and their habitats. This addresses the threat to all listed steelhead, chinook and bull trout of habitat conditions. In addition, MA2A-4S addresses the removal of hazard trees from wild river segments to provide for ecologically desirable effects on the stream and ground of the riparian area.

MA2A – 3S protects the riparian area vegetation from new road construction by limiting new roads and motorized trails to areas outside the corridor. This protects the riparian vegetation, and addresses the threat to all listed fish species from sediment delivery and the impacts to instream habitat.

MA2A-5S prevents the authorization of mining of common minerals within the MA designation. This provides protection to stream channel characteristics, stream bank, and riparian vegetation.

Starkey Experimental Forest and Range MA 2I

Starkey Experimental Forest and Range is a 30,453 acre research facility conducting long term research to support the ecological management of the Blue Mountains national forests. Public access is managed to protect the facility and facilitate research needs. Typical forest practices are conducted as part of research direction and may result in a higher level of uncertainty of effects than is expected in other management areas. These effects to listed fish species will overall be limited in scope and scale and limited to Snake River spring/summer Chinook salmon and steelhead. Starkey is located in the Upper Grande Ronde subbasin and within the Meadow Creek watershed. The primary standard contributing to minimizing effects to listed fish is related to sediment delivery to streams and limiting the threat from road use to those listed fish. That standard is:

MA 2I STA-EXP-2 Standard – Vehicle access shall only be allowed on designated routes, unless necessary to meet research needs or objectives.

This standard while applied throughout the year is particularly important protection measure since public access is limited to Starkey Experimental Forest and Range from Nov 1 to May 1 each year. This is when increased access could cause increased sediment delivery from the road system to the stream channels supporting listed Snake River steelhead and spring/summer Chinook salmon.

Municipal Watersheds – MA 2J

The Malheur National Forest has no change in their MA 2J designation status (535 acres). The Umatilla National Forest designation will provide protection for 8 miles of Mid-Columbia steelhead habitat and 12 miles of bull trout habitat. The Wallowa-Whitman National Forest designation will provide no additional protection for listed fish habitat. The listed fish and their habitat will be conserved by protecting water quality and applying standards that allow for multiple use so long as management activities do not degrade water quality.

Two standards that provide protection for water quality and thus reduce threats for bull trout and steelhead within designated municipal watersheds are described below:

Table 45. Municipal watershed standards that provide protection for water quality

Standard/Guideline	Description
MA 2J MUN-WAT-1 S-39	Standard All management activities shall be designed to protect water quality at the intake in public water supply watersheds. Activities that could influence drinking water sources will be conducted in accordance to Oregon Drinking Water Rules and regulations.
MA 2J MUN-WAT-2 S-40	Standard Fertilizers and chemicals shall only be used in emergency situations, subject to the terms of existing agreements between individual cities and the U.S. Department of Agriculture.

Backcountry (Non-Motorized and Motorized) - MA 3A/3B

The primary difference between the two management areas is the suitability for non-motorized (MA 3A) and motorized recreation (MA 3B). Backcountry emphasizes non-motorized recreation opportunities and can include foot, horse, and mechanized (e.g., mountain bikes) modes of travel along designed trails or cross country. Lands in this management area often have high quality or undisturbed natural resources. Backcountry motorized emphasizes summer and winter motorized recreation opportunities and can include off-highway vehicles, motorcycles, jeeps, and over-snow vehicles. Motor vehicle access in this management area may be restricted seasonally, by route designation, or by area restrictions.

The backcountry motorized (3B) and nonmotorized (3A) management area designations show an increase of 103,020 acres on the Malheur, 177,225 acres on the Umatilla, and 121,238 acres on the Wallowa-Whitman national forests. The largest part of the increase coming in the from backcountry (motorized) management area designations.

The 2001 Roadless Area Conservation Rule ((36 CFR 294) provides protection through prohibitions on road construction, road reconstruction, and timber harvesting. The BACK-1S Standard in the Forest Plan (Appendix K) for Management Areas MA-3A and MA-3B states that “Backcountry management areas within inventoried roadless areas shall be managed consistently with the guidance in the 2001 Roadless Area Conservation Rule (36 CFR 294) (USDA Forest Service 2001b).” New road construction is only allowed for designated special uses or as required by law to provide access to non-Federal land or valid existing rights.

Within MA 3A/3B on the Malheur National Forest there are 96,600 acres of key watersheds designated (containing 29 miles of steelhead habitat and 45 miles of bull trout habitat), which will be managed under the key watershed. Similarly, on the Umatilla National Forest there are 113,300 acres of key watershed designation within these MAs which contain 88 miles of steelhead habitat and 52 miles of bull trout habitat to be managed under Key Watershed Standard KW-1S. On the Wallowa-Whitman National Forest there are 137, 200 acres of key watershed designation within these MAs which contain 36 miles of steelhead habitat, 7 miles of spring chinook habitat, and 54 miles of bull trout habitat.

In the rare situations when road building occurs within this management area within key watersheds, standard KW-1S requires road reductions that pose the greatest ecological risks to riparian and aquatic ecosystems. This should help to reduce sediment and capture/re-routing of overland flows to streams and riparian areas in remote parts of the landscape that are already in relatively good condition for listed fish. Road construction prohibitions will also reduce threats to tributary habitat from water quality, fish habitat, and riparian areas impacts. This should result in greater conservation benefits to listed fish and their habitats.

Other effects from recreation uses in these management areas could include sediment and turbidity and concentrated runoff from designated roads and trails, and user created routes. These effects would be

especially pronounced at stream crossings. However, regular road and trail maintenance and application of BMPs should help to minimize many of these effects. Only user created routes that do not receive maintenance would effects remain, until travel management plans are completed on the Malheur and Wallowa Whitman national forests.

General Forest and Riparian Management Areas

General Forest MA 4A

This MA is designed to meet a variety of ecological and humans needs. With an increase in the number of acres in this MA on all forests (Malheur 47 percent increase, Umatilla 118 percent increase and Wallowa-Whitman 17 percent increase in acres over existing) there is expected to be a higher level of management activity allowed primarily in livestock grazing, vegetation management, wildfire management, access management, and developed recreation. With this higher level of activities there is expected to be a higher risk to listed fish and their designated habitat.

This MA area is anticipated to see an increase in silvicultural activities to reduce departure from and thereby move toward desired conditions, and an increase in fire and fuels management to reduce fuel loadings and risk to wildland urban interfaces (WUIs). Further discussion on effects is found below in the Program Direction, Vegetation Management section for this MA.

Riparian Management Areas MA 4B

A complete discussion on effects of this management area are described under the Blues ARCS RMA analysis in section 4.2.9 and will not be repeated here.

Program Direction

Vegetation Management

Timber Harvest and Silvicultural Management and Fuel and Wildland Fire Activities

MA 4A comprises the largest acres (2,715,100 acres) of any MA within the Revised Forest Plan suitable for timber harvest. This MA also contains the highest listed fish distribution of any MA. The potential for adverse effects can be minimized through the use of standards and guidelines described in the following paragraphs. These potential adverse effects would occur at the subwatershed scale, a “watershed function effect” as the effect would be occurring on upslope areas primarily outside the RMAs. These effects would be from timber harvest and associated harvesting methods, temporary road construction and use, and prescribed fire.

Table 46. Management areas suitable for timber harvest and listed fish species distribution (miles) for the planning area.

Management Area	Total MA (acres)	Steelhead Distrib (miles)	Snake River spring/summer Chinook salmon Distrib (miles)	Snake River fall Chinook salmon Distrib (miles)	Bull trout Distrib (miles)
2A	109,600	72	39		93
2C	2,500	>1	0		>1
2D	600	0	0		0
2H	45,500	12	0		6
3A	228,200	19	4		18

Management Area	Total MA (acres)	Steelhead Distrib (miles)	Sneke River spring/summer Chinook salmon Distrib (miles)	Sneke River fall Chinook salmon Distrib (miles)	Bull trout Distrib (miles)
3B	425,200	134	3		133
4A	2,715,100	668	119		191
4B	792,900	-	-		-
5	13,600	12	2		4

The potential for adverse effects is greatest on land in the MA 4A due to it being the only MA deemed suitable for timber production. These potential adverse effects are the result of higher intensity vegetation manipulation and more ground disturbance due to timber harvest and associated road construction, reconstruction, and use. Timber harvest is suitable on all other MAs (Table 46) except Wilderness MA 1A, 1B, and 1C and Research Natural Areas, MA 2B. Timber harvest (vegetation management) in all MA emphasizes the restoration of forest vegetation.

While a goal of the Revised Forest Plan is intended to produce commercial forest products, the intent of the timber harvest and silvicultural management program is to create forest and non-forest vegetation structure that contributes to the species diversity, species composition, and structural diversity of native plant communities. The desired vegetation structure classes, identified by plant community type, are to be resilient and compatible with maintaining characteristic disturbance processes such as wildland fire, insects and diseases. These are all to promote the ecological integrity (a goal) within the planning area. It is also the intent of the Revised Forest Plan that active management, such as wood product removal, wildland fire use, vegetation treatments will be used to meet desired conditions, move toward desired conditions, or not impair desired conditions.

The current conditions in many mixed severity fire regime forests have been broadly simplified by the combined effects of a century of fire suppression, fire exclusion, livestock grazing and road building, selection cutting in dry forests, and clearcut logging in more productive moist forests. Shade-tolerant Douglas-fir, grand fir (*Abies. grandis*), white fir (*A. concolor*), and subalpine fir (*A.lasiocarpa*) now dominate in many areas formerly occupied by fire-tolerant and shade-intolerant ponderosa pine, Jeffrey pine (*P. jeffreyi*), western white pine (*P. monticola*), sugar pine (*P. lambertiana*), and western larch (*Larix occidentalis*). This has simplified species diversity at patch and larger scales. Large, old trees that are naturally fire-tolerant today are often threatened by dense understory that create fuel ladders increasing the susceptibility of large trees to large, severe fires. Land management objectives for forests with mixed-severity fire regimes are increasingly to restore successional diverse landscapes that are resistant and resilient to current and future stressors, such as climate change (Hessburg et al. 2016).

Large fires can result in accelerated erosion due to surface erosion or debris slides, increasing the sediment supply to streams and changing channel structure (Wondzell and King 2003, Benda et al. 2003). However, disturbances such as fires and the resulting erosion processes also help create diverse fish habitat through the introduction of large woody debris and coarse substrates that maintain productive fish habitat (Reeves et al. 1995). Fires can cause direct mortality to fish resulting in local extirpations. However, fish populations, especially salmonids, have been observed to rapidly recover after an episodic disturbance such as a wildfire; as long as the population and habitat are connected to adjoining populations, (Sestrich et al. 2011, Rieman et al. 2003, Rieman et al. 1995). A number of local populations are in streams with little connectivity to adjacent populations and are therefore more susceptible to extirpation by a large disturbance. The concern therefore is not so much over the effects of “natural” fires but larger, possibly more severe fires than generally occurred historically, especially if the fires occur in subwatersheds with isolated populations.

Vegetation management through timber sales for timber production or as a fuel treatment (e.g., thinning and prescribed fire) and managing wildfires to reduce the potential for uncharacteristically severe wildfires, can adversely affect watershed processes and aquatic and riparian habitat (Spence et al. 1996, Mehan 1991, Day 2016). Removal of large trees through timber harvest or prescribed fire within the RMA reduces large wood input to stream channels that is necessary to create complex aquatic habitat. Removal of trees shading streams can result in increased summer stream temperatures. Accelerated erosion from ground disturbing activities associated with vegetation management, such as skid roads and the transportation system, result in accelerated erosion and sediment delivery to stream channels. Pumps and other equipment used to deliver water to manage prescribed fire or wildfire can also transmit aquatic invasive species (AIS) from infected waters to unaffected waters.

Vegetation management activities can cause adverse effects to listed fish and their habitats; however, the RMA desired conditions, standards, and guidelines will greatly reduce the potential for long-term adverse effects. As described previously, projects would not be consistent with WM-1S and RMA-1S if effects did not maintain baseline conditions when they are within desired conditions. When baselines are outside of desired conditions, projects must restore or not retard attainment of desired conditions to the degree that the project contributes to them. Short-term adverse effects from projects may occur as long as they support or do not diminish long-term recovery of watershed function desired conditions and federally listed species.

The Revised Forest Plan also has standards and guidelines that specifically guide vegetation management to prevent or minimize adverse effects. Collectively, these are intended to: (1) minimize adverse effects to ESA listed and proposed species and their habitats and ensure these effects do not retard recovery (RE-5S); manage ESA listed species in accordance with their recovery plans within Forest Service authorities; (2) allow timber harvest only when it will not cause irreversible damage to soil, slope, or other watershed conditions (TM-10S); (3) ensure prescribed burning contributes to and does not retard attainment of aquatic and riparian desired conditions (FM-10S); (4) ensure direct ignition of prescribed burns do not occur in RMAs unless site or project scale effects analyses demonstrate they would not retard attainment of aquatic and riparian desired conditions (FM-9G); (5) allow silvicultural treatments in RMAs only when they maintain, enhance, or restore desired conditions, while avoiding or minimizing adverse effects to aquatic and riparian resources (TM-1S); (6) prohibit fuelwood cutting in RMAs unless designed to attain aquatic and riparian desired conditions (TM-2S); (7) disallow use of existing or construction of new landings, designated skid trails, staging, and decking within RMAs, unless they are associated with projects designed to improve RMA conditions (TM-3G); (8) for yarding, require full suspension over the active channel even when dry, unless other alternatives (i.e., over snow) are used, as determined in consultation with a USFS soil scientist (TM-4S); and (9) ensure silvicultural practices include appropriate best management Practices (BMPs) to avoid detrimental changes to water temperatures or blockages of water courses, and to protect streams, stream banks, shorelines, lakes, wetlands, and other bodies of water, and deposits of sediment (TM-5S).

Proper implementation of Revised Forest Plan guidance should help to reduce management effects that have contributed to limiting factors (e.g., excessive sediment, elevated summer water temperatures, and degraded riparian conditions) in tributary habitat identified in listed species recovery plans. It should also create a vegetation composition and structure that is more characteristic of the natural fire regime; promote late forest structure appropriate to the biophysical environment, a component of managing for natural watershed function; and may result in terrestrial and aquatic ecosystems that are more resilient to disturbance from fires or insects and disease.

Roads and Trails

The Revised Forest Plan provides for a transportation system that addresses future road maintenance and future new road construction. The desired condition provides for road systems that are safe and responsive to public needs and desires, are affordable and effectively managed, have minimal effect on aquatic and terrestrial systems, and are in balance with available funding.

Roads needed for the long-term are identified and investments are made to minimize negative impacts on the ecosystem. Roads identified for long-term use, but not currently funded for adequate maintenance are put in a stored condition, where they remain on the system but are not actively used. Access requirements anticipated in the future are met by using travel analysis reports to inform travel management decisions.

A system of roads, trails, and areas for non-motorized and motor vehicle use is identified and is available for public use. Motor vehicle use occurs only on approved and designated roads, trails, and areas open to motor vehicle use in compliance with Travel Management Rule (36 CFR 212). Trails for motor vehicle use provide a variety of recreational experiences, including various difficulty levels and trail lengths, access to scenic areas, and routes through assorted ecosystems, while minimizing impacts to natural resources and user conflicts. Loop trails and trailhead developments meet the needs of increased recreation use. Snowmobile use is managed to provide varying challenges and distances while respecting ecological systems and other users.

Opportunities for trails where motor vehicle use is prohibited are emphasized in backcountry, recommended wilderness, and wilderness areas and provide a range of difficulty for a variety of recreational experiences, including mechanized transportation (bicycles – except in wilderness areas), foot travel, and pack or riding stock. Trails are located to provide experiences in different ecosystem types and scenic settings that do not contribute to natural resource damage.

Roads can have numerous adverse effects on fish and fish habitat, including the interruption or alteration of geomorphic and hydrologic processes. Geomorphic impacts of roads include chronic and long-term sediment delivery to aquatic habitat, accelerated mass failures of cuts and fills depositing large quantities of sediment, and altered channel morphology if the roads confine streams and prevent access to the floodplain. Roads constructed in riparian areas damage or remove vegetation thus reducing stream shade and large woody debris input. Roads constructed in the floodplain may inhibit natural stream channel migration processes (Gucinski et al. 2001). Meredith et al. (2014) found that in the interior Columbia Basin, the presence of near-stream roads resulted in reduced amounts of large woody debris in streams.

The effects of roads on hydrologic processes include the interception of rainfall directly onto the road surface and subsequent road cutbanks affecting subsurface water moving down the hillslope, concentrating flow on the surface or in an adjacent ditch or channel and diverting or rerouting water from normal flow paths were the roads not present. Trombulak and Frissell (2000) in their review of the ecological effects of roads cite research on how roads directly change the hydrology of slopes and stream channels. Roads intercept shallow groundwater flow paths, diverting the water along the roadway and routing it efficiently to surface-water systems at stream crossings. This can cause or contribute to changes in the timing and routing of runoff, the effects of which may be more evident in smaller streams than in larger rivers. Hydrologic effects are likely to persist for as long as the road remains a physical feature altering flow routing.

Roads can deliver pollutants to aquatic habitat as the chemicals applied to roads or from vehicles runs off a road into a stream (Gucinski et al. 2001). Chemical contamination can also come from the use of pumps during road maintenance activities.

Roads can influence fish populations by creating passage barriers at culverts at road/stream crossings. Blocking passage is a serious issue, as maintaining connectivity between populations of a species and providing access to blocked habitat are important factors in a species' long-term persistence; such connectivity to adjacent populations and habitat may be an important strategy for species to persist in a changing climate (ISAB 2007).

In addition to the effects of the roads on the physical environment and passage, roads are an indicator of the level of potential human uses or management intensity that may affect fish population. Lee et al. (1997) found strong fish populations in the interior Columbia Basin were more frequently found in areas of low road density than high road density. Similarly, Al-Chokhachy et al. (2010) found reference watersheds generally provided higher quality physical stream habitat than managed watersheds with higher road densities.

Motorized trails that are not designed or maintained properly, including the drainage system, can be sources of chronic and long-term sediment delivery to streams. Negative impacts of soil and watershed functions from motorized activities include soil compaction, reduced water infiltration capacity, increased erosion, and damage to vegetation. Extensive networks of motorized trails across a landscape, especially on steep slopes, can direct or alter the direction of surface flows forming gullies that channel sediment and contaminants into aquatic systems (Ouren et al. 2007).

The road and trail network can also be a vector for aquatic invasive species. Boats coming from water bodies with AIS can introduce AIS, infecting a previously unaffected system. Road construction and maintenance often requires water that is obtained by pumping out of nearby streams. A pump that has been previously used in waters with AIS can transmit the AIS into new uninfected waters. Pumping water from streams can also entrap juvenile fish, resulting in direct mortality. During road construction, reconstruction, and maintenance, both pumps and vehicles need to be refueled near the work site, creating the potential for a fuel spill.

The effects of roads and trails on watershed function can be reduced by considering the location and design, and employing design or maintenance methods to disperse runoff (Furniss et al. 1991). Road removal or decommissioning creates a short-term disturbance which may temporally increase sediment, but over the long-term, decommissioning can reduce chronic erosion and the threat of landslides.

Implementation of the Travel Management Rule

The Revised Forest Plan states a desired condition for road and trails as: motor vehicle use occurs only on approved and designated roads, trails, and areas open to motor vehicle use in compliance with Travel Management Rule (36 CFR 212). The Umatilla NF is the only forest that currently operates under an approved travel management plan implemented through a motor vehicle use map, and limits cross country travel. The Revised Forest Plan identifies a standard for the Umatilla NF only; RATA-1S states, "Limit motorized vehicles to roads, trails, and areas which are designated for use in the Umatilla NF Motorized Access and Travel Management Plan." The use of the matrix of pathways and indicators (MPI) for watershed condition, specifically road density and location, will also provide diagnostic criteria to assist in evaluating attainment or progress towards aquatic and riparian desired conditions, compliance with WM-1S and RMA-1S, and effects at the project level for roads and trails on listed fish and their habitat.

In order to meet the desired condition statement for compliance with the travel management rule, the Wallowa-Whitman NF and the Malheur NF will comply with subpart B of the travel management rule following the completion of the Revised Forest Plan. RATA-1S and future travel management plans for the Wallowa-Whitman NF and the Malheur NF will contribute to the conservation of listed fish species and their habitat by providing a guide to implementing a system of roads and trails that reduce total road

density, improve road location (out of riparian areas), limit cross country travel, improve or reduce road drainage features to reduce sediment delivery, as well as focus restoration actions of road decommissioning and road maintenance.

New Road Construction and Maintenance

New, permanent road construction has markedly declined in recent years. Currently, new road construction ranges from 0 to 3 miles and reconstruction ranges from 5 to 35 miles annually, for each of the three National Forests. Roads are reconstructed for a number of purposes, including improving road conditions, driver safety, and mitigating resource impacts.

The road management standards and guidelines are very similar to the PACFISH and INFISH guidance when combined with forest-wide water resource plan components. New road construction is suitable in MAs 2D, 2E, 2F, 2H, 2I and 3B. Any new road construction in these MAs would follow standards and guidelines to reduce the effects on hydrologic processes that contribute sediment to streams that may impact listed fish or their habitat.

Management of the existing road and trail systems, both maintenance and new road construction, will follow standards and guidelines designed to minimize effects that may result from those actions to listed fish or critical habitat. One standard designed to specifically reduce the potential for adverse effects due to new road construction is KW-1S. As discussed in ARCS key watershed effects analysis, this standard provides protection for fish from new road construction and protection for riparian area desired conditions. Key Watershed DC-2 also states that roads in key watersheds must present minimal risk to aquatic resources. As also discussed in the ARCS effects section, projects in key watersheds should give higher emphasis to desired conditions that are intended to provide high-quality habitat or water for rare aquatic and riparian species/or provide high-quality drinking water to municipal water sources, than other desired conditions. Collectively, the key watershed standard and desired conditions should provide greater emphasis to addressing roads issues over the majority of designated critical habitat and a large portion of each forest; Malheur NF (57 percent), Umatilla NF (57 percent) and Wallowa-Whitman NF (71 percent).

The proposed action includes a desired condition that long-term investments (improvements) for roads need to be made to avoid negative effects on the ecosystems. The proposed action also identifies annual objectives (Table 5) to reduce sedimentation and hydrologic connectivity from road systems by considering designating routes for other uses, or closing or decommissioning roads where open motor vehicle routes are negatively affecting riparian conditions.

There are also eight specific standards and guidelines developed to further minimize the potential impacts during road or trail construction, reconstruction, and maintenance activities. These helps to minimize road related impacts to streams by: (1) avoiding side-casting of road material in RMAs (RF-3S); (2) avoiding placing fill material and debris in RMAs when constructing or replacing stream crossings unless disposal sites will not retard attainment of desired conditions (RF-4S); (3) avoiding constructing new roads and trails in RMAs unless no other feasible alternatives exist (RF-1G); (4) minimizing or avoiding the disruption of natural flow paths when constructing or reconstructing roads inside or outside of RMAs (RF-5S); (5) avoiding wetlands and unstable areas when reconstructing or constructing roads (RF-6G); (6) routing road drainage away from unstable channels, fills, and hillslopes as practicable (RF-12G); (7) ensuring all projects are implemented in accordance with Best Management Practices, as described in National and Regional Technical Guides (WM-2); and (8) road maintenance and new road construction shall be designed to minimize adverse effects to threatened, endangered, proposed, or candidate aquatic species and their habitat (RF-13S). Collectively, this and other Revised Forest Plan guidance addresses much of the criteria in PACFISH and INFISH standards and guidelines RF-2 and RF-3 that help to avoid adverse effects to fish and their habitat. Temporary roads, while not considered specified roads, can

contribute sediment to fish bearing streams and potentially effect fish and their habitats. Typically, temporary roads are used and then “deconstructed” following use. Guideline RF-2G (temporary roads, including stream crossings, in RMAs should be minimized and, should be managed to protect and restore aquatic and riparian desired conditions) will protect fish and their habitat from the effects of sediment delivery and the removal of riparian vegetation. These design features will provide protection and minimize impacts to listed fish and their habitats.

Stream Crossings (Fish Barriers)

The Revised Forest Plan has specific guidance to address road and trail related barriers to aquatic organisms. All new and replaced permanent stream crossings must provide passage for all live stages of native and desired non-native aquatic and riparian dependent organisms (RF-9S) unless the barrier is needed to restrict access to undesirable non-native species that could impact native species (RF-10G). This is most important for bull trout to maintain isolated populations from introductions of brook trout. This will contribute to the persistence and genetic integrity of the population. Culverts must also pass a 100-year flood event, and associated material (RF-7S) which should create more natural stream profiles and hydraulics to encourage passage.

Water Drafting and Chemical Contamination

The effects of drafting water from streams for road maintenance will be limited through the application of standards and guidelines RMA-4G, RMA -5S, and RMA-6G. The location for water drafting sites, screening requirements, and protection of water quality at drafting sites will reduce the threat of flow reduction, entrainment, and chemical contamination from drafting and pumps.

The additional threat of chemical contamination from refueling from any activity will be reduced by utilizing RMA-7S. Locating refueling sites out of RMAs and no closer than 100 feet from a waterway will limit the risk of chemical contamination.

Livestock Grazing and Grazing Land Vegetation.

Table 47. Active allotments and allotments suitable for grazing for each national forest (existing condition 2013)

Measure	MAL	UMA	WAW (excluding HCNRA)
Total NFS lands in the planning area	1,700,000 acres	1,400,000 acres	1,800,000 acres
Active livestock grazing allotments (all land types)	1,551,000 acres	826,000 acres	978,000 acres
Percent of national forest in active allotments	91%	59%	54%
Suitable acres in active cattle and sheep grazing allotments	1,299,000 acres	344,000 acres	433,000 acres
Percent of acres suitable for livestock grazing in active allotments	83%	42%	44%
Percent of national forest suitable for livestock grazing (percent suitable within active allotments relative to all NFS lands)	76%	25%	24%

The Revised Forest Plan does not include any changes to grazing allotment boundaries or elimination or addition of grazing allotments, but does include new desired conditions and standards and guidelines for managing the grazing program.

Recent monitoring and assessments suggest watershed and stream habitat conditions appear to be maintaining or restoring watershed and stream habitat conditions at the Pacfish and Infish strategy scale (Archer and Ojala 2016, Roper 2014). While trends for some PIBO parameters show improvement, as displayed in the baseline, the current status of many habitat metrics on the three forests are still highly departed from reference conditions. Grazing is also still being identified as a major factor in decline for each listed fish species in each recovery plan. Specifically, improper grazing has reduced stream habitat complexity and floodplain connectivity and function, and degraded riparian conditions in tributary habitat. The potential effects of livestock grazing on fish habitat have been well documented (e.g., Platts 1991, Spence et al. 1996). The potential adverse effects of grazing include soil erosion and sediment delivery to streams; soil compaction; alteration or removal of riparian vegetation that provides shade, cover, a terrestrial food source, and which stabilizes stream banks; and altered channel morphology including channel widening, increased bank instability, and loss of undercut banks. Al-Chokhachy et al. (2010) found the presence of cattle in watersheds sampled across the interior Columbia Basin and the Missouri River Basin often resulted in degraded physical aquatic habitat conditions. Excessive grazing can cause impacts that move a system beyond its short-term ability to maintain functionality. Excessive impacts over an extended period can cause the system to cross thresholds that permanently alter it beyond its ability to recover (Laycock 1994, Miller et al. 1994) especially where grazing occurred in watersheds with high road densities.

Salmonid species are especially vulnerable to grazing during early development stages, when fish are less mobile, and large numbers of embryos or young are concentrated in small areas. Livestock entering spawning areas can trample redds, and destroy or dislodge embryos and fry. The vulnerability of embryos and fry to mortality from trampling, wading, and other types of disturbance often decrease as fish become more mature and mobile.

The Revised Forest Plan provides a number of desired conditions specific to RMAs, instream habitat, and aquatic species. As mentioned previously, Federally Listed Species DC-1 states, “critical habitat components (PBFs) are protected and restored to achieve species recovery.” Aquatic Habitat Function DC-1 states, “Aquatic habitats contribute to ecological conditions capable of supporting self-sustaining populations of native species, and diverse plant, invertebrate, vertebrate aquatic and riparian-dependent species.” Aquatic Habitat Function DC-3 states, “National Forest System lands contribute to the protection of population strongholds for federally listed or proposed threatened and endangered aquatic species and designated critical habitats, as well as for a diversity of other at-risk aquatic species including Forest Service sensitive species, narrow endemics, and commercially fished species of Pacific salmon.” Finally, Riparian Management Area DC-2 states, “Key riparian processes and conditions (including slope stability and associated vegetative root strength, bank stability, wood delivery to streams, and, within the riparian management areas, input of leafy and other organic matter to aquatic and terrestrial systems, solar shading, microclimate, and water quality) are operating consistent with natural disturbance regimes.”

These desired conditions provide improved and more specific guidance than PACFISH and INFISH goals for management of grazing in riparian areas. These reflect the desire to move

RMAs and instream conditions to operate consistent with natural disturbance regimes and reflect a natural composition and distribution of native plants and animals. It also ensures existing strongholds for federally listed and proposed species are protected. Appendix I contains lists of stronghold subwatersheds associated with each of the national forests in the action area.

The Revised Forest Plan contains three standards and three guidelines specifically developed to avoid or minimize the potential adverse grazing effects to riparian and aquatic habitat. Standard GM-1 establishes a high level of aquatic resource protection since livestock grazing cannot retard attainment of desired conditions. This means that if monitoring indicates conditions are not improving when outside of desired conditions, appropriate steps will need to be taken to adjust grazing practices. If monitoring continues to show conditions not improving, then livestock will need to be removed. These actions should in time lead to improved riparian and aquatic conditions where impaired.

Context for GM-3G Changes

In the development of GM-3G the Forest Service has emphasized the importance of using the best available science along with site specific information, circumstances, and conditions. There has been recognition all along that inference and professional judgement must be made to interpret and apply the best available scientific information in the crafting of the guideline. And there has also been recognition and wording in the guideline emphasizing the importance of site specific information, circumstance, and conditions. While those two things have not changed in principle in the latest iteration of GM-3G, we have seemingly had difficulty at times getting stakeholders to agree that we have properly provided for both. That in part, is what led to the revised proposal for GM-3G which has restructured some of the language, in particular with respect to the importance of site specific circumstances and conditions.

The original GM-3 more prominently identified instances where more conservative indicator values could and should be applied but it was less descriptive of where less restrictive indicator values that address fish and aquatic conservation needs might be appropriate. While some of the more restrictive language has been altered or removed in the latest iteration of GM-3G, the guideline does not preclude implementation of those more restrictive measures. For example the guideline frequently includes wording such as “maintain a minimum of” language that suggests that more restrictive measure might be appropriate and necessary based on site specific information, circumstances, and conditions in individual allotments.

GM-3G is a guideline that applies to areas that contain federally listed fish and areas that do not. That too created confusion and concern with stakeholders, particularly when forecasting requirements in allotments without ESA listed fish; that too provided some impetus for revising the original GM-3G guideline. We believe we have better addressed that with this iteration. For example, in circumstances where desired conditions are not yet met, but are trending in that direction, the guideline prescribes a 4-6” range be applied. It goes on to identify factors that should be considered to appropriately establish the indicator value within that range. Most notably, those factors include presence of ESA listed species, as well as the degree of departure between existing and desired conditions, and current and desired rate of improvement. As

needed then, under GM-3G requirements can be prescribed consistent with the existing PACFISH guidance found in enclosure B of the document (i.e. a minimum of 6”).

Revised GM-3G

GM-3G provides a further basis to manage livestock grazing to maintain or move towards desired conditions described in the Revised Forest Plan. Specifically, this guideline it is intended: (1) provide more current, consistent, and objective grazing management across the entire Blue Mountains based on best available science; and (2) maintain or improve riparian vegetative and stream conditions improving the viability of Regional Forester sensitive aquatic species, contributing to the recovery of ESA-listed species, and facilitating the attainment of State water quality standards over the long-term.

GM-3G includes four annual use indicators (stubble height, utilization of deep-rooted herbaceous vegetation, streambank alteration, and use of woody species) and default numeric range of indicator values used to detect change and adaptively manage riparian resources. These indicators were chosen because they generally: 1) have demonstrated or plausible relationships to grazing intensity, 2) are representative of cumulative impacts throughout the season, 3) have demonstrated or plausible relationships to long-term stream conditions, 4) are regularly used by field personnel, and 5) have readily implementable field protocols that are reasonably repeatable.

Because riparian areas and streams are extremely diverse (Sayre et al. 2012, Swanson et al. 2015), the guideline recognizes that not all indicators are appropriate to every situation (Bryant et al. 2006, Clary and Leininger 2000). Only indicators and indicator values appropriate to a particular site would be applied. Indicators and associated values should be adjusted based on site-specific conditions (e.g., natural site potential, similarity of existing conditions to desired conditions, and ability of the area to resist livestock impacts and to recover once disturbed). For example, stubble height is a less meaningful indicator for steeper channels, where channel morphology is controlled by coarse substrates. Annual use indicators, when properly selected and applied should help achieve aquatic and riparian desired conditions over time.

The livestock use indicator values described in GM-3G are a starting point for management based on three condition scenarios for water quality, aquatic habitat, and riparian/wetland vegetation. These include:

- Where desired conditions for water quality, aquatic habitat, and riparian and wetland vegetation **have been attained and riparian vegetation is in late-seral conditions**, annual livestock grazing use must protect or maintain those conditions by applying appropriate indicators and values (e.g., utilize no more than 30-45 percent of deep-rooted herbaceous vegetation; streambank alteration to no more than 20-25 percent; woody species to no more than 30-40 percent of current year’s leaders; and a minimum stubble height of 4” of key herbaceous species on the greenline).

- Where desired conditions for water quality, aquatic habitat, and/or riparian vegetation **have not yet been attained, but conditions are moving towards those desired conditions**, enable continued recovery by managing annual livestock grazing use and disturbance by maintain a minimum of 4 to 6” residual stubble height of key herbaceous species on the greenline. Criteria for utilization of deep-rooted herbaceous vegetation, streambank alteration, and use of woody species would remain the same as those described desired conditions have been attained and where riparian vegetation is in late-seral.
- Where desired conditions for water quality, aquatic habitat, and/or riparian vegetation **have not been attained and conditions are not moving towards those desired conditions**, a set of minimum indicator values (e.g., e.g., minimum of 6” of residual stubble height of key herbaceous species on the greenline; utilize no more than 30-35 percent of deep-rooted herbaceous vegetation; streambank alteration to no more than 15-20 percent; woody species to no more than 20-30 percent of current year’s leaders) would be applied to move conditions to desired conditions overtime.

Incorporation of best available science and monitoring data within the Blue Mountain Forests in the development of GM-3G and implementation expectations.

Appendix H of the BA provides a detailed description of the best available science that supports GM-3G, including key conclusions that support why application of the appropriate indicator values under GM-3G will help move aquatic and riparian areas toward desired conditions. In addition to discussion of the relevant scientific literature, Appendix H also discusses information and inference that can be derived from monitoring and assessment data from the Blue Mountains. These evaluations figured prominently in the multi-party discussions that lead to the revised GM-3 guidelines.

Some of the important information and inferences (specific to the Blue Mountains Forests) that were shared with the Cooperating Counties and the involved Federal Agencies, and were foundational in the updated proposed GM-3G, above, are discussed in Appendix H and summarized below. We expect that these finding will inform deliberations of the indicator values at the allotment level consistent with the GM-3G guideline. Those findings include the following:

- Though inconsistencies and variability exist with residual stubble height implementation data, there does appear to be a relationship between residual stubble height implementation results and trends observed in stream condition.
- Across the Blue Mountain Forests, sites with residual stubble heights of 4-6” are generally associated with better stream conditions than those with residual stubble heights less than 4”.
- Sites with greater than 6” residual stubble heights are generally representative of streams in the best condition and those that most closely reflect reference conditions.
- Monitoring results indicate that the Malheur NF has the fewest instances of stubble heights below 4 inches and the Malheur also shows the greatest rate of improvement in stream condition.

These findings along with the scientific literature helped frame the guideline specific to stubble height requirements.

Other important scientific studies that helped frame the utilization, stream bank disturbance, and woody browse guidance in GM-3G are:

- Maximum utilization rates of 30-35% for deep-rooted herbaceous plants specified for situations where desired conditions have not yet been achieved and conditions are not moving towards them are considered 'conservative' or somewhere between 'moderate' to 'light' grazing intensity, respectively (Clary and Leininger 2000, Holechek et al. 1999).
- Bengeyfield (2006) found two degraded streams on the Beaverhead-Deerlodge NF in southwest Montana were recovering and beginning to resemble the shape (narrower and deeper) of an undisturbed 'reference reach' when bank alteration was reduced over the course of 7 years and had ultimately reached levels of 15-17%, as measured using a line intercept method.
- Browse rates on woody species of 20-30% specified when desired conditions have not been met and conditions are not improving are comparable to those cited in Winward (2000) who characterized utilization values of 20-40% on woody species as 'light' grazing that should avoid reductions in seed production.

Timeframe to implement GM-3G and evaluation of existing condition and trend

The information used to characterize existing condition and evaluate trend toward desired condition was another issue that prompted conversation that ultimately led to the revised GM-3G. Use of the Watershed Condition Framework (WCF) in the evaluation of existing condition was in particular a point of confusion and concern for the Cooperating Counties. The WCF is now not specifically identified in GM-3G as a driver in establishing existing condition. It will, however, be information that can and will be used as part of the evaluation. We have clarified that there is other specific and local information that will also play a prominent role. In short, establishing condition and trend will be a body of evidence approach using information at multiple scales.

As for the timing of implementation, under the revised GM-3G we propose that within five years of signing of the Records of Decision (RODs) the GM-3 guidelines in the plan will have been implemented in all allotments with ESA listed fish. We expect that an interdisciplinary team comprised of (at a minimum) range, watershed, and fisheries personnel will adjust indicator values, again, based on a weight-of-evidence approach using the best available information (e.g. local monitoring data {MIM, PIBO, Champ, etc.} and aquatic assessments {watershed condition framework, TMDLs, listed species recovery plans, etc.}) at the appropriate spatial and temporal scales in relation to the subwatershed being assessed where livestock grazing occurs. The same process will be followed within seven years for remaining allotments on the three forests. This will provide a more accurate depiction of existing conditions to guide long-term range management and recovery of impaired aquatic resources. Until this evaluation is completed allotments and pastures would use current indicator values as informed by allotment management plans and NEPA decisions or requirements from current Biological Opinions at the allotment level.

Comparison to Existing Pacfish/Infish Strategies

GM-3G provides indicators and numeric values that are not included within the standards and guidelines associated with the Pacfish and Infish aquatic strategies (USDA and USDI 1995a, 1995b, 1995c, 1995d), which amended existing Forest plans throughout the Blue Mountains. Comparable indicators and numeric values are, however, included in inter-regional PACFISH ‘implementation guidance’, entitled Recommended Livestock Grazing Guidelines (USDA FS and USDI BLM 1995e). GM-3G differs from the Pacfish implementation guidance in that it applies to all areas that will be implementing the Blues ARCS. Moreover, once adopted into the Forest Plans, GM-3G will be a plan component. Consequently, it is more enforceable than the PACFISH ‘recommended guidelines’ that were issued as implementation guidance. As such, GM-3G will continue the positive trends in aquatic and riparian habitat conditions across the Forests as well as address the need for more consistent, objective grazing management direction across the entire Blues ARCS domain and for greater assurances that this direction will be implemented than previous Pacfish and Infish guidance.

Conclusions - GM-3G and Other Plan Guidance

When GM-3G is used in conjunction with GM-1S, RMA-1S and WM-1S, a reduction in the threats posed by grazing management should be realized. As previously discussed, RMA-1S and WM-1S requires projects to restore or not retard attainment of desired conditions to the degree that project contributes to impaired baseline conditions. GM-1G states that livestock grazing must be managed to attain aquatic and riparian desired conditions and when grazing prevents or retard attainment of aquatic and riparian desired conditions, grazing should be modified. If adjustments are not effective, then livestock should be removed using appropriate administrative authorities and procedures. These other standards and guidelines reinforce the intent of GM-3G to maintain properly functioning conditions and make the appropriate management changes to enable improvement of impaired conditions.

GM-2S, GM-5G, and GM-6S should collectively help to minimize redd and fish disturbance by taking appropriate management actions to avoid redd trampling and locating trailing, watering, loading, and other handling outside of RMAs. GM-2S, GM-4G, and GM-5G should also help to reduce livestock grazing pressure aquatic resources by locating new and relocating existing facilities outside of RMAs unless it can be shown that they will not prevent or retard attainment of desired conditions. Collectively, GM-3G and other Revised Forest Plan direction will facilitate protection and recovery of aquatic and riparian resources and ESA-listed fish and critical habitat, while supporting continued grazing of NFS lands. Monitoring and adaptive management should help guide additional protection to listed fish and their habitat, if needed.

References (Page 304) – The following needs to be added to the reference section:

Roper, B. 2014. Stream habitat conditions in the Interior Columbia Basin. Unpublished dataset, used with permission.

Minerals Management

The Greater Mining Act of 1872 states, “that all valuable mineral deposits in land belonging to the United States are to be free and open to exploration.” Under this law, a mine locator “shall have the exclusive right of possession and enjoyment of all the surface included within the lines of their locations and of all veins, lodes, and ledges throughout the entire depth.” Forest Service Surface Use Regulations (36 CFR 228, Subpart A – also known as the 228 Regulations) direct us to prepare the appropriate NEPA analysis and documentation when proposed operations may significantly affect surface resources. These regulations do not allow the Forest Service to deny entry or preempt the miners’ statutory right granted under the Greater Mining Act of 1872, but do require the development of mitigation measures to minimize adverse impacts on national forest resources.

The Revised Forest Plan does not authorize any new mining operations on the three national forests. The Revised Forest Plan does however address new and existing mining operations with specific standards for mining and through the identification of suitable uses within RMAs in order to avoid or minimize the effects of mining operations on listed fish and their habitat.

Spence et al. (1996) reviewed the effects of mining on fish habitat. In general, mining activities can increase sediment delivery, cause changes in the substrate, and increase streambed and streambank stability. Mining activities may fundamentally alter the way water and sediment are transported through a river system, altering the erosional and depositional processes changing channel configuration. Increased turbidity can not only affect salmonids but also the macroinvertebrate community. Mining operations can damage streamside vegetation that shades streams and stabilizes streambanks. Toxic effects of materials used in mining or metals released into the stream environment can affect growth, reproduction behavior, and migration of salmonids, and can degrade macroinvertebrate habitat.

The desired condition for minerals and geological resources include the need to conduct exploration, development, and production of minerals and energy resources to minimize adverse environmental effects on national forest surface resources. WM-1S and RMA-1S recognize there are situations where the Forest Service has limited authorities as described above. In these situations, adverse effects to aquatic resources may not be avoided. Projects would instead effects minimize adverse effects to the greatest extent possible through mitigation measures.

There are also five specific standards and guidelines developed to further minimize the potential impacts of mining operations. Collectively, this guidance ensures permitted operators: (1) take all practicable measures to maintain, protect, and rehabilitate water quality and habitat for fish and wildlife and other riparian dependent resources that may be affected by the operations (MM-1G); (2) locate and manage structures, support facilities, and roads outside RMAs to minimize damage to aquatic and riparian dependent resources, and removing or reclaiming these facilities when they are no longer required (MM-2G); (3) do not authorize placement of mine waste in RMAs or areas where groundwater contamination is possible, except where temporary staging is needed during abandoned mine clean-up (MM-3S); (4) require BMPs and other appropriate conservation measures to mitigate potential mine operation effects (MM-4G); and (5) avoid or minimize adverse effects, especially where placer mining occurs, to aquatic threatened or endangered species/populations or their designated critical habitat (MM-5S).

The mining standards and guidelines are as stringent if not more so than the PACFISH and INFISH guidance when combined with forest-wide water resource plan components, and are an improvement over current direction. Not all impacts of mining can be avoided, but the standards and guidelines will help minimize potential impacts.

Recreation Management

Recreation is a large program on all three forest in the planning area with the potential to effect listed fish and their habitat. The desired conditions for the recreation program include providing a variety of high quality, nature-based outdoor recreational settings and opportunities varying from primitive to urban in both developed (e.g., campsites, vistas, parking areas) and dispersed (e.g., camping, , boating, mushroom and berry picking, hunting, and fishing), as well as backcountry recreation settings.

The potential effects to listed fish and their habitat due to recreation include effects due to the access system maintained to support the recreation activities, and the potential human disturbance to the environment and individual fish at dispersed and developed sites.

The potential effects of developed and dispersed camping are similar, the major difference being that developed sites have been dedicated to recreation. The concentrated human use of developed and dispersed sites can lead to soil compaction and trampled vegetation, exposing soils to erosion accelerating sediment delivery to streams. Riparian and streamside vegetation may be damaged or destroyed by removing shade and the resultant increase in solar radiation reaching a stream and increasing water temperatures. Large wood that is important for providing complex aquatic habitat and instream cover for fish may be lost as hazard trees are felled in developed sites and by unauthorized firewood cutting in dispersed sites. Loss of streamside vegetation can result in destabilizing streambanks as the roots holding the banks together are damaged, causing accelerated bank erosion that contributes excess sediment to the stream system and causes channel widening. Wider streams with shallow flow are subject to greater amounts of warming plus loss of deep pools necessary for adult bull trout holding during spawning migrations, and loss of overhead hiding cover for both juvenile and adult fish. Litter fall from streamside vegetation is an important food source for aquatic macroinvertebrates that provide food for juvenile fish, and the vegetation provides habitat for terrestrial insects that are also an important food source.

Camping and other recreation uses may also encourage harassment of spawning fish, especially bull trout and spring Chinook salmon that spawn in the late summer and fall. Redds may be damaged resulting in egg and alevin mortality if disturbed by campers. Finally, recreation activities, especially boating, can introduce aquatic invasive species into previously uninfected waters. In general, the effects of recreation activities other than the transportation are confined to the site; however, larger scale effects may result from cumulative impacts of multiple sites.

The potential effects to riparian habitat are recognized by the recreation program. RMA plan components provide more complete direction to minimize the potential effects of recreation.

RMA guidelines specific to recreation activities that will help minimize the potential adverse effects of recreation to listed fish and their habitat include:

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

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

The recreation-specific guidelines combined with the overarching standards and guidelines for RMAs provide the management direction to implement actions necessary to minimize the potential effects of the

Recreation Program on watershed and riparian processes and listed fish and their habitat. The direction is at least equal to the direction in PACFISH and INFISH. The restoration objectives address recreation impacts and provide specific direction through WM-1S to improve riparian and aquatic habitat where recreation impacts have occurred. This is an improvement over PACFISH and INFISH.

Potential impacts from motorized trails is covered in the Road Management Program section above.

Land and Special Uses Program

The Land and Special Uses programs include road use permits, right-of-ways or easements, use of federally owned structures, operation of resorts on Federal land, recreational residences, water transmission lines, diversion dams, water withdrawals for irrigation, diversion structures, telephone lines, and some powerline special use permits. A permit for a special use is governed by the management direction for the area the special use permit, lease, or easement is authorized. The effects of a special use will be determined at the time a request for a permit is received, and there is no way to predict what uses may be requested in the future. Current special use permits may need to be modified in order to meet the new direction provided by the Revised Forest Plan.

It is challenging to generalize program effects at the Revised Forest Plan scale since it can include a wide variety of activities across the landscape. Effects from the most common permit activities include:

- Disturbance and stress to fish from in water or shoreline activities.
- Entrainment and impinge of fish from improperly screened water diversion.
- Impacts to water quality, quantity, and fish and their habitat from water diversions.
- Clearance of vegetation along powerlines and telephone lines to reduce risks to the infrastructure causing impacts to stream shade, streambank vegetation, and inchannel woody debris.
- Sediment and turbidity from issuance of road use permits or granting of right-of-ways. Activities such as rocking and culvert and ditch maintenance, which are intended to prevent erosion in the long term, often produce some short-term sediment delivery. Also, hauling of logs, heavy traffic, or heavy equipment use on non-paved roads during wet weather can damage the road surface, causing piping and runoff that carries fine sediment particles. This is of particular concern where haul roads and other access routes closely parallel and cross streams containing fish.
- Chemical contamination from equipment leaks, refueling, and septic systems associated with cabins and solid waste sites, and recreational and group use of other sites.

The potential effects of special uses will be minimized by RMA standards and guides, especially RMA-1S. As described previously, projects would not be consistent with this standards if effects did not maintain baseline conditions when they are within desired conditions. When baselines are outside of desired conditions, projects must restore or not retard attainment of desired conditions to the degree the project contributes to them. Short-term adverse effects from projects may occur as long as they support or do not diminish long-term recovery of watershed function desired conditions and federally listed species.

Effects would be further constrained by standard LH-1. This standard states all new and existing special uses that result in adverse effects to habitat conditions and ecological processes essential to aquatic and riparian-dependent resources shall require mitigation that results in re-establishment, restoration, mitigation, or improvement of those conditions and processes. This standard provides considerably more protection for listed fish and their habitats from threats associated with special uses than PACFISH and INFISH.

This program also includes real estate activities (including land exchanges and acquisitions and granting or accepting of easements). The Lands Program can be beneficial to listed species and their habitats in that one of the reasons for land acquisition is to maintain, restore, and enhance plant, wildlife, and

riparian aquatic and riparian-dependent resources and ecological processes and habitat including aspects of connectivity, foraging, and reproduction for threatened, endangered, conservation concern species. The Lands Program activities will continue and do not change as a result of the Revised Forest Plan. Guideline LH-4G protects fish and other aquatic species and their designated critical habitat by avoiding the disposition of occupied habitat. This would ensure Forest Service administration would continue, and all relevant Revised Forest Plan components associated with the ARCS and other direction would be applied.

In addition to the standard above, hydropower special uses are further constrained by two additional standards.

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

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

These standards provide additional protection where hydroelectric facilities will be placed over and above PACFISH and INFISH.

Climate Change

A climate change vulnerability assessment (Halofsky et al. 2017) was completed in 2015 for the Blue Mountains. The assessment indicated that significant changes to hydrology (decreased snowpack, earlier snowmelt; higher peak flows, and lower summer flows) may occur. These projected changes may have far-reaching effects on aquatic and terrestrial ecosystems, especially as frequency of extreme climate events (drought) and associated effects on ecological disturbance (wildfire) increase. Abundance and distribution of spring/summer Chinook salmon, steelhead, and bull trout may be greatly reduced. Fall spawning species, such as Chinook salmon and bull trout, whose eggs overwinter in streambed gravels, are likely to be especially impacted by increased winter flooding and greater movement of streambed gravels and cobbles during winter rain-on-snow events. However, lower summer base flows and higher water temperatures will likely impact all listed fish species as perennial streams shrink during the summer dry period, forcing fish into smaller wetted channels and less diverse habitats.

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

The ARCS and other Plan components are intended to: (1) protect and maintain the ecological integrity of aquatic ecosystems and watersheds, riparian areas, water quality, and water resources; (2) maintain and

restore dynamic ecological processes responsible for creating and sustaining habitats over broad landscapes, and (3) identify watershed(s) that are a priority for protection, maintenance, or restoration. Restoring and maintaining resilient conditions are also mentioned in several desired conditions (e.g., Aquatic Habitat Function DC-8: Aquatic and riparian ecosystems are resilient to the effects of climate change and other major disturbances; Water Use DC-1: Water is available in sufficient quantity and quality to meet downstream human needs as well as the needs of aquatic species considering the range of possible climate change scenarios, etc.) and standards and guidelines (e.g., Standard RF-7S: New or replaced permanent stream crossings shall be designed to allow for the 100-year flood and its bedload and debris. 100-year flood estimates will reflect the best available science regarding potential effects of climate change).

Collectively, the ARCS components are designed to maintain and improve watershed, riparian and aquatic habitat conditions, fish populations, and habitat connectivity, particularly within the key watersheds. As restoration is implemented across the three forests, projects should slowly implement the Blues Vulnerability Assessment recommendations and create a network of properly functioning watersheds that are more resilient to withstanding some climate change effects and that are better able support to a variety of aquatic species and other riparian-dependent resources on NFS lands.

Cumulative Effects

Scope

In the context of the Endangered Species Act (ESA), cumulative effects encompass the effects of future State, Tribal, local, or private actions that are reasonably certain to occur within the action area; in this case, in the entirety of the Blue Mountains of Oregon. Future Federal actions, including those are unrelated to the proposed action, are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA. Cumulative effects, in the context of Section 7 consultation, are generic to the area of consideration and not related to this proposed action. The cumulative effects analysis is therefore independent of the specific activities addressed in this programmatic BA and addresses impacts in the context of general trends in population and land-use.

Eastern Oregon Population Trends

The Eastern Oregon Local Workforce Area is comprised of eight counties (Baker, Grant, Harney, Malheur, Morrow, Umatilla, Union, and Wallowa). In terms of population, this area is relatively small when compared with the whole of Oregon. According to the most recent population estimates by Portland State University's *Population Research Center*, Oregon's population reached 4,013,845 in July 2015; an increase of 176,545 (4.6 percent) since 2010, and 592,409 (17.3 percent) since 2000. In comparison, Eastern Oregon's population reached 187,140 in 2015; an increase of 4,715 (2.6 percent) since 2010, and 9,941 (5.6 percent) since 2000. As Oregon's total state population has increased, Eastern Oregon's share of total state population has decreased. Eastern Oregon accounted for 5.2 percent of the state's population in 2000, 4.8 percent in 2010, and 4.7 percent in 2015.

While Eastern Oregon's total population has continued to rise over the years, Baker, Grant, Harney, Malheur, and Wallowa counties have each decreased in county population from 2000 to 2015. Grant County dropped 505 people (6.4 percent), which was the largest decrease for the period, while Baker and Harney both saw a decrease of just over 300 people. This trend has reversed recently in three of these five counties. Since 2010, Baker, Malheur, and Wallowa have seen slight upward movement in population; Grant and Harney however, continue to decrease. This means that for Eastern Oregon, population growth since 2000 has come primarily from three counties (Morrow, Umatilla, and Union), and the vast majority of growth has come from Umatilla alone.

Since 2000, Umatilla County has seen an increase of 8,607 people; a 12.2 percent jump in the county's population. Union County has seen an increase of 2,095 people; an increase of 8.5 percent in county population. Morrow has seen an increase of 635; an increase of 5.8 percent in county population. Overall, Umatilla accounted for 76.0 percent of Eastern Oregon's combined population growth from 2000 to 2015. This share of growth in the region narrowed from 2010 to 2015, with Umatilla County responsible for 64.0 percent of the region's population growth for that period (<https://www.qualityinfo.org>).

Residential, Commercial, and Infrastructure Development

Intuitively, population growth results in increasing residential and commercial development. Improvements and upgrades to infrastructure (including highways, other transportation facilities, pipelines, power lines, and power plants) will likely track closely with increased residential and commercial development. Primary pathways of potential effects of land development include the following: direct habitat loss, decreased water quality, contamination of waterways and uplands, changes to runoff patterns, habitat fragmentation, isolation of populations, and loss of habitat diversity. In general, as development increases, the quantity and quality of habitat suitable for threatened and endangered species typically decreases. Based on past trends and types of development, future residential, commercial, and infrastructure development will likely lead to further habitat degradation. Actions taken to mitigate for the potential impacts of development may help slow the rate of habitat degradation.

Agriculture

Assuming future trends mirror the historical pattern in Oregon, substantial additional impacts to fish and wildlife due to agriculture are not expected. However, in many areas within the programmatic area, certain ongoing agricultural practices (such as livestock grazing, irrigation, chemical application, and regular habitat disturbance in agricultural areas) are likely to prevent habitat from reaching properly functioning conditions for listed species.

Forestry

In Oregon, non-federal timber harvest typically involves clear-cutting. Impacts due to clear-cutting and forest roads have been well documented and such impacts are long lasting and additive. Timber harvest and associated impacts are concentrated in western Oregon; however, timber harvest is anticipated within the Blue Mountains, to varying degrees, within the action area. Although the rate of harvest appears to be slowing in some areas and improved forestry practices have been implemented, the collective impacts of past and reasonably foreseeable future forestry activities are likely to result in additional future degradation of habitat for listed species.

Pollutant Discharge

Air and water pollution can degrade habitat and have lethal and sub-lethal effects on fish and wildlife. Increased human population typically causes increased air and water pollution. Developed areas also generate effluent, and runoff is often polluted with a variety of substances. Within the Blues, each of the sub-basins within the action area contain 303(d)- listed streams, with water temperature being the most frequent parameter exceeding state standards. Other notable parameters include bacteria, dissolved oxygen, flow modification, habitat modification, nutrients, pH, sedimentation, total dissolved gas, toxicants, and turbidity. Ongoing activities in Eastern Oregon will help mitigate and/or reverse pollutant sinks and sources. The Oregon Department of Environmental Quality (ODEQ), for instance, has completed TMDLs for several major basins since 1998. By 2004, ODEQ will complete TMDLs in more than 40 additional basins. However, continued pollutant discharges will likely continue in the future and are very likely to degrade habitat for listed species.

Oregon Fish Recovery Efforts

Beginning in 1997, the State of Oregon developed a comprehensive aquatic conservation strategy (The Oregon Plan). The goal of the Oregon Plan is to "restore populations and fisheries to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits." Components of the Oregon Plan include (1) coordination of efforts by local, state, and Federal governments as well as Tribal, private, and other interests; (2) development of action plans with relevance and ownership at the local level; (3) monitoring progress; and (4) making appropriate corrective changes in the future. This process included chartering 84 locally formed "watershed councils" across the State. Membership on the watershed councils includes landowners, businesses interests, agricultural interests, sport fishers, irrigation/water districts, individuals, State, Federal, and Tribal agencies, and local government officials. Further, since 1990, the State of Oregon has taken several actions to address the conservation and recovery of bull trout. More restrictive harvest regulations were implemented beginning in 1990; by 1994 the harvest of bull trout was prohibited throughout the State with the sole exception of Lake Billy Chinook in central Oregon. Bull trout working groups have been established in the Klamath, Deschutes, Hood, Willamette, Odell Lake, Umatilla and Walla Walla, John Day, Malheur, and Pine Creek river basins for the purpose of developing bull trout conservation strategies. In addition, the Oregon Department of Fish and Wildlife reduced the stocking of hatchery reared rainbow trout and brook trout in areas where bull trout occur, and genetic analysis for most bull trout populations was completed in 1997.

Conclusion for Cumulative Effects

The ESA listings of fish and wildlife species in the States of Oregon have been based, in part, on the additive impacts of growth, development, and other human activities. At this point, the trends discussed above indicate that future impacts will progress similarly, leading to additional adverse impacts on all fish and wildlife and their habitats. Changes to past development practices and fish recovery efforts in Oregon provide hope that past trends are not predictive of future circumstances.

Summary of Effects of Hells Canyon National Recreation Area Comprehensive Management Plan on Listed Aquatic Species and their Designated Critical Habitats

As discussed previously, the Revised Forest Plan incorporates the 2003 CMP and subsequent plan amendments (e.g., PACFISH, INFISH, and Eastside Screens) within its 652,488 acre boundary. The nature of the CMP is to identify goals and objectives for HCNRA management, functioning as a framework for future decisions. The CMP does not cause specific actions to happen, but does identify sideboards within which future actions may be developed or implemented. As such, the effects of the decision are indirect, occurring in the future and resulting after subsequent analysis, decisions, and consultation.

The CMP contains nine MAs. Approximately 43.1 percent of these MAs occur in wilderness (33.7 percent), wild and scenic rivers (7.6 percent), and research natural areas (1.8 percent) where the intent is to protect and preserve natural conditions, not diminish outstanding remarkable values, and preserve gene pools for typical and rare and endangered plants and animals. Other than designated and dispersed recreation, education, and research, there are few management activities that pose a threat to BPFs in these MAs. Non-motorized trails use may cause some minor erosion and concentrated runoff near stream channels and at stream fords. However, trail maintenance should minimize most impacts to spawning and rearing habitat, and water quality. Concentrated use of dispersed sites may cause soil compaction, streambank disturbance, and trampled vegetation, accelerating sediment delivery to streams. Maintenance and proper implementation of the PACFISH and INFISH standards and guidelines (RM-1, RM-2, and RM-3) should minimize impacts to fish habitat, riparian vegetation, water quality, and food sources for fish forage. Specially, RM-1 requires operation of recreation sites so they do not retard or prevent

attainment of the RMOs, and relocating/closing recreation facilities where RMOs cannot be met or where adverse effects on listed anadromous fish cannot be avoided.

The remaining acres within the HCNRA are managed for: (1) grazing that must enhance native vegetation (Management Area 9 – Dispersed Recreation/Native Vegetation, 24.7 percent); (2) grasslands managed for maximum forage production (Management Area 10 – Forage Emphasis, 18.9 percent); and (3) timber management to provide a variety of tree species, a diversity of healthy forests (Management Area 11 – Dispersed Recreation/Timber Management, 10.8 percent). All of these MAs also provide for a mixture of primitive, semi-primitive nonmotorized, and semi-primitive motorized recreation opportunities and must be managed to meet the intent of the HCNRA by enhancing recreational and ecological values.

Within the above MAs, management is focused in a small portion of the overall remaining acres. Based on the 2003 CMP assessment, a maximum of 17,700 acres (2.7 percent) of forested vegetation is available for precommercial thinning, mechanical treatment, and underburning, single-tree selection, and commercial thinning. An active prescribed fire program would also be implemented. No new roads would be built in the HCNRA and timber harvest will be limited to areas near past management. However, road relocation and reconstruction may occur. Of the 735 miles of road under the jurisdiction of the Forest within the HCNRA, approximately 71 percent (533 miles) are continuously or intermittently open to the public. Additionally, there are 925 miles of trails in the HCNRA. Access off of designated roads is limited to 20 feet on either side. The current trail system will be maintained with no significant net increase in the number of trails. Approximately 51 percent of the HCNRA will be included in active grazing allotments.

Management activities have the potential to adversely affect the listed fish species and their BPFs, including impacts to water quality, water temperature, instream and riparian habitat, and food sources for salmonids. Specifically, vegetation management activities can accelerate erosion and increase runoff by changing upslope hydrology and road-related disturbance, which can impact water quality, alter hydrologic conditions, increase landslides, and block fish habitat. Developed and dispersed camping can frequently result in streambank disturbances, soil compaction, and vegetation removal. Grazing can lead to an increase in sedimentation through increased surface erosion, a decrease in effective vegetative ground cover and root binding strength, streambank instability, stream channel incision, and loss of primary shade in small streams. The results can lead to pool filling, decrease in spawning and rearing habitat, and reduction in fry emergence and solar heating. Additionally, livestock often cross streams or drink from shallow stream sections where fish spawning occurs, and their hooves can crush and destroy sensitive incubating eggs within redds. Management activities in the HCNRA may also adversely affect listed Bull Trout and Snake River steelhead trout, and Spring/Summer Chinook within tributaries due to habitat impacts and disturbance to rearing, spawning, and pre-spawning fish.

Forest Plan management direction for riparian and aquatic resources has been developed to maintain or improve watershed and aquatic conditions on NFS lands. PACFISH/INFISH standards and guidelines and Forest Plan guidance included in the CMP will avoid or minimize potential adverse effects to listed fish and their critical habitat BPFs from management activities. Examples of this guidance includes: (1) GM-1: Modify grazing practices (e.g., accessibility of riparian areas to livestock length of grazing season, stocking levels, timing of grazing, etc.) that retard or prevent attainment of RMOs or are likely to adversely affect DCH. Suspend grazing if adjusting practices is not effective in meeting RMOs and avoiding adverse effects on DCH; (2) Rip/Aqu-S1 (RHCA's would be maintained and protected for 300 feet on each side of perennial fish-bearing streams and 150 feet of perennial streams, ponds, lakes, springs and other natural water bodies); (3) Rip/Aqu-S2: No management practices causing detrimental changes in water temperature or chemical composition, blockages of water courses, or deposition/erosion of sediment shall be permitted within RHCA's which seriously and adversely affect water quality and riparian aquatic habitat; (4) Wqq-O1: Maintain or improve water quality, while recognizing the limitations posed by marginally stable tributary stream channels in a canyon environment that efficiently

collect and transport surface water from frequent intense runoff events in high-gradient, dendritic, drainage networks; and (5) Wqq-O2: Maintain favorable conditions of stream flows for water quality, while recognizing limitations posed by the exercise of valid water rights, hydropower licenses, and natural conditions that affect streamflow. A complete set of guidance in the CMP is located in Appendix F.

PACFISH and INFISH aquatic conservation strategy components, CMP guidance, and the large portion of the HCNRA in protective land allocations (wilderness, wild and scenic rivers, etc.) is expected to maintain appropriately functioning conditions and restore habitat-limiting factors identified in recovery plans and critical habitat PBFs for Snake River Basin steelhead, and Snake River spring/summer Chinook salmon, and Columbia River bull trout. Improvement would be due in part to reductions in open road mileage, limited access along open roads, and limited acres where timber harvest can occur. Effects from programmatic actions will indirectly lead to improved environmental baseline conditions over time for all affected watersheds. All future site-specific actions will undergo appropriate site-specific analysis under the ESA for DCH during the earliest stages of project planning. Although standards and guidelines address many management activity effects, adverse effects are still anticipated from project activities to have the potential for effects to DCH. Based on the review of the indirect and cumulative effects, the Forest management programs such as vegetation management, roads and trails, livestock grazing all have the potential to **may affect, likely to adversely affect** bull trout, Snake River Basin steelhead trout, and Snake River spring/summer Chinook and their PBFs associated with their DCH.

Summary of Effects on ESA Listed Fish Species and their Designated Critical Habitat within the Plan

The summary of effects to aquatic listed fish species and their designated critical habitat will be common to all. These will include Snake River spring and summer Chinook, Mid- Columbia River steelhead, Snake River steelhead, and Columbia River bull trout. Based on the nature of this programmatic plan and the fact that it doesn't authorize any federal action, there will be no direct effects to aquatic listed species and or their designated critical habitats.

The proposed action represents a programmatic decision, and therefore would have no direct effects on fish or their habitats. Any direct or indirect effects would occur later, during project implementation, when site-specific decisions are made based on Revised Forest Plan direction and direct, indirect, and cumulative effects are evaluated. All project level activities will undergo separate, site-specific, environmental analyses, and Section 7 consultation will occur where effects to threatened or endangered species or their habitats are anticipated.

The Blues ARCS (e.g., desired conditions, standards and guidelines, key watershed network, etc.) is designed to provide the ecological conditions conducive to maintaining, restoring, and enhancing habitat necessary to sustain aquatic and riparian-dependent species on NFS lands. The Blues ARCS is also consistent with the Interior Columbia Deputy Team direction for revising Forest Plans. The Revised Forest Plan includes an integrated watershed and aquatic resource monitoring program designed to assess if management actions during Revised Forest Plan implementation are meeting or moving towards the desired conditions.

The Blues ARCS and plan components are more comprehensive than the current PACFISH and INFISH direction (e.g., desired conditions; expanded RMAs for lakes/ponds, and seasonally flowing streams, wetlands; use of diagnostic criteria to evaluate attainment or progress towards aquatic and riparian desired conditions, and compliance with key standards and guidelines, key watersheds, etc.). The plan components for watershed resources, riparian management areas, and key watersheds are designed to

maintain and improve watershed, riparian and aquatic habitat conditions, fish populations, and habitat connectivity, particularly within the key watersheds. As restored watersheds accumulate over time through implementation of focused aquatic restoration, fish and habitats would likely respond in priority subwatersheds in subsequent decades creating larger blocks of high-quality, well-connected habitat, and increases in the number of refugia. Though impaired aquatic habitat within the planning area still exists, many habitat variables, based on PIBO monitoring, appear to be slowly improving in since the adoption of PACFISH and INFISH. Implementation of the Revised Forest Plan is expected to continue this improving trends. Management activities must be designed to meet applicable standards and guidelines. Two key standards (WM-1S and RMA-1S) set the tone for project development by requiring baselines that are within desired conditions to be maintained. When baselines are not within desired conditions, projects must restore or not retard attainment of desired conditions to the degree that project contributes to it. Short-term adverse project effects may occur when they support or do not diminish long-term recovery of watershed function desired conditions and federally listed species, unless forests have limited authorities (e.g., Alaska National Interest Lands Conservation Act {ANILCA}, Greater Mining Act of 1872, valid state water rights, etc.) to deny projects. In these situation project effects shall be minimized to the greatest extent possible.

Although standards and guidelines address many management activity effects, adverse species effects are still anticipated from project activities, for example, take through habitat impacts and disturbance/mortality to fish. Forest management programs, especially vegetation management, roads and trails, livestock grazing, minerals, and lands and special uses all can adversely affect the PBFs associated with critical habitat and the aquatic species.

By adopting and implementing the Revised forest Plan and all its components, consistency with section 7(a) (1) of the ESA that requires federal agencies to use their authorities to further the conservation of listed species, will be achieved. The Revised Forest Plan is also consistent with the recovery plan as standards and guidelines should limit the potential for exacerbating the threats to listed fish recovery due to forest management practices, National Forest System roads, and fish passage issues within the planning area. The key watershed objectives are also consistent with and will complement recovery actions identified in the recovery plans and restoration plans of other entities. Based on the review of the indirect and cumulative effects, the ARCS and plan components should prevent any long-term adverse effects so that management activities implemented under the Revised Forest Plan direction **may affect, likely to adversely affect** Snake River Basin spring and summer Chinook, Middle Columbia River steelhead, Snake River Basin steelhead, and Columbia River bull trout and their critical habitats.

The selected alternative makes no changes in the Wild and Scenic River designation and management allocation or direction for the Grande Ronde, Big Sheep Creek or the Imnaha Wild and Scenic Rivers, or to the management of the Imnaha River in the HCNRA. The Blue Mountains ARCS, Wild and Scenic River management direction, Wilderness and other management direction for other management allocations in the selected alternative will guide all future actions on other Umatilla and Wallowa-Whitman lands affecting fall Chinook salmon or their DCH in and downstream of the planning area. The selected alternative therefore will have negligible and discountable direct, indirect and cumulative effects on fall Chinook salmon DCH in the planning area for reasons previously discussed. The impact of the action is expected to improve existing conditions for fall Chinook DCH. Some suitable uses in management allocations implemented through site-specific actions in the Grande Ronde River, Tucannon or Big Sheep Creek watersheds outside the WSR corridors may **still have a May Affect, not likely to adversely affect** determination to PBFs for Snake River fall Chinook salmon DCH or to individual fish due to their very nature (i.e., timber harvest, prescribed fire, grazing, roads and trails, recreational floating and associated activities) all have negligible and discountable potential to indirectly or cumulatively affect water quality and aquatic habitat, and recreational floating has potential to momentarily disturb individual fish which are not likely to be encountered in the Grande Ronde WSR between the Wenaha and Wallowa river confluences. The direct and indirect effects

analyzed with this BA would pose low risks of causing any adverse effects on DCH in the Grande Ronde River upstream of Troy Oregon due to canyon topography and the majority of NFS suitable land uses and activities occurring upslope, outside the Wild and Scenic River corridor. Land management effects in the planning area portion of the Tucannon River subbasin **May Affect, but are not likely to adversely affect** fall Chinook or their DCH in the Tucannon River thirty miles downstream from the Umatilla National Forest boundary.

EFH under MSA Conclusion

Essential Fish Habitat for Coho and Chinook Salmon

Coho and Chinook salmon EFH are found in the planning area. Chinook salmon EFH is found within the Forests in the Imnaha and Snake Rivers (including the HCNRA), Upper and Lower Grande Ronde, Wallowa, Tucannon, Asotin, and Umatilla rivers. Coho were historically present in the Umatilla, Tucannon, Asotin, Upper and Lower Grande Ronde and Wallowa rivers but went extinct and have been reintroduced in some drainages. Hatchery coho are present in the Umatilla River downstream of the Umatilla National Forest. Hatchery coho are also currently present in the Grande Ronde River to the confluence with the Wallowa River, occupying habitat managed by the Umatilla and Wallowa-Whitman National Forests, and in the lower Wenaha River and North Fork Wenaha River (tributary to the Grande Ronde) managed by the Umatilla National Forest. Current distribution of hatchery coho is based on information provided by the Pacific Salmon Marine Fisheries Commission (PSMFC). Historic and current Coho and Chinook salmon habitats in these rivers are considered essential fish habitat under the Magnuson-Stevens Act (Federal Register /Vol. 79, No. 243 /Thursday, December 18, 2014).

The Magnuson-Stevens Act defines adverse effects as any impact which reduces the quality and/or quantity of essential fish habitat. Adverse effects include direct, indirect, site-specific, or habitat wide impacts, including individual, cumulative, or synergistic consequences of actions. Based on the assessment of indirect and cumulative effects completed in this analysis, implementation of the Revised Forest Plan and HCNRA CMP **may have adverse effects on EFH**. This determination is based on the following rationale:

1. Temporary effects for management actions have been defined as occurring up to three years and short-term effects from 3 to 15 years. These effects may impact habitat indicators, which EFH was designated for.
2. Threats to water quality from spills of fuel, oil, cleaning materials, or human waste have been greatly reduced, but not completely eliminated. Some storage and use would still occur in RMAs or along roads within RMAs where there is no other alternative. Spills and accidents thus may occur from this use, affecting EFH.
3. Threats to RMAs and EFH may occur in certain circumstances when no other suitable locations for incident bases, camps, helibases, staging areas, etc., exist. Delivery of chemical retardant, foam, and other additives near or on surface waters may occur when there are imminent threats to human safety and structures or when a fire may escape causing more degradation to RMAs, than would be caused by addition of chemical, foam or additive delivery to surface waters in RMAs.
4. Although most threats for each management activity (e.g., timber, etc.) are addressed by management direction, those management activities that emphasize active management have a higher potential for temporary and short-term risks to EFH. As more active treatments are applied, more protective measures are needed to mitigate potential effects. It is assumed that as more protective measures are applied, the greater the potential impacts from mitigation measures not being implemented correctly. It is also assumed that the more management activities applied to a specific location, the more the risk there is of impacts from those management disturbances to essential fish habitat, regardless of mitigation measures.

Wildlife/Plants Chapter

Status / Environmental Baseline of the Species and Critical Habitat

Status of the Species – Gray Wolf

On May 5, 2011, the USFWS published a final rule – as directed by Congressional legislative language in the enacted Fiscal Year 2011 appropriations bill – reinstating the USFWS 2009 decision to delist biologically recovered gray wolf populations in the NRM, including a portion of Oregon and Washington. Wolves in Oregon located west of Highways 395-78-95 and in Washington east of Highway 97-17-295 remain protected by the Federal ESA (Figure 66). The USFWS is the lead management agency for wolves that occur west of Highways 395-78-95 (Oregon) and Highways 97-17-295 (Washington) and all provisions of the Federal ESA apply.

Current Status and Conservation Needs

Wolves on a portion of the Umatilla National Forest, and the Malheur National Forest West of State Highway 395, are listed as federally endangered (Figure 66).

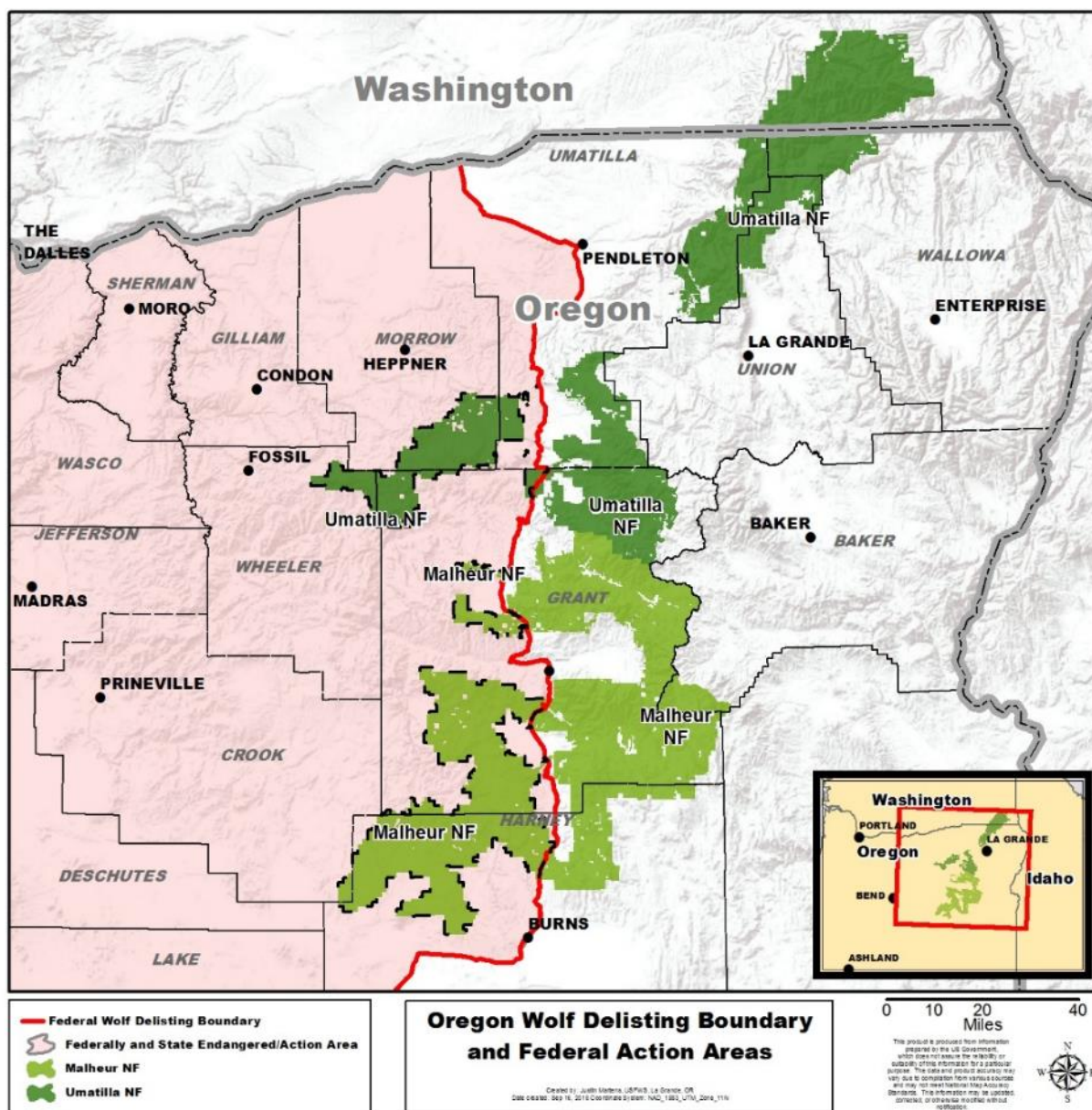


Figure 66. Area and location map of Umatilla and Malheur national forests. The Federal listing boundary is shown in red, and the action area is all Umatilla and Malheur national forest lands west of the red line (Highway 395)

Through natural dispersal from neighboring Idaho, wolves became established in Oregon in 2008 and have increased in both distribution and abundance during all years since that time. At the end of 2014, there were nine successful breeding pairs of wolves in Oregon. The direct count of wolves in 2016 was 112 wolves, with reproduction having been documented in 11 packs or groups (Figure 67). There are two documented wolf packs in southeastern Washington primarily overlapping the Umatilla National Forest, though outside of the area where the species is federally listed (Figure 68).

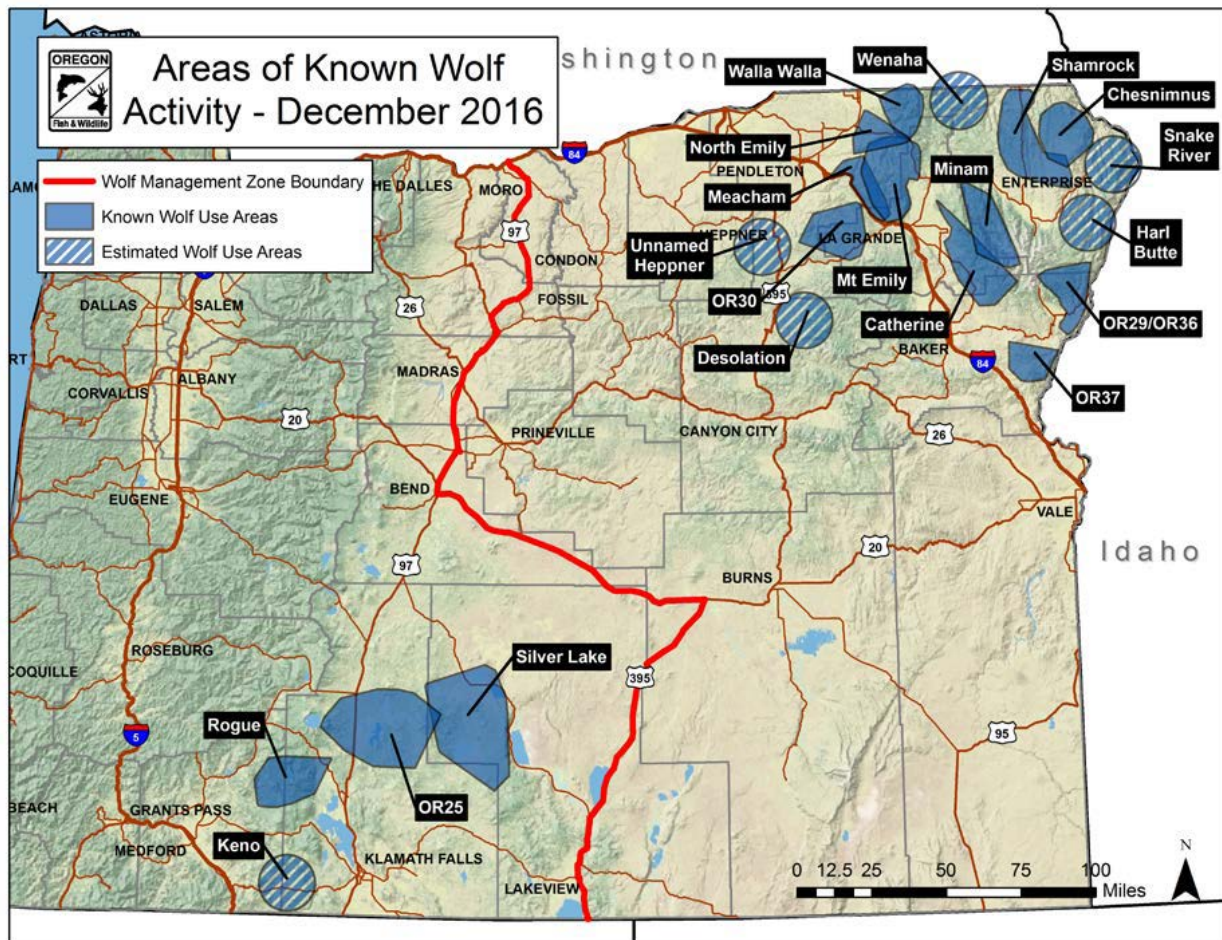


Figure 67. Areas of Known Wolf Activity within Oregon in 2016 (ODFW 2017).

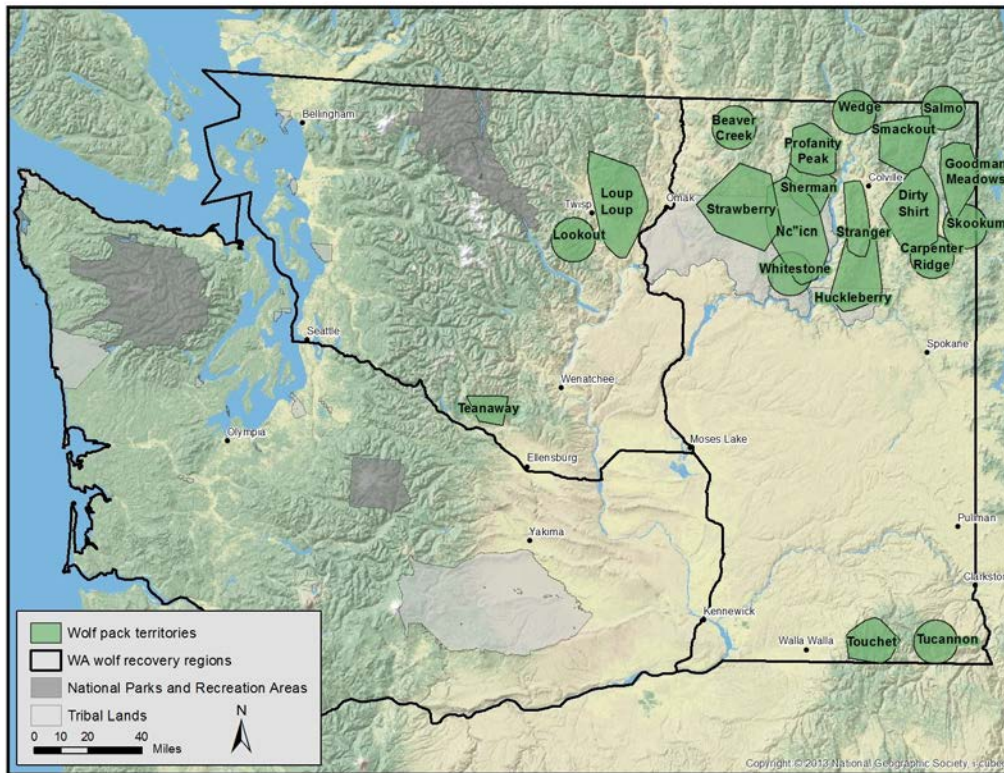


Figure 68. Wolf Packs in Washington in 2016 (WDFW et al. 2016).

Life History

Food Habits

The following is largely taken from Oregon Department of Fish and Wildlife (ODFW) Biological Status Review (2015), available at:
http://www.dfw.state.or.us/agency/commission/minutes/15/11_november/Exhibit%20B_Attachment%203_Updated%20Biological%20Status%20Review.pdf

Across their range in North America, wolves depend on native large ungulates as a primary prey source (Haight et al. 1998, Fuller et al. 2003). Oregon is a multi-prey system with abundant elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), black-tailed deer (*O.h. columbianus*) and white-tailed deer (*Odocoileus virginianus*). Though prey selection may vary in multi-prey systems, diets of wolves in the Northern Rocky Mountains are dominated by elk wherever the two species co-occur (Smith et al. 2004, Oakleaf et al. 2006).

Analysis of prey selection and kill rates by wolves in Oregon has not been completed, but observations in northeastern Oregon indicate that elk are common prey species of wolves. Oregon maintains a robust and widely distributed elk population numbering an estimated 128,000 elk across 151,500 square kilometers (ODFW 2015). Between 2009 and 2014, all wildlife management units (WMUs) of northeastern Oregon with established wolf packs for at least four years (Imnaha, Snake River, Walla Walla, Wenaha) had increasing elk populations, and two of the four (Imnaha and Snake River) were above the established management objectives for elk since wolves became established (ODFW 2015).

Other important wolf prey species include mule deer – estimated at 229,000 in eastern Oregon (ODFW 2015), black-tailed deer (western Oregon) and white-tailed deer (especially in northeastern Oregon). ODFW does not maintain specific population estimates of black-tailed and white-tailed deer. However, hunter harvest data shows that both species are abundant within their respective habitats. Deer distribution overlaps with all elk range in Oregon and Washington.

Movement / Home Range

Wolf packs defend their territories from other wolves. Territory size is a function of prey density and can range from 25-1,500 square miles. Both male and female wolves disperse at equal rates and equal distances, sometimes greater than 600 miles.

Reproductive Strategy

The following is taken from the Gray Wolf Programmatic BA for Umatilla and Malheur national forests.

Female wolves begin to bear young when they are about two years old. Breeding usually occurs only between the dominant male and female in a pack, with the breeding season peaking in mid- to late-February. Pregnancies last for two months and usually result in a litter of three to five young, called pups. All the adults in a pack share in the raising of pups. Wolf packs generally range in size from 3 to 19 wolves.

April 1 until July 15 pack activity is centered near the den or at one or more rendezvous sites in close proximity to the den as the adult wolves hunt and return with food for the pups. Rendezvous sites typically are located in meadows or forest openings near the den, but can be several miles away as pups become more mobile. Adults carry small pups between the rendezvous sites, where the pups stay until they are able to travel and hunt with the pack, which usually occurs by September.

Habitat Characteristics

Wolves can occupy a variety of land cover types, provided adequate prey exists (Keith 1983, Fuller 1989, Haight et al. 1998) and human activity is minimal (Oakleaf et al. 2006, Belongie 2008). Global Positioning System (GPS) location data indicated wolves in Oregon primarily use forested habitat with seasonal shifts to more open habitats that reflect seasonal distributions of prey (e.g., lower elevation elk wintering areas). Location data from wolves collared in Oregon from 2006 to 2014 showed that 62 percent of all locations occurred on public and 38 percent occurred on private lands (ODFW unpublished data). Denning also occurs on both public and private land in Oregon and all known den sites occurring within forested habitat. In 2015, eight (62 percent) den sites were on National Forest System land and five (38 percent) were on private land.

Den and Rendezvous Sites

Studies of wolves have demonstrated contrasting results with respect to effects of habitat composition, topography, and human disturbance on dens and den site selection. Wolves generally select den sites based on specific habitat features within the immediate vicinity (within 100 meters) of a den, and prefer locations away from roads and human activity (Person and Russell 2009).

If suitable or preferred locations are not available, wolves will select den sites in less desirable habitat (i.e., near human activity or disturbance) (Person and Russell 2009). In some instances, wolves may move their pups to another den site if disturbed, but may also move their pups spontaneously due to other external factors (Nonaka 2011, Mech 2003).

Avoidance of human disturbance is more important during denning when pups are less mobile compared to when they inhabit rendezvous sites (Benson et al. 2014, Iliopoulos et al. 2013). Wolves may have

several rendezvous sites during a summer (Claar et al. 1999) and occupancy of these areas is variable. Studies of rendezvous sites have demonstrated that wolves exhibit a wide variety of responses to human disturbance (Claar et al. 1999). Site selection of rendezvous sites varies across the globe. There are no known studies in Oregon or Washington that have identified trends in rendezvous site selection, but wolves in the neighboring state of Idaho typically select wet meadows near forested stands (Ausband et al. 2010).

Road Density

Studies have shown that there is a negative correlation between road density and suitable wolf habitat (Thiel 1985, Mech et al. 1988, Wydeven et al. 2001, and Mladenoff et al. 1995). As a generalist species, habitat is primarily based on prey availability, but a key secondary variable of predicting wolf occupancy is road density, and more importantly traffic volume (Mladenoff et al. 2009, Merrill 2000). Merrill (2000) determined that road density alone is not an accurate variable in determining wolf habitat, and is less significant than traffic volume, since roads themselves will not prevent wolves from inhabiting an area. Other studies have concluded that wolves may inhabit areas with greater road densities if those habitats are adjacent to relatively unroaded areas (Mech 1989). The primary issue of high road density and traffic volume is providing access for humans who deliberately or accidentally kill wolves (Mech et al. 1988, USDA Forest Service 2015c).

Risk Factors

Studies have shown that there is a negative correlation between road density and suitable wolf habitat (Thiel 1985, Mech et al. 1988, Wydeven et al. 2001, and Mladenoff et al. 1995).

The ability to persist will be determined largely by the degree of human tolerance for the species across the state's vast rural landscapes (ODFW 2005 (updated 2010)).

Risk of Climate Change on Gray Wolves

The gray wolf was ranked as low vulnerability to climate change by Gaines et al. (2012) because it is a habitat generalists and is more mobile compared to species that are habitat specialists. For example, the presence of wolves in Yellowstone significantly mitigates the reduction in late-winter carrion expected under climate change, suggested by a decreases in late winter snowpacks and thus less elk mortality (Wilmsers and Getz 2005).

Critical Habitat

No critical habitat has been proposed or designated in the Northern Rocky Mountains (USDI Fish and Wildlife Service 2011a). Gray wolves are expected to continue to increase in number and to migrate from those portions of eastern Oregon where wolves no longer receive protections under the Federal ESA into other parts of Oregon, to eventually establish populations in across Oregon.

Environmental Baseline for Gray Wolves

As of 2016, no known wolf activity areas or packs have been documented on those portions of the Malheur national forests west of the State Highway 395, the area where wolves are listed as federally endangered. On the Umatilla NF there is one unnamed estimated use area that includes area to the west of State Highway 395 (unnamed Heppner), the area where wolves are listed as federally endangered (Figure 66).

Habitat conditions on the forests today are a culmination of past management actions such as timber harvest, prescribed fire, fire suppression, and livestock grazing; combined with other factors such as establishment of invasive plants and the changing climate. Extensive timber harvest and road building

activities occurred between the 1950s and the 1990s. Within the last 25 years, the rate of these activities have significantly decreased, and with current budget and environmental laws, management activities are expected to continue at a somewhat similar rate. Livestock numbers peaked in the 1890s to early 1900s. As the Forest Reserves became established, grazing became a managed and regulated activity and numbers of livestock have steadily declined since the early 1900s. Livestock numbers have been fairly stable within the last 25 years. This discussion is important because it provides an environmental baseline and a framework for evaluating effects of future forest management actions to gray wolf habitat and populations, and discusses the existing conditions during the re-establishment of wolves in this area (USDA Forest Service 2017c from BA – programmatic)

Status of the Species – Wolverine

Current Status and Conservation Needs

Wolverine were proposed for listing under the Federal Endangered Species Act on October 18, 2016 (Federal Register 81, 71670-71671).

Wolverine habitat has been described as being primarily at high elevation and isolated from human activity (Carroll et al. 2001, Rowland et al. 2003, Aubry et al. 2007). Montane coniferous forests, suitable for winter foraging and summer kit rearing, may only be useful if connected with subalpine cirque habitats required for natal denning, security areas, and summer foraging (Copeland 1996, Copeland et al. 2010).

Life History

The following is taken from the ECOS Environmental Conservation Online System – Species Profile for Wolverine (<http://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A0FA>).

Food Habits

Wolverines are opportunistic feeders, consuming a variety of foods depending on availability. They primarily scavenge carrion, but also prey on small animals and birds and eat fruits, berries, and insects (Hornocker and Hash 1981; Wilson 1982; Hash 1987; Banci 1994). Wolverines have an excellent sense of smell, enabling them to find food beneath deep snow (Hornocker and Hash 1981).

Movement / Home Range

Wolverines have large spatial requirements; the availability and distribution of food is likely the primary factor in determining wolverine movements and home range (Hornocker and Hash 1981; Banci 1994). Wolverines can travel long distances over rough terrain and deep snow, with adult males generally covering greater distances than females (Hornocker and Hash 1981; Banci 1994). Home ranges of wolverines are generally extremely large, but vary greatly depending on availability of food, gender, age, and differences in habitat. Home ranges of adult wolverines range from less than 100 square kilometers (km²) to over 900 km² (38.5 square miles (mi²) to 348 mi²) (Banci 1994). Home range sizes are large relative to the body size of wolverines, and may indicate that wolverines occupy a relatively unproductive niche in which they must forage over large areas to consume the amount of calories needed to meet their life-history requirements (Inman et al. 2007a, p. 11).

Reproductive Strategy

Breeding generally occurs from late spring to early fall. Females undergo delayed implantation until the following winter to spring, when active gestation lasts from 30 to 40 days (Rausch and Pearson 1972). Litters are born between February and April, containing one to five kits, with two to three kits being the most common number (Hash 1987). Female wolverines use natal (birthing) dens that are excavated in

snow. Persistent, stable snow greater than 1.5 meters (5 feet) deep appears to be a requirement for natal denning, because it provides security for offspring and buffers cold winter temperatures (Pulliainen 1968, p. 342; Copeland 1996, pp. 92-97; Magoun and Copeland 1998, pp. 1317-1318; Banci 1994, pp. 109-110; Inman et al. 2007b, pp. 71-72; Copeland et al. 2010, pp. 240-242). Female wolverines go to great lengths to find secure den sites, suggesting that predation is a concern (Banci 1994, p. 107). Natal dens consist of tunnels that contain well-used runways and bed sites, and may naturally incorporate shrubs, rocks, and downed logs as part of their structure (Magoun and Copeland 1998, pp. 1315-1316; Inman et al. 2007b, pp. 71-72). Occupation of natal dens is variable, ranging from approximately 9 to 65 days (Magoun and Copeland 1998, pp. 1316-1317).

Habitat Characteristics

The following is taken from the ECOS Environmental Conservation Online System – Species Profile for Wolverine (<http://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A0FA>).

Wolverines do not appear to specialize on specific vegetation or geological habitat aspects, but instead select areas that are cold and receive enough winter precipitation to reliably maintain deep persistent snow late into the warm season (Copeland et al. 2010). The requirement of cold, snowy conditions means that, in the southern portion of the species' range where ambient temperatures are warmest, wolverine distribution is restricted to high elevations, while at more northerly latitudes, wolverines are present at lower elevations and even at sea level in the far north (Copeland et al. 2010, Figure 1). Deep, persistent, and reliable spring snow cover (April 15 to May 14) is the best overall predictor of wolverine occurrence in the contiguous United States (Aubry et al. 2007, pp. 2152-2156; Copeland et al. 2010).

Risk Factors

The current distribution of wolverines is likely determined by the intensity of human settlement, the persistence of spring snow cover, and the distribution of alpine/subalpine habitats (Aubry et al. 2007, Inman et al. 2012). Several researchers have documented the effects of roads and other human activities, on wolverines and their habitat and have included roads in models of source habitat (Carroll et al. 2001, Copeland et al. 2007, Krebs et al. 2007, Raphael et al. 2001, Rowland et al. 2003, Wisdom et al. 2000). Carroll et al. (2001) found areas with road densities less than 1 mile per square mile to be strongly correlated with the presence of wolverines. Rowland et al. (2003), in a test of the Raphael et al. (2001) source habitat model, found that road density was a better predictor of wolverine abundance than the amount of habitat when applied to a watershed scale.

Motorized recreation and the use of National Forest System roads may influence the habitat use and populations of wolverines. These potential effects include displacement from key habitats, disturbance during critical periods, and an increased risk of mortality (see Wisdom et al. 2000 and Gaines et al. 2003 for a complete list of road and trail associated factors that influence wolverine). The effects of motorized recreation and roads can occur during the non-winter period or during the winter period when snowmobiling or ski-trail grooming occurs.

Risk of Climate Change on Wolverine

The sensitivity of wolverine to the effects of climate change are considered to be high (McKelvey et al. 2011, Gaines et al. 2012). Because the extent of persistent spring snow cover has constrained current and historical distributions, then it is reasonable to assume that it will also constrain the wolverine's future distribution (Copeland et al. 2010 and Aubry et al. 2007).

An important climate change adaptation that has been recommended for wolverine is to reduce the negative effects of non-climate related stressors such as the effects of roads (and trails) on habitat (Gaines

et al. 2012, Lawler et al. 2014). By reducing the negative effects of roads, habitats can become more resilient to the effects of climate change, and habitat connectivity can be restored allowing wolverines to adjust their ranges as conditions change.

Critical Habitat

As wolverine is proposed species under the Endangered Species Act, there is no critical habitat at this time.

Environmental Baseline for Wolverine

In Oregon, the wolverine was thought to have been extirpated by 1936 (Hiller 2011). Based on records from the Oregon Department of Fish and Wildlife (ODFW), at least one report of a wolverine was documented for each decade from the 1960s to the 1990s, including locations in Linn, Harney, Wheeler, and Grant counties (Hiller 2011). More recently, a monitoring project resulted in confirmation of three individual wolverines in northeastern Oregon on the Wallowa-Whitman NF (Magoun et al. 2013), an area with no prior documentation of wolverines.

Malheur National Forest

The wolverine is listed as suspected on the Malheur National Forest (USDA Forest Service 2015b) but there is no recent evidence to indicate that the Forest currently contains occupied habitat. The remains of a juvenile wolverine were found in the Strawberry Mountain Wilderness in 1992 and verified by Oregon State University (Kranich 2011 (14 Dec.)). Winter helicopter surveys conducted by Oregon Department of Fish and Wildlife in 1997 documented a potential den site in the Strawberry Mountain Wilderness, and probable wolverine tracks near Pine Creek and in the Monument Rock Wilderness (Holden 1997).

Wales et al. (2011) in assessing denning habitat found the vast majority (96 percent) of the watersheds on the Malheur National Forest had zero to low (1-600 acres) amounts of denning habitat, with only four having moderate amounts, and there were no watersheds with high amounts (greater than 1400 acres). This would suggest that it would be highly unlikely that the Malheur National Forest would support a breeding population of wolverines, and that occurrence on this Forest would in all likelihood represent extreme dispersal events that are not representative of self-sustaining populations as suggested by Aubry et al. (2007).

Umatilla National Forest

The wolverine is listed as suspected on the Umatilla National Forest (USDA Forest Service 2015b) but currently there is no evidence to indicate that the Forest contains occupied habitat. Snow tracking surveys conducted in the analysis area during the early 1990s and winter 2011 (Sharps Ridge route) for wolverine, Pacific fisher, American marten, and Canada lynx have resulted in no suspected wolverine tracks. There have been no sightings of this species on the Umatilla National Forest. Similar to the Malheur National Forest, 96 percent of the watersheds on the Umatilla had zero to low (1-600 acres) amounts of denning habitat (Wales et al. 2011) with only four percent having moderate amounts, and there were no watersheds with high amounts (greater than 1400 acres). Similar to the Malheur National Forest, 87 percent of the watersheds on the Umatilla National Forest have little to no denning habitat. This would suggest that it would be highly unlikely that the Umatilla National Forest would support a breeding population of wolverines and that occurrence on this Forest would in all likelihood represent extreme dispersal events that are not representative of self-sustaining populations as suggested by Aubry et al. (2007).

Wallowa-Whitman National Forest

Prior to 2011, there had been several unconfirmed sightings reported periodically in numerous areas on the Wallowa-Whitman National Forest. Sightings are mostly from wilderness, or more remote, high-

elevation areas. Formal winter track surveys for wolverine were conducted during the winters of 1991 through 1994 but did not detect wolverines. In 2011, the Wallowa-Whitman National Forest worked cooperatively with The Wolverine Foundation and several other partners on a systematic survey for wolverine in and around the Eagle Cap Wilderness. The survey utilized remote cameras, snow tracking, and aerial surveys. As a result of these surveys, three wolverines were confirmed in the Wallowa Mountains of Northeast Oregon (Magoun et al. 2011).

Currently, there are no confirmed denning areas of wolverines on the Wallowa-Whitman National Forest. However, unlike the Malheur and Umatilla national forests, the Wallowa-Whitman has watersheds that were categorized as having high amounts of denning habitat. Wales et al. (2011) determined that 18 percent of the watersheds had moderate amounts of denning habitat while at least 10 percent had high amounts (greater than 1400 acres). Less than 58 percent of the watersheds had no denning habitat. As suggested by Magoun et al. (2011), it is possible that the Wallowa-Whitman National Forest supports a small breeding population of wolverines and that their occurrence on this Forest may not represent extreme dispersal events as suggested by Aubry et al. (2007). Wales et al. (2011) determined that the watersheds with the greatest amount of potential denning habitat are all in the Wallowa Mountains (Eagle Creek, Upper Wallowa Creek, Upper Imnaha River, and the Minam River) which would align with the recent documentation of wolverines on the Wallowa-Whitman National Forest (Magoun et al. 2011)

Wales et al. (2011) completed a viability assessment for a wide range of focal species in northeastern Oregon, including wolverine, to establish baseline conditions and inform Forest Plan revision. Their viability assessment considered the current condition of vegetation, potential denning, road density, and winter recreation routes on their habitat. They found that the current viability outcome scores were considerably lower than those estimated for historical conditions (pre-settlement), largely due to the prevalence of roads in both winter and summer.

Status of the Species – Spalding’s Catchfly

On December 3, 1999, the USFWS published a proposed rule to list Spalding’s catchfly as threatened (64 FR 67814). Spalding’s catchfly was listed as a threatened species October 10, 2001 (66 FR 51597).

The Recovery Plan for *Silene spaldingii* (Spalding’s catchfly) was published September 2007 (US Fish and Wildlife Service 2007). Critical habitat has not been designated for this species.

Current Status, Distribution and Conservation Needs

Spalding’s catchfly is endemic to the Palouse region of southeastern Washington and adjacent Oregon and Idaho, and is disjunct in northwestern Montana and British Columbia, Canada. Spalding’s catchfly is found predominantly in the Pacific Northwest bunchgrass grasslands and sagebrush-steppe, and occasionally in open-canopy pine stands.

Massive range-wide loss of habitat for *S. spaldingii* is due to a combination of the conversion of habitat to intensive agriculture and the degradation of the remaining habitat, primarily by weed invasion. The fragmentation of habitat has left small, genetically isolated populations scattered across four states and five physiographic provinces (USDI Fish and Wildlife Service 2005), namely (1) the Palouse Grasslands in west-central Idaho and southeastern Washington, (2) the Channeled Scablands in east-central Washington, (3) the Blue Mountains Basins in northeastern Oregon, (4) the Canyon Grasslands along major river systems in Idaho, Oregon, and Washington, and (5) the Intermontane Valleys of northwestern Montana and British Columbia, Canada (USDI Fish and Wildlife Service 2007). More than half of the remaining populations are on private land, with the majority lacking regulatory control (USDI Fish and Wildlife Service 2005).

The Spalding's catchfly recovery plan (USDI Fish and Wildlife Service 2007) outlines steps to recover the plant by protecting and maintaining reproducing, self-sustaining populations so that protection under the Endangered Species Act is no longer necessary. The plan specifies the following recovery criteria (somewhat condensed):

1. Twenty-seven populations, with at least 500 reproducing *Silene spaldingii* individuals in each and with intact habitat, occur rangewide at key conservation areas and are distributed throughout the five identified physiographic provinces as follows: five within the Blue Mountains Basins, seven within the Canyon Grasslands, eight within the Channeled Scablands, four within the Intermontane Valleys, and three within the Palouse Grasslands.
2. All 27 key conservation areas of *Silene spaldingii* are composed of at least 80 percent native vegetation (by canopy cover), have adjacent habitat sufficient to support pollinating insects, and are not fragmented (i.e., intact; see criterion #1).
3. Populations of *Silene spaldingii* at key conservation areas demonstrate stable or increasing population trends (less than a 10 percent chance that the population is declining) for at least 20 years. To address this criterion, consistent range-wide long-term monitoring methodologies that identify what parameters will be monitored, how, and at what frequency need to be developed.
4. Habitat management plans have been developed and implemented for all key conservation areas.
5. Invasive nonnative plants with the potential to displace *Silene spaldingii* have been continually controlled or eradicated within a 100-meter (328 foot) radius of all *S. spaldingii* populations within key conservation areas.
6. Prescribed burning is conducted, whenever possible, to mimic historical fire regimes within a particular physiographic region in *Silene spaldingii* habitat.
7. Seed banking occurs *ex situ* first at all smaller *Silene spaldingii* populations (not key conservation areas or potential key conservation areas) and second at all larger *S. spaldingii* populations (key conservation areas or potential key conservation areas) to preserve the breadth of genetic material across the species' range.
8. A post-delisting monitoring program for the species will be developed and ready for implementation.

Therefore, the recovery plan for Spalding's catchfly (recovery plan) outlines a strategy to protect and maintain reproducing, self-sustaining populations in each of the five physiographic regions where it resides to ensure the long-term persistence of the species (USDI Fish and Wildlife Service 2007). Within each of these regions, the USFWS identifies key conservation areas (KCA) to focus conservation efforts on the larger populations that can or do support at least 500 plants, the assumed minimum viable population size. Across its range, there are approximately 125 populations of *S. spaldingii*, most of which have fewer than 100 plants; only about 23 populations hold 100 or more individuals. The 10 largest populations are each made up of more than 500 plants and represent 75 percent of the species.

A key conservation area possesses the following qualities:

- Is composed of intact habitat (not fragmented), preferably 40 acres or greater
- Native plants comprise at least 80 percent of the canopy cover of the vegetation
- Adjacent habitat is sufficient to support pollinating insects
- Habitat is of the quality and quantity necessary to support at least 500 reproducing individuals of Spalding's catchfly

According to the recovery plan, key conservation areas should be surrounded by 300 acres of habitat that is intact or could be restored to support Spalding's catchfly.

The action area analyzed here includes Spalding's catchfly occurrences in the Blue Mountains Basins and Canyon Grasslands physiographic regions.

In the Canyon Grasslands physiographic region, the recovery plan identifies five Spalding's catchfly key conservation areas, only one of which, called the Blue Mountains Foothills KCA, is within the Revised Forest Plan planning area and on the Umatilla National Forest. A second key conservation area adjacent to the planning area, Joseph Creek, is located on Nez Perce Precious Lands bordering to the north of the Wallowa-Whitman National Forest.

The Blue Mountains Foothills KCA for Spalding's catchfly is located near the farthest northeastern corner of the Umatilla NF on the Pomeroy Ranger District. Privately held inholdings within the Forest proclaimed boundary also show mapped occurrences of the plant. Forest Service botanists surveyed these areas (USDA Forest Service 2006) including specific searches for *S. spaldingii* in 1997 and 2000. All

suitable habitat for *S. spaldingii* on the Umatilla National Forest has been surveyed. Occupied habitat on the Umatilla NF lands amounts to 111 mapped acres as of 2016.

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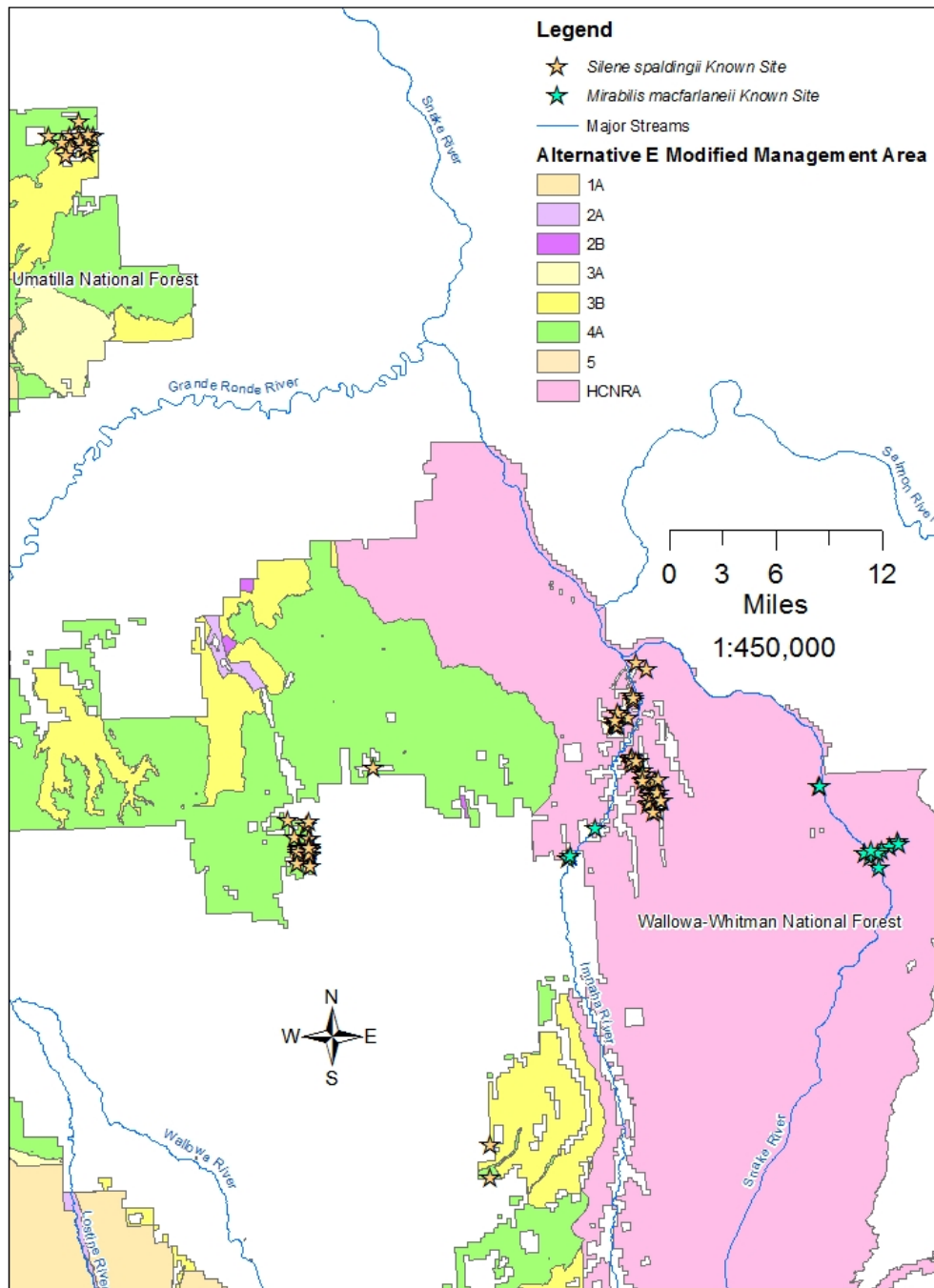


Figure 69. Distribution of *Silene spaldingii* (Spalding's catchfly) locations mapped on the Umatilla NF and the Wallowa-Whitman NF

In the Blue Mountains Basins physiographic region, the recovery plan identifies four Spalding's catchfly key conservation areas, two of which include area on the Wallowa-Whitman National Forest, Crow Creek and Clear Lake Ridge.

One KCA, Crow Creek, is located almost entirely on the Wallowa-Whitman National Forest. The Crow Creek population is estimated to hold approximately 2,400 plants and is the third largest Spalding's catchfly population range-wide (USDI Fish and Wildlife Service 2007).

A second KCA, Clear Lake Ridge, occupies NFS lands, BLM, and private lands including the Nature Conservancy's (TNC) Clear Lake Ridge Preserve. Most patches of Spalding's catchfly at Clear Lake Ridge are found on TNC lands. The population here was sampled and statistically calculated with a size ranging from 1,730 to 3,645 plants (Jansen and Taylor 2010). Nearby on the adjacent Wallowa-Whitman National Forest, an estimated 520 plants have been found in this same vicinity within the KCA. About five miles south of this site, a recently discovered population with no population estimate has been identified occupying about 50 acres. This newly identified site is on USFS lands, outside of the Clear Lake Ridge KCA.

Spalding's catchfly populations also occur in the adjacent Hells Canyon National Recreation Area (within the Blue Mountains physiographic region) which lies outside the area under consideration for the Forest Plan revisions. Consultation with the USFWS was completed in 2003 for the Hells Canyon Comprehensive Management Plan (USDA Forest Service 2003).

Life History

Spalding's catchfly is an herbaceous perennial. Seasonal stems emerge in the spring from the root crown, sending usually one, but occasionally a second shoot 8 to 24 inches in height. Each stem has typically 4 to 7 pairs of lance-shaped leaves and 3 to 20 sizeable flowers with small greenish-white petals flowers on reproductive shoots. Stems, leaves, and the floral calyx are covered with dense sticky hairs that catch insects. The species is noted for its very long taproot that can exceed 1 meter (39 inches) and may grow up to three feet or more in length, and which can store reserves for multiple seasons until environmental conditions are conducive to flowering (Lesica 1997). The large taproot stores water and nutrients allowing the species to remain dormant, in some cases, up to three seasons (Lesica 1999, Hill and Gray 2004). Spalding's catchfly begins blooming in mid to late July. Blooming continues through August and sometimes into September. Fruits mature from August until September. The small, 2-millimeter, seeds are wrinkled, winged, and dispersed by wind following dehiscence of the capsule (USDI Fish and Wildlife Service 2007).

Spalding's catchfly is a long-lived perennial herb in the pink family (*Caryophyllaceae*) with a lifespan that is poorly understood but may exceed 30 years in some specimens (USDI Fish and Wildlife Service 2007). Lesica (1995, 1999) found that most catchfly plants spend nearly half their summers in the dormant state; in a given year, depending on climatic conditions, between 10 and 70 percent of the individuals in a site could be dormant. It is uncommon for an entire patch of catchfly plants to remain dormant all season, but some plants in a population are found to be dormant most seasons (Lesica 1995, 1999).

Seeds of Spalding's catchfly typically germinate in the spring. Seedlings grow for approximately two months before entering seasonal dormancy. Cooler temperatures and rains may promote an early fall growth period (Lesica 1988b). The plants grow as broad-leaved rosettes during their first year and may produce vegetative or flowering stems in subsequent years. The typical flowering period is from mid-July through August with some specimens still flowering well into September (Lesica 1995). Seed matures from August through September, at which time the plant senesces and becomes dormant. The growth period for the species range-wide has been reported as early as April 1st with senescence as late as October 31st (Hill and Gray 2004, Lesica 1997).

Spalding's catchfly reproduces solely by seed. It lacks rhizomes or other means of reproducing vegetatively (Lesica 1993). Spalding's catchfly reproduces sexually (Lesica & Heidel 1996) as an obligate or para-obligate out-crossing species requiring insect pollination to set viable seed (Lesica 1988a, Lesica & Heidel 1996). The yellow bumblebee (*Bombus fervidus*) is the main pollinator of Spalding's catchfly (Lesica 1993, Lesica and Heidel 1996, Tubbesing et al. 2014) with the white-shouldered bumble bee (*Bombus appositus*) pollinating much less often (Tubbesing et al. 2014). Dense patches of Spalding's catchfly or catchfly plants growing in areas having a high abundance of other flowering plants are more often visited by pollinators, thereby resulting in higher seed set (Taylor and DeBano 2012). Noctuid moths have also been observed visiting Spalding's catchfly (Lesica and Heidel 1996). *Silene spaldingii* appears to have only two major pollinators in the Zumwalt Prairie, of which one (*B. fervidus*) accounts for 90 percent of visits, and those pollinators appear to preferentially visit catchfly (Tubbesing et al. (2014). It is, therefore, vital to prevent *B. fervidus* and *B. appositus* populations from declining. Additionally, this study showed that dense patches of catchfly plants are disproportionately important for conservation, since they are visited more frequently by pollinators and thus probably have greater seed set and recruitment.

Habitat Characteristics

Spalding's catchfly inhabits deep, typically loess-derived soil in native bunchgrass communities of the inland Pacific Northwest. It is most often found in open grasslands in association with the ecological dominant grass Idaho fescue (*Festuca idahoensis*) or, in Montana, with rough fescue (*Festuca scabrella*). It also grows in ecotonal settings with shrub species such as common snowberry (*Symphoricarpos albus*) and Wood's and Nootka rose (*Rosa woodsii* and *Rosa nuktana*). Rarely, it can also be found under open-canopy ponderosa pine stands that have intruded as stringers into grassland communities. The Spalding's Catchfly Conservation Strategy (Hill and Gray 2004) gives detailed descriptions of the plant associations that the species inhabits.

Risk Factors

The conservation strategy for Spalding's catchfly (Hill and Gray 2004) discusses in detail the causes of Spalding's catchfly rarity, the reasons for federal listing, and the current and future threats to this species. According to the conservation strategy, the threats of greatest concern to the continued existence of Spalding's catchfly currently include, in order of priority:

- Habitat degradation from weed invasion and livestock grazing;
- Habitat loss and fragmentation and associated genetic pressures of small populations (i.e., pollinator limitation, inbreeding depression, and loss of populations);
- Alteration of fire regimes, including fire suppression, increasing fire frequencies, and out-of-season fires;
- Predation by herbivores, including domestic livestock, native ungulates, and rodents and insects;
- Herbicide drift; and
- Prolonged drought and global warming.

On National Forest System lands, the main threats to Spalding's catchfly are invasions by aggressive, nonnative plants, adverse livestock grazing management, and changes in fire frequency and seasonality. Neither leasable nor locatable mineral activity occurs within the range of Spalding's catchfly. The Conservation Strategy does not identify leasable or locatable mineral development as threats to the species on National Forest System lands in the planning area.

Livestock Grazing Risk

Livestock grazing can directly impact Spalding's catchfly by herbivory and trampling and indirectly impact Spalding's catchfly via soil compaction, soil erosion, the introduction of nonnative plants, and the loss of pollinator habitat. Grazing of Spalding's catchfly has been observed and is considered a threat to the species (Kagan 1989, Hill and Gray 2004, Taylor 2007). Direct herbivory removes flowers or seeds, thereby limiting reproduction. Herbivory of leaves inhibits a plant's ability to manufacture carbohydrates necessary for seasonal growth and storage in the perennial taproot. Trampling can easily break off entire plants at the ground level and damage the root crowns from which stems emerge. Root crown damage is more frequently associated with early season grazing (Hill and Gray 2004). Late summer grazing or heavy grazing is especially detrimental to Spalding's catchfly (Hill and Gray 2004). In one study (Cullen et al. 2011) browse rates could not be correlated to cattle stocking rates. Their results suggested cattle did not consume significant numbers of catchfly plants during the peak summer growth period, but the authors could not conclude that grazing does no harm to populations of the plant. That study measured stocking as animal units/time period and not as percent forage utilization or stubble height, so it is not possible to compare these results to the utilization standards proposed in the Revised Forest Plan. Another study (Dingledein et al. 2010) found significant browse of catchfly plants throughout the growth season ranging from 20 to 71 percent, although this was attributed largely to wild ungulates, because the study area was not grazed by livestock during the investigation. Sufficient research has not been completed to discern what levels of grazing may allow the Spalding's catchfly to persist (USDI Fish and Wildlife Service 2007).

Indirect effects can impact the habitat of Spalding's catchfly. Although grassland ecosystems of the arid intermountain west experienced little grazing pressure from large hoofed animals during the last 10,000 years (Mack and Thompson 1982, Lyman and Wolverton 2002) they cannot tolerate the levels of grazing exerted by domestic livestock in the 1800s and early 20th century. Both *Pseudoreigneria spicata* and *Festuca idahoensis* are poorly adapted to herbivory by comparison to other grass species, having little compensatory growth, such as tiller production (Caldwell et al. 1981). Disturbances, most frequently linked to adverse livestock grazing and trampling, have dramatically altered western arid ecosystems in a progression from native perennial bunchgrass communities to invasive nonnative annual grasslands that are then susceptible to more invasive perennial plant invasions (DiTomaso 2000).

Of greater concern is the impact livestock grazing may have on the pollinator community in Spalding's catchfly habitat. Kimoto et al. (2012) found that even where catchfly plants had not been fed on by livestock, grazing of habitat reduced pollinator abundance, thereby limiting seed production. Described as the first large-scale manipulative study of the effect of grazing intensity on native bee communities in a North American grassland, Kimoto (2010) found that increases in grazing intensity showed a linear decline in bee diversity, abundance, and richness, especially with bumblebees (*Bombus spp.*), which include the main pollinator of Spalding's catchfly, the yellow bumblebee (*Bombus fervidus*), identified as the most significant pollinator (*B. fervidus*) of Spalding's catchfly (Lesica and Heide 1996, Taylor and DeBano 2012, Kimoto and others 2012). In the absence of open pollination, Spalding's catchfly experienced an 85 percent reduction in fecundity and a loss of fitness, due to inbreeding depression, resulting in an estimated total reduction in fitness of 99 percent (Lesica 1993). Therefore, management practices that significantly reduce pollinators, especially bumblebees, could have a significant impact on the recruitment of new plants into a Spalding's catchfly population. Even though Spalding's catchfly is

long lived, without seedling recruitment, populations would decline over time. Forage utilizations approaching 50 percent showed very little to no bumblebee abundance (Kimoto 2010). Kimoto (2010) found that even moderate grazing (22 to 40 percent utilization) led to bumblebee declines.

Invasive Plants Risk

Exotic, invasive plant species threaten the viability of Spalding's catchfly. Invasive plants compete with Spalding's catchfly for water, nutrients, and light. Of greatest concern is the effect of invasive plants on seedling establishment, a vulnerable state for perennial plants. Not only are invasive species able to outgrow seedlings of Spalding's catchfly, they often leave behind increased leaf litter, inhibiting the germination of other plants. In one study in Washington, high levels of exotic plants (*Bromus secalinus*, *Hypericum perforatum*, and *Ventenata dubia*) were associated with less vigorous occurrences of Spalding's catchfly (Caplow 2002). Invasive plants also provide competition for pollinators, affecting fecundity and individual fitness in Spalding's catchfly (Lesica and Heidel 1996). Insects may switch from Spalding's catchfly to an invasive plant if it is more abundant or provides more pollen or nectar (Richards 1997). Lesica and Heidel (1996) found lower visitation rates for Spalding's catchfly in sites infested with *Hypericum perforatum* (St. John's wort).

Prescribed Fire Risk

Although the actual effects of prescribed fire are unknown, Spalding's catchfly is presumed to have evolved with and adapted to the historical fire regime in intermountain western North America (Lesica 1999), where fire has been a common occurrence in grasslands (Barrett and Arno 1982). Historical fire frequency in the Idaho fescue grasslands of the Blue Mountains is not well understood, but it is believed that fires were frequent, with return intervals of less than 35 years (Johnson and Swanson 2005). Late summer fires are more damaging to Idaho fescue, but pre-burn cover of fescue returns usually within five years (Johnson and Swanson 2005). In the Idaho fescue grasslands of northeastern Oregon and southeastern Washington, fire is not believed necessary to promote seedling establishment of Spalding's catchfly as it apparently is in the western Montana grasslands dominated by rough fescue (Lesica 1999). Drier conditions in northeastern Oregon and southeastern Washington also limit the ability of trees and shrubs to encroach onto grasslands. Therefore, prescribed fire may not be needed to maintain grasslands in northeastern Oregon and southeastern Washington. If prescribed fires are needed to improve habitat for *S. spaldingii*, they would likely be carried out during the early spring or fall, when fires are more easily controlled. Fires carried out in the fall would probably have less impact to *S. spaldingii* than fires carried out during spring, when it is possible seedlings could be killed. Dormant plants would probably not be affected, and older plants emerging from root crowns may suffer only minor damage. Perennial individuals damaged by spring fire are expected to send up additional shoots from axillary buds.

Risk of Climate Change on Silene Spaldingii

Climate change is expected to profoundly alter vegetation structure and composition, terrestrial ecosystem processes, and the delivery of important ecosystem services over the next century (Kerns et al. 2017). Climate influences the spatial distribution of major vegetation biomes, the abundance of species and communities within biomes, biotic interactions, and the geographic ranges of individual species. Researchers speculate that a warming climate will alter precipitation patterns, with some regions becoming drier and others becoming wetter. Within the Pacific Northwest, a recent model predicts warmer and wetter winters in 80 years. Being stationary, plants must migrate through dispersal, colonization, and recruitment strategies, a relatively slow process compared to mobile organisms. Some researchers believe that plant species will not be able to migrate at a pace dictated by a warming climate, which would isolate and eventually doom some species, unless new adaptations arise to cope with a changing environment.

Critical Habitat

Critical habitat has not been designated for this species.

Environmental Baseline for *Silene Spaldingii*

Umatilla National Forest Baseline

As of 2016, the Forest Service has mapped 111 acres of occupied habitat on the Umatilla National Forest. These mapped areas are all within the Canyon Grassland physiographic province in the Blue Mountains Foothill KCA. Within this key conservation area, the Sourdough area where Spalding's catchfly occurs includes portions of four open ridges on the south side of Lick Creek (Cabin, Sheep, Sourdough, and Bracken ridges) and their intervening draws that support plant communities typical of the Canyon Grasslands (USDI Fish and Wildlife Service 2005, Johnson and Simon 1987, Tisdale 1986).

The condition of grasslands in the vicinity inhabited by Spalding's catchfly is described as variable: the northerly slopes and ridge tops are reported in good to excellent condition (USDA Forest Service 2006), whereas the southerly slopes have been invaded by exotic plants, including state-listed noxious weeds, such as *Centaurea solstitialis*.

National Forest System lands that support Spalding's catchfly within the Umatilla National Forest are currently allocated to MA C3, big game winter range. Under this management allocation all management actions are suitable, but with some restrictions of vegetation treatments. Permitted grazing utilization standards for upland grasslands in big game winter range are 55 percent for pastures in satisfactory condition and zero to 35 percent for pastures in unsatisfactory condition.

Within the Blue Mountains Foothills KCA, Spalding's catchfly occurs within two range allotments, MacKee and Peola. The MacKee allotment is closed so there is no domestic livestock grazing there. Most of the plants occur in the Upper and Lower Sourdough pastures of the Peola Allotment, which has been in voluntary non-use for several years, due to the presence of the Spalding's catchfly, and also due to weed concerns (*Paula Brooks pers. comm. June 2017*). There are two small populations in the Lick pasture, which is currently grazed. The cows go through there twice each season, as they are passing between other pastures. In 2017 they are scheduled to be present June 18-28 (150 pairs) and August 23 through October 3 (333 pairs). There are also some plants in the Cottonwood pasture, which is normally grazed early in the season; in 2017 grazing by 150 cow/calf pairs will occur for 15 days from June 3rd to June 17th.

Yellow-star thistle (*Centaurea solstitialis*), an aggressive invasive plant, does threaten the Spalding's catchfly in this area. Off road vehicle use is impacting Spalding's catchfly habitat in the Blue Mountains Foothills key conservation area contributing to nonnative plant spread and degradation of habitat. In 2010, a fence was discovered severed with fresh vehicle tracks within 50 feet of Spalding's catchfly.

Abundance and vigor trends for the Umatilla National Forest populations of Spalding's catchfly are unknown. Long-term population monitoring as specified in recovery criterion 3 was initiated in 2015 but to date no conclusions can be drawn.

Wallowa-Whitman National Forest Baseline

Within the Wallowa-Whitman National Forest, Spalding's catchfly populations appear stable or increasing where multiple years (15 to 20 years) of inventory has been done (USDA Forest Service 2008b). Populations range from 20 to more than 500 plants. In total, occupied habitat on national forest system lands on the WWNF (outside of the HCNRA) amounts to approximately 100 acres (all within the key conservation area).

The populations on National Forest System lands in Oregon are within grazing allotments, and status within each allotment varies. The Mud Duck allotment is closed. The FEIS and Record of Decision (ROD) for the Joseph Creek Rangeland Analysis and associated biological assessment and biological opinion (USDI Fish and Wildlife Service 2005) for Spalding's catchfly in the Swamp Creek and Crow Creek Allotments were completed in 2005. Direction from these allotment RODs continues grazing within the Crow Creek and Swamp Creek allotments where Spalding's catchfly occurs; however, an adaptive approach to grazing management was implemented with specific protections for sensitive areas. Management direction is designed to improve range condition through monitoring, reduction of trailing through the pastures, and rotation so that spring grazing is rested. Conservation measures in these allotment RODs for Spalding's catchfly include spring drought protections and rest every third year, restrictions on herding through the Doe Gulch pasture (Crow Creek allotment), and restricting use to spring and fall, mostly outside the active growing season. Current management direction allows the Dorrance pasture (Swamp Creek allotment) to be used during June, but not in every year. The revised plan continues these measures.

Effectiveness monitoring has been conducted on a large portion of the Swamp Creek and Crow Creek allotments for the last two decades and reveals that populations are stable within detection limits. No population declines or increases are obvious (Hustafa pers. comm. June 2017). The goal of effectiveness monitoring is to ensure that the conservation measures are working as designed.

Annual exotic bromes (*Bromus tectorum*, *B. japonicus*, *B. secalinus*) are present at most Spalding's catchfly sites. The Spalding's catchfly population within the Clear Lake Ridge key conservation area is infested with sulfur cinquefoil (*Potentilla recta*). North Africa grass (*Ventenata dubia*) is present at the Crow Creek key conservation area. Two populations of Spalding's catchfly within the Swamp Creek allotment are within one-quarter mile of a diffuse knapweed site (about 10 acres) along Crow Creek. In one Crow Creek population, both Kentucky bluegrass and *Ventenata dubia* (an exotic annual grass) have been documented. Other annual grasses, yellow starthistle, and sulfur cinquefoil occur within one-quarter to one-half mile of populations on the Wallowa plateau (USDA Forest Service 2005c).

Status of the Species – MacFarlane's Four O'Clock

MacFarlane's four o'clock is listed as threatened under the Federal Endangered Species Act (ESA) (USDI Fish and Wildlife Service 1996).

A U.S. Fish and Wildlife Service revised recovery plan was released for MacFarlane's four o'clock in 2000 (USDI Fish and Wildlife Service 2000a) (http://ecos.fws.gov/docs/recovery_Plan/000630.pdf).

A U.S. Fish and Wildlife Service 5-year review addressing updated conservation needs for MacFarlane's four o'clock was released in 2009 (USDI Fish and Wildlife Service 2009b) (http://ecos.fws.gov/docs/five_year_review/doc2614.pdf).

Current Status, Distribution and Conservation Needs

MacFarlane's four o'clock (*Mirabilis macfarlanei*) is a rare plant narrowly endemic to a small range (46 by 29 km) in northeastern Oregon and adjacent west-central Idaho. MacFarlane's four o'clock was listed endangered under the Endangered Species Act in 1979. As more populations were discovered, MacFarlane's four o'clock was downgraded to threatened status (61 FR 10693-10697). Populations have not been discovered within the planning area but are present in the adjacent Hells Canyon National Recreation Area (). Suitable habitat for the species exists within the planning area below 3,000 feet in the Joseph Creek canyon, Wallowa Ranger District, Wallowa-Whitman National Forest. The nearest population to this unoccupied suitable habitat is approximately 30 miles to the southeast in the Imnaha River canyon outside the planning area.

The USFWS (2009) 5-year review of this species opined that populations are not secure from threats. The potential for wildfires is expected to increase due to the expansion of non-native plant species into currently occupied habitats and, currently one or more species of non-native plants occur in two of four element occurrences in Oregon. Two of the five criteria identified in the 2000 revised recovery plan have been met (criteria 1 and 3). In summary, the review concluded that the threat from non-native weed invasions and wildfire is ongoing and difficult to control in *Mirabilis macfarlanei* sites, and the species remains listed as threatened.

The recovery criteria for *Mirabilis macfarlanei* are as follows (USDI Fish and Wildlife Service 2000a):

- A minimum of 11 populations are secure from threats and naturally reproducing with stable or increasing populations trends for at least 15 consecutive years. (Criteria met USFWS (2009)).
- Population sizes are above the minimum necessary to maintain the viability of the species.
- Populations of these species occur throughout its current range in each of the three geographic areas (i.e., Imnaha, Snake, and Salmon River areas) (Criteria met USFWS (2009)).
- Management practices reduce and control threats.
- A post-delisting monitoring program for the species is developed and implemented.

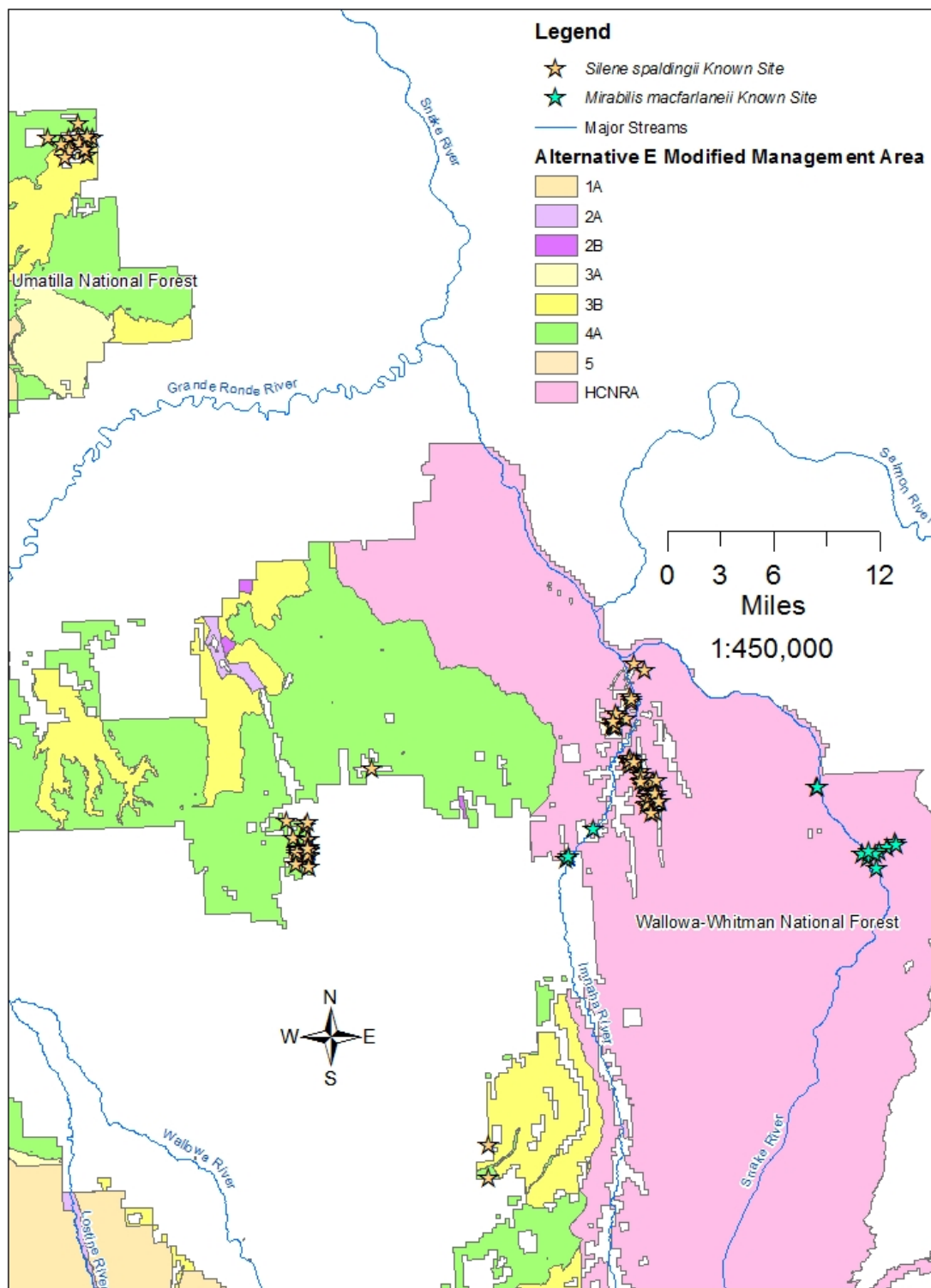


Figure 70. Distribution of *Mirabilis macfarlanei* locations on the Wallowa-Whitman NF

Life History

MacFarlane's four o'clock is a long-lived perennial with a deep seated, thickened root that spreads by underground roots. This species typically blooms from May through June. The bright pink flowers are conspicuous, up to 1 inch long by 1 inch wide. Each flower has the potential to produce one fruit and one seed (Kaye et al. 1990). Individual stems have been observed to live over 20 years. Seeds are typically dispersed in June and July, and seed germination probably occurs in early spring. Seed germination and establishment may be infrequent and may be dependent upon a specific suite of environmental conditions.

Most reproduction is accomplished asexually via tuberous-thickened roots that continue to grow in several directions sending up new stems. Some populations comprise several clones. Studies on its genetic structure show that the species has lower genetic diversity than other species with a similar life history (Barnes et al. 1994, 1995; Wolf et al. 1994). The greatest level of gene flow (pollen or seed dispersal) occurred between populations that were less than 1 mile apart.

Common floral visitors to *M. macfarlanei* include long-tongues bees of several genera, such as *Anthophora*, *Bombus*, *Synhalonia*, and *Melecta* (Barnes 1996). Although *M. macfarlanei* is self-compatible, it apparently requires a vector for pollination (Barnes 1996). It appears that sexual reproduction is not the main mode of spread for this species; but it is a critical factor for maintaining genetic diversity and may be a key to long-term survival of the species.

Habitat Characteristics

MacFarlane's four o'clock occurs in river canyon grassland habitats, often on steep slopes, that are characterized by regionally warm and dry conditions. It is endemic to low to mid-elevation canyon grassland habitats in west-central Idaho and northeastern Oregon. Precipitation occurs during winter and spring. Sites are generally open, with scattered shrubs. Plants are found on all aspects as well as slopes ranging from steep to flat. Elevations range from 300 to 900 meters (1,000 to 3,000 feet). Soils vary from sandy to talus substrate.

A habitat analysis study conducted in Oregon showed that distribution appeared to be influenced by slope aspect, soil development, topographic position, and the density of non-native plants (Kaye 1992).

Risk Factors

High quality grassland habitat is important for the long term survival of MacFarlane's four o'clock. Domestic livestock grazing (cattle, sheep, and horses) likely has the greatest potential to impact populations (USDA Forest Service, 2003). Potential negative effects from grazing include ingestion, trampling, erosion from trampling, introduction and spread of non-native plants, and changes in species composition (USDA Forest Service, 2003).

Some populations within the action area are located on grazing allotments currently under varying grazing intensities. Due to a lack of historical reference conditions, it is not possible to determine whether grazing has eliminated patches of MacFarlane's four o'clock in Hells Canyon. The history of grazing at least in the Hells Canyon National Recreation Area is extensive, starting as early as the 1730's by the Nez Perce tribe. Heavy grazing occurred in the latter half of the 19th century. By the early 1900s when the Forest Service began to regulate numbers of livestock, heavy impacts were lessened. In 1995, domestic sheep grazing ceased on the Oregon side of the recreation area, and by 1998 only 38,620 sheep animal use months were permitted within the Idaho side (USDA Forest Service, 2003).

Herbicide and pesticide spraying in areas where MacFarlane's four o'clock occurs could also lead to adverse effects if not carefully implemented. One known population (on BLM managed lands) is directly adjacent to a major highway where roadside vegetation spraying is routinely is flagged to avoid the

population. An unauthorized aerial herbicide spraying incident affected the species in the vicinity of the Salmon River in Idaho County, Idaho. Plants on both Federal and private lands were affected. At least 2,750 stems on BLM land exhibited foliar kill as a result of spraying in 1997. Subsequent monitoring in 1998 found that most of the plants did survive, although long term effects on the population are unknown (USDA Forest Service, 2003).

Significant damage from landslides and flooding could also impact the species. Landslides in 1996, 1997, and 2006 in occupied habitat led to population damage from highway repair and landslide stabilization activities. To compensate for the loss of plants, the BLM and Idaho Transportation department transplanted approximately 400 rhizomes to a nearby research natural area.

Risk of Climate Change on *Mirabilis macfarlanei*

Warwell et al. (2010) used bioclimate modeling to conclude that the contemporary populations of species with small distributions such as smooth Arizona cypress (*Cupressus arizonica ssp. glabra*) and the endangered perennial MacFarlane's four o'clock (*Mirabilis macfarlanei*) are likely to be subjected to complete climate disequilibrium earlier in the century than more broadly distributed species. Climate modeling predicts a suitable climatic niche in the contemporary range for the four o'clock throughout most of the 21st century, but at higher altitudes than currently occupied. By 2090, this niche is no longer present in the Snake, Salmon and Imnaha River canyons and has migrated south and higher in elevation. However, the extent of disequilibrium predicted by these studies may be an underestimate owing to the potential for maladaptation to climate within species (Rehfeldt 2004, Rehfeldt et al. 1999, Rice and Emery 2003).

Critical Habitat

Critical habitat has not been designated for this species.

Environmental Baseline for *Mirabilis Macfarlanei*

MacFarlane's four o'clock grows in river canyon grassland habitats between 1,000 and 3,000 feet of the Imnaha River and Snake River, Hells Canyon National Recreation Area and adjacent habitats in the Salmon River. Populations are not known to occur in the Revised Forest Plan area, and the nearest population to unoccupied suitable habitat within the planning area is approximately 30 miles away.

A survey completed in 2004 in *Mirabilis macfarlanei* potential habitat in the Joseph Creek canyon (USDA Forest Service 2005d) did not detect new occurrences. This survey was conducted in the likely best available habitat in the planning area nearest the known range of the four o'clock. Additional plant surveys were conducted in 2014 in preparation for Lower Joseph Canyon Restoration project; however, no locations of MacFarlane's four o'clock were identified (Ferriell 2015). Additional surveys conducted in 2007, 2008, 2009, and 2010 of *Mirabilis macfarlanei* in potential habitat in the Snake River canyon also did not detect new occurrences. Based on the negative survey findings in the planning area and in the Snake River canyon, there is a low likelihood that *Mirabilis macfarlanei* is present or may subsequently be found in the planning area.

Habitat capable of supporting the species does occur in the canyon grassland habitat of the Wallowa Ranger District, Wallowa-Whitman National Forest. All currently known populations occur in two counties: Idaho County, Idaho and Wallowa County, Oregon. The twelve known populations are found in the Snake River Canyon area, the Salmon River drainage, and the Imnaha River drainage (USDA Forest Service 2003). The total geographic range of the species occupies an area of approximately 46 by 29 kilometers (29 by 18 miles) (Kaye 1992).

The population size for all MacFarlane's four o'clock populations was previously considered to range from 1,500 to 3,000 individuals (7,500 to 15,000 stems), based on estimates of clonal size (Barnes 1996) and on population estimates (Johnson 1995). However, recent information and survey data suggest that the total population size is approximately 8,000 to 9,000 individuals (39,000 to 44,000 stems) (USDI Fish and Wildlife Service 2000).

Monitoring conducted by the Bureau of Land Management from 1981 to 1998 has documented significant annual fluctuation in stem counts and foliar cover, which are influenced by annual climatic conditions such as temperature and precipitation. Population estimates are further complicated by the fact that seedlings (new individuals produced by sexual reproduction) are very difficult to distinguish from small new stems that emerge from the colonial root network. Forest Service botanists have not observed seedling recruitment in areas of soil disturbance since these areas are subsequently invaded by weedy species (USDI Fish and Wildlife Service 2000a).

Reduction in grazing numbers in the Hells Canyon National Recreation Area have likely improved the populations located there. None of the known population of *Mirabilis macfarlanei* in the Snake River is currently grazed, either because the allotment is vacant (Pittsburg allotment) or are on lands not suitable for grazing. For *Mirabilis macfarlanei* sites in the Imnaha watershed; Fence Creek and Buck Creek are in allotments. The Fence Creek site is in a vacant allotment, and a small portion of this site has also been fenced. Trespass cattle have been documented at the Fence Creek site. Buck Creek site, once private, was recently acquired by the Forest Service, and is not within an allotment. Most MacFarlane's four o'clock populations on National Forest System lands are excluded from livestock grazing; however, trespass cattle have been documented. Therefore some risks of adverse effects, although unlikely, could occur.

Occurrences within the Pittsburg Allotment are not currently fenced and this allotment is currently vacant. It is possible that this allotment could be stocked in the future, but this would require additional NEPA analysis. While the allotment is in vacant status, the risk of adverse effects is very low.

To date, surveys have been conducted in Idaho and Oregon, management plans have been developed by the BLM for three sites in the Salmon River drainage, and monitoring has taken place on both BLM and National Forest System lands. Seed collection and long term storage at Berry Botanic Garden has been initiated.

Status of the Species – Whitebark Pine

Current Status, Distribution and Conservation Needs

The following is largely taken from a USFWS candidate assessment for whitebark pine (USDI Fish and Wildlife Service 2016a).

Pinus albicaulis is widely distributed in subalpine forests and parklands where it establishes following fires and acts as a keystone species in these high elevation habitats. The risk to the continued existence of many whitebark pine populations is high enough to warrant ESA listing (USDI Fish and Wildlife Service 2011b) and it is currently a federal candidate for listing.

Threats to whitebark pine include habitat loss and mortality from white pine blister rust, mountain pine beetle, catastrophic fire and fire suppression, environmental effects resulting from climate change, and the inadequacy of existing regulatory mechanisms. Whitebark pine is experiencing an overall long-term pattern of decline, even in areas originally thought to be mostly immune from the above threats. Recent predictions indicate a continuing downward trend within the majority of its range. While individual trees may persist, given current trends, the Forest Service anticipates whitebark pine forests will likely become

extirpated and their ecosystem functions will be lost in the foreseeable future. On a landscape scale, the species appears to be in danger of extinction, potentially within as few as two to three generations. The generation time of whitebark pine is approximately 60 years.



Figure 71. Estimated range of whitebark pine from two data sources. Differences between the layers do not represent a range contraction or expansion (Keane 2000; Whitebark Pine Ecosystem Foundation, Parks Canada 2014)

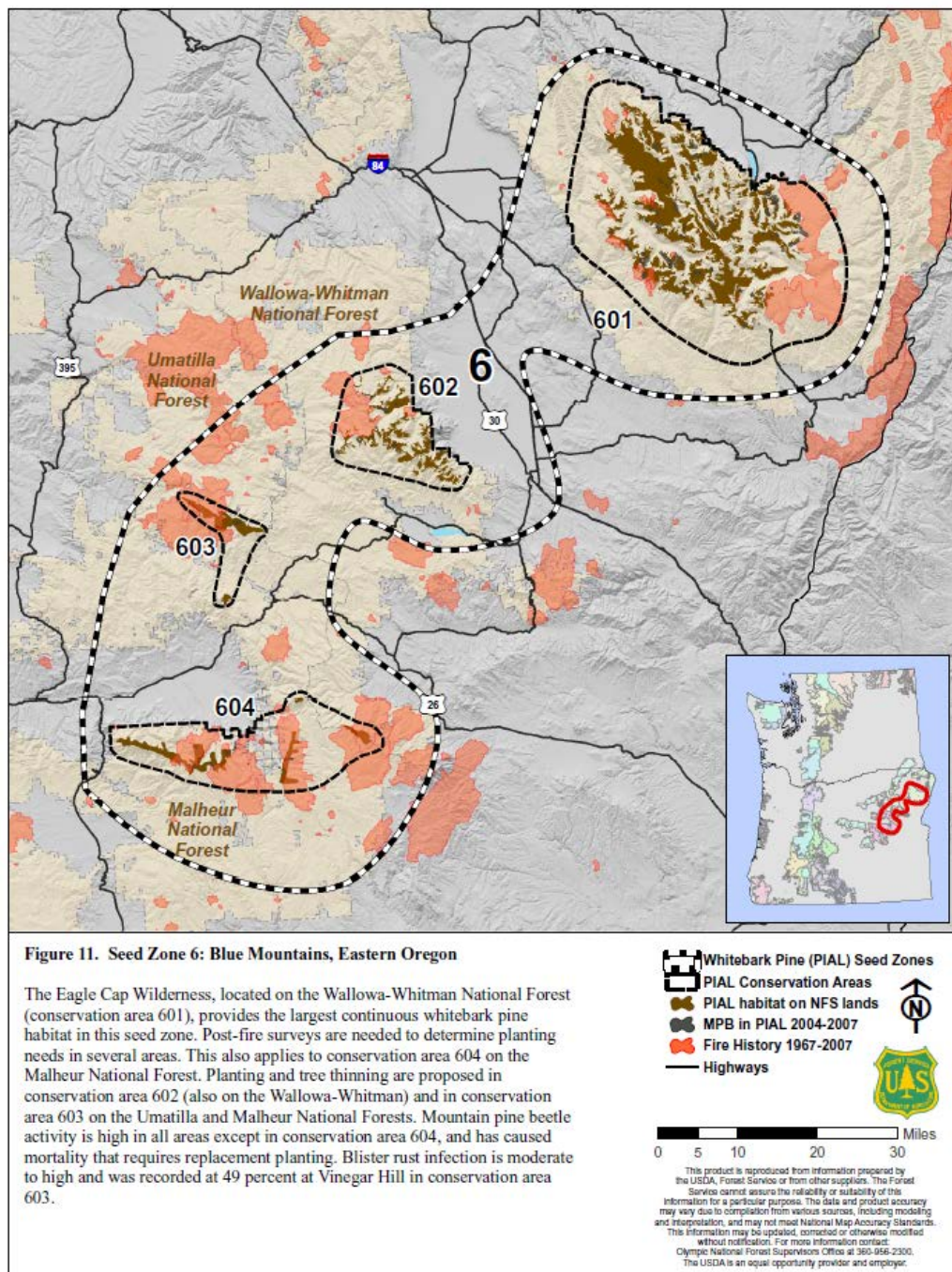


Figure 72. Whitebark Pine distribution in the Blue Mountains (from Aubry et al. 2008)

Life History

The following is largely taken from a USFWS candidate assessment for whitebark pine (USDI Fish and Wildlife Service 2016a).

Whitebark pine is a 5-needled conifer species placed in the subgenus *Strobus*, which also includes other 5-needled white pines. Whitebark pine is a stone pine (so-called for their stone-like seeds). Only five species of stone pines are recognized worldwide, and whitebark pine is the only stone pine that occurs in

North America. Characteristics of stone pines include five pine needles per cluster, cones that stay on the tree, and wingless seeds that remain fixed to the cone and cannot be dislodged by the wind. Because whitebark pine seeds cannot be wind-disseminated, primary seed dispersal occurs almost exclusively by Clark's nutcrackers (*Nucifraga columbiana*) in the avian family *Corvidae* (whose members include ravens, crows, and jays). This pine is a very long-lived species with some individuals documented at over 1,000 years old (ECOS Environmental Conservation Online System – Species Profile for Whitebark Pine).

Whitebark pine is considered a keystone species in high elevation ecosystems because it increases biodiversity and contributes to critical ecosystem functions. It is frequently the first conifer to become established after disturbances like wildfires, and subsequently stabilizes soils and regulates runoff. Snow will drift around whitebark pine trees, thereby increasing soil moisture, modifying soil temperatures, and holding soil moisture later into the season. Whitebark pine also provides important, highly nutritious seeds for numerous birds and mammals. In addition to these important contributions to high elevation ecosystems, whitebark pine forests have a high esthetic value that is prized by backcountry hikers and other recreational users (ECOS Environmental Conservation Online System – Species Profile for Whitebark Pine).

Habitat Characteristics

Roughly 44 percent of the species' range occurs in the United States in Wyoming, Montana, Idaho, Nevada, California, Oregon, and Washington. The remaining 56 percent of the species' range occurs in British Columbia and Alberta, Canada. It typically occurs on cold and windy high-elevation or high-latitude sites (ECOS Environmental Conservation Online System – Species Profile for Whitebark Pine).

Pinus albicaulis is distributed in subalpine forests and parklands where it establishes following fires and acts as a keystone species in these high elevation habitats. Alpine areas are lands above the timberline dominated by low-growing cushion or tufted plants that are able to grow in the harsh environment at upper elevations. Plants here are exposed to short growing seasons, large daily temperature changes, high solar radiation loads, desiccating winds, freeze-thaw forces in the rooting zone, and low soil fertility.

Risk Factors

The following is largely taken from a USFWS candidate assessment for whitebark pine (USDI Fish and Wildlife Service 2016a).

The primary threat to the species is from disease in the form of the nonnative white pine blister rust and its interaction with other threats (USDI Fish and Wildlife Service 2016a). The USFWS concluded that white pine blister rust is now nearly ubiquitous throughout the range of whitebark pine. White pine blister rust results in the mortality of an overwhelming majority of infected individuals, and all age classes of trees are susceptible. Seedlings are killed rapidly, and while some mature individuals may persist on the landscape for decades following infection, white pine blister rust typically kills seedcone-bearing branches. White pine blister rust has impacted millions of acres of whitebark pine. Currently, colder, drier areas of the range that were originally thought to be less susceptible to the disease are now showing considerable rates of infection.

Mountain pine beetle predation is no longer occurring at an epidemic level. Although no longer causing the high levels of mortality that were seen in recent years, mountain pine beetle epidemics are cyclical, and given climatic conditions that are increasingly favorable to the beetle, the USFWS anticipates future epidemics will be more frequent and severe. They also anticipate that continuing environmental effects resulting from climate change will result in direct habitat loss for whitebark pine, a high-elevation species occurring only in cool mountaintop habitats. Bioclimatic models predict that suitable habitat for

whitebark pine will decline precipitously within the next 100 years. Research indicates that northern migration of whitebark pine is a possible but unlikely response to the projected rate of warming climatic conditions.

Past and ongoing fire suppression is also negatively impacting populations of whitebark pine through direct habitat loss. Many stands of trees once dominated by whitebark pine are now dense stands of shade-tolerant conifers, especially lodgepole pine and subalpine fir. This change in forest structure and composition facilitates an increased frequency and intensity of wildfire and an increased susceptibility to predation and disease. Additionally, environmental changes resulting from changing climatic conditions are acting alone and in combination with the effects of fire suppression to increase the frequency and severity of wildfires. Whitebark pine could potentially regenerate following even stand-replacing wildfires, if a seed source is available. However, widespread predation and disease currently impacting whitebark pine are limiting available seed sources, making the probability of regeneration following wildfire less likely.

Risks of Climate Change on Whitebark Pine

Climate change predictions for the Inland Pacific Northwest include average temperature increases, changes in precipitation amounts, precipitation patterns, snowpack accumulations, snowmelt, and run-off regimen. These changes would affect plant populations and habitat components resulting in shifting spatial physiological optimums and habitat effectiveness. High elevation subalpine habitats would shift upwards in elevation with increasing temperatures and result in loss of suitable habitat on the higher mountainous areas (Felde et al. 2012, Miller-Struttmann et al. 2015, Munson and Sher 2015, Walther et al. 2002).

In addition, climate change components would interact with insect ecology, plant phenology, invasive plant infestations, habitat connectivity, and fire regime shifts to indirectly impact existing populations and their habitats (Miller-Struttmann et al. 2015). Shifts in some of these habitat factors may outpace the ability of plant species to adapt to changing environments (Walther et al. 2002). This leads to more isolated populations which can increase stress in already vulnerable species. Condition and trend monitoring, and conservation of genetic material in seed banks have been identified as strategies to deal with these changing environments.

A bioclimate model predicting the location of sites having suitable climate for *P. albicaulis* for three time periods under climate change scenario using an average of Hadley and Canadian General Circulation Model scenarios (1 percent increase greenhouse gases per year) is shown in Figure 73.

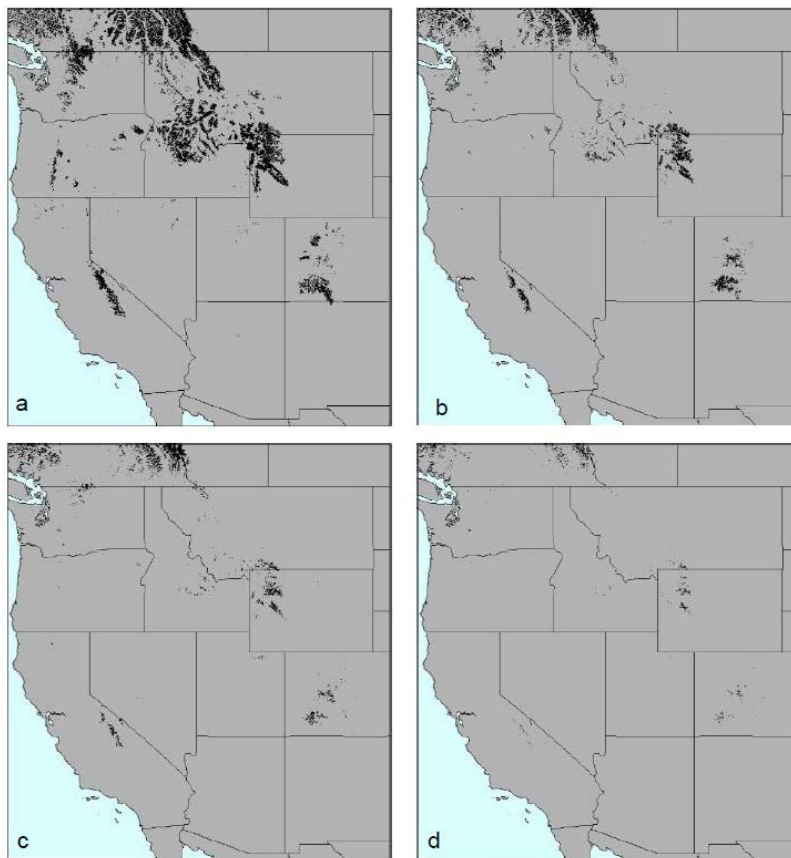


Figure 73. Modeled bioclimate profile of *Pinus albicaulis* for the present (a) and predicted climate for decades 2030 (b), 2060 (c) and 2090 (d)

Critical Habitat

As whitebark pine is candidate species for listing, there is no critical habitat.

Environmental Baseline for Whitebark Pine

Whitebark pine has a limited distribution within the Blue Mountains and is strongly associated with higher elevation areas within the cold forest potential vegetation group and within wilderness areas. The Wallowa-Whitman National Forest contains the largest acreage of whitebark pine, with an estimated 49,000 acres. The Malheur National Forest contains an estimated 7,000 acres of whitebark pine. The Umatilla National Forest contains an estimated 1,000 acres of whitebark pine. Whitebark pine was encountered during the installation of Current Vegetation Survey (CVS) plots on National Forest System lands, and was found on approximately 140 of the 10,000 plots in the Blue Mountains. Locations include the Eagle Cap Wilderness, the Elkhorn Mountains, areas near the Strawberry Wilderness, and Hells Canyon (Seven Devils Mountains).

The four major threats to whitebark pine populations within the Blue Mountains are white pine blister rust, mountain pine beetle, wildfire, and climate change (Aubry et al. 2008). Monitoring transects within the Blue Mountains analysis area indicate white pine blister rust infection within the majority of checked sites, with higher levels of infection in the Elkhorn Mountains, compared to the Wallowa Mountains.

The Eagle Cap Wilderness, located on the Wallowa-Whitman National Forest (conservation area 601), provides the largest continuous whitebark pine habitat in its seed zone (Aubry et al. 2008, see Figure 72

for a map of conservation areas). Post-fire surveys are needed to determine planting needs in several areas. This also applies to conservation area 604 on the Malheur National Forest. Planting and tree thinning are proposed in conservation area 602 (also on the Wallowa-Whitman) and in conservation area 603 on the Umatilla and Malheur national forests. Mountain pine beetle activity is high in all areas except in conservation area 604, and has caused mortality that requires planting. Blister rust infection is moderate to high in the Blue Mountains, and was recorded at 49 percent at Vinegar Hill in conservation area 603.

Effects of the Action – Wildlife/Plants

Gray Wolf

Effects

Plan components include desired conditions to provide for a natural range of habitats for all native and desired nonnative wildlife species. The desired conditions for federally listed species such as the wolf is that habitats will be managed in accordance with conservation planning documents, recovery plans, best available scientific information, and local knowledge. Critical habitat components are protected and restored to achieve species recovery. Specific standards and guidelines that pertain to wolves are listed in Section 2.3.2 of the Revised Forest Plan. Other Standards and Guidelines listed in Sections 1.2, 1.3 and 2.3.1 of the Revised Forest Plan provide additional protections for gray wolves. Examples of those Standards and Guidelines are discussed below. Standards and Guidelines specific to gray wolves from Section 2.3.2 include:

Gray Wolf

- | | |
|--|--|
| SD-6G | Management activities within one mile of a known active (during same calendar year that use is documented) wolf den and rendezvous sites should implement appropriate seasonal restrictions, based on site specific consideration and potential activity effects, to reduce disturbance to denning wolves. |
| SD-7G | Do not authorize turnout of sick or injured livestock to reduce risk of attracting wolves. |
| SD-8G | Remove or otherwise dispose of livestock carcasses such that the carcass will not attract wolves. If, due to location of the carcass, this is not possible, develop other remedies. |
| SD-9G | Do not authorize salt or other livestock attractants near known active (during same calendar year that use is documented) wolf dens or rendezvous sites to minimize livestock use of these sites. If a new wolf den or rendezvous site is discovered, relocate any previously established salt or attractant location, as necessary, to minimize livestock use of those sites. |
| Malheur and Umatilla NFs Only - West of Hwy 395 | |
| FLS-16S | Domestic sheep grazing shall not be authorized (during same calendar year that use is documented) in an allotment that contains a known active wolf den or rendezvous site unless a herder is with the sheep at all times and retrieves known strays within 24 hours. |

The potential impacts of motorized use on roads to wolves would be similar on the Umatilla and Malheur national forests with the exception of summer cross-country travel that has been prohibited on the Umatilla NF. Gray wolves are not listed as federally endangered on the Wallowa-Whitman National

Forest. **Standard RE-5S** gives direction to minimize adverse effects to all ESA listed and proposed species. Proposed projects would need to evaluate potential impacts in relation to common threats to wolves and see how disturbance to the species during sensitive time periods can be minimized. Plan component (**Standard SD-6G**) prohibits management activities near active denning and rendezvous sites during critical periods by requiring seasonal restrictions where an active den or rendezvous site has been identified. Compliance with this Standard will ensure that any disturbance in the vicinity of an active den or rendezvous site would not occur during critical times of the reproductive year, and therefore would not be likely to adversely affect survival or reproduction of any individual wolves or their pups using an active den or rendezvous site. The proposed action will have more area allocated to management areas that would have more restricted management actions, primarily wilderness and backcountry motorized.

Disturbance caused by the use of roads will likely be reduced in the identified elk priority areas where there is a guideline to increase elk security when management activities are proposed in those areas (RME – 3G). There is little indication from the Revised Forest Plan that extensive road building will occur. Plan standards and guidelines, especially in key watersheds, stress no net increases in road densities and also requires net reductions in overall road densities where watershed conditions are not functioning properly (**KWS-1S**). **RME-1S and RMS-2G** maintain existing elk security areas and do not allow them to be reduced as a result of increased road density. Wolves are likely to benefit from implementation of these standards and guidelines as they will at minimum maintain existing areas with limited exposure to disturbance, and will likely result in additional well-distributed areas with reduced exposure to disturbance from human activities for individual wolves as well as for their prey..

The risk from over snow vehicle (OSV) use is slightly reduced from the current conditions due to the amount of area where OSV vehicles are allowed.

There is no anticipated reduction in prey availability for the wolf.

Gray wolf populations are increasing in eastern Oregon and this trend is likely to continue over the short term due to high prey populations, decreasing open motor vehicle route density across the Blue Mountains, management direction to protect denning wolves, and the formation of new packs. As populations increase, wolves will continue to disperse into new areas, eventually increasing contact with human populations and activities. Habitat does not appear to be limiting, and therefore the greatest threat is mortality due to interaction with humans. Legal and illegal killing of individuals, both on and off of public lands, is of concern. Increased livestock predation and interaction with humans could lead to lethal removal of individuals by the State game department as well as the illegal shooting of individuals, which has already occurred in some areas.

Illegal killing of individual wolves is outside the scope of the revised Forest Plan and is not considered an effect of the revised plans. U.S. Fish and Wildlife Service does not currently authorize any lethal control of wolves in the planning area west of Highway 395, where wolves are still listed. Any non-lethal control of listed wolves must be initiated by the USFWS and would be a future federal action requiring separate consultation under the ESA, which would be conducted internally within that agency. Authorized non-lethal control measures may temporarily disturb individual wolves but the degree of effect would be so small as to be unmeasurable, given the size of their territories, their wide-ranging movements, their adaptability and the availability of other prey. The Forest Plan does not authorize predator control. Several standards and guidelines are directed toward alleviating wolf livestock interactions which can lead to human intervention (SD-7G, SD-8G, SD-9G, FLS-16S). These standards and guidelines are designed to ensure that individual listed wolves would not be likely to experience indirect or cumulative adverse effects resulting from interactions with permitted livestock on the Umatilla or Malheur National Forests Climate Change

The gray wolf was ranked as low vulnerability to climate change by Gaines et al. (2012) because it is a habitat generalists and is more mobile compared to species that are habitat specialists. Effects of climate change on gray wolves habitat are not anticipated.

Cumulative Effects

In the context of the Endangered Species Act, cumulative effects encompass the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area (in this case the two national forests). Future Federal actions, including those 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.

Cumulative effects, in the context of Section 7 consultation, are generic to the area of consideration. Activities typical of Eastern Oregon and Southeast Washington are expected to continue to occur, such as urban and rural growth, agricultural activities such as farming and livestock grazing, fuels and timber management, and energy development.

Summary of Effects

Per the ODFW status review update (ODFW 2015), wolves are increasing and expanding under Oregon's current forest management policies and we have no information to indicate that current utilization of forests is negatively affecting the wolf population.

Though wolves may use a variety of habitats, a strong relationship between persistence of wolf populations and forested cover has been established (Mladenoff et al. 1995, Larsen and Ripple 2006, Oakleaf et al. 2006). Approximately 50 percent of Oregon is public land with a large portion managed as forested habitat. Both State and Federal forests are regulated in Oregon; national forests are regulated by Federal law and multiple-use Forest Plans, and State and private forests are regulated under Oregon forest protection laws and regulations. ODFW is not aware of any planned or imminent changes in laws or policies affecting Oregon's forest management on a broad scale (ODFW 2015). ODFW expects that forest attributes and conditions which allowed Oregon's wolf population to increase and expand to its present distribution will continue in the foreseeable future.

The Revised Forest Plan would not directly implement activities that could cause disturbance to individual wolves. However, it is assumed that the probability exists that at least one project implemented under the guidance of the Revised Forest Plan could disturb an individual wolf. Using this premise, implementing the Revised Forest Plan might affect individuals. All activities with potential to affect individual wolves, would be designed to avoid harassment or harm, and would be extremely unlikely to wound, kill or capture any individuals. No activities implemented under the forest plan would authorize hunting shooting, wounding, killing, trapping, capturing, or collecting any wolves and would not authorize attempts to engage in any such conduct. Implementing the management direction for the proposed Revised Forest Plan would be consistent with the Gray Wolf Recovery Plan and result in the continued viability and persistence of the wolf across the planning area during the life of the Revised Forest Plan.

Under the Revised Forest Plan it is likely that proposed management activities may affect the gray wolf but is not likely to adversely affect the gray wolf or its habitat in those areas where it is a federally listed species.

Because:

- USFWS has acknowledged that habitat is not the primary issue regarding wolves- but rather the acceptance by humans.

- Further evaluations will occur at the project level for any proposal that may affect this species or its habitat.
- Plan components (specifically standards and guidelines designed to avoid or provide minimal disturbance to any known or discovered wolf den or rendezvous site from vegetation or fuels management activity during critical denning and early pup rearing periods) under the Revised Forest Plan provide adequate protection to ameliorate the identified risks to this species and its habitat.

Any changes in road access associated with vegetation management activities and the duration and location of increased motorized use would be so slight in relation to the existing road system and background levels of human use that any displacement would likely be temporary and would not be expected to result in an adverse effect to an individual wolf..

Wolves are habitat generalists and any disturbance to an individual wolf or their prey abundance and distribution would be expected to be short-term, very small or non-existent.

Wolverine

Wales et al. (2011) completed a viability assessment for a wide-range of focal species in northeastern Oregon, including wolverine, to establish baseline conditions and inform this Forest Plan revision. Their viability assessment considered the current condition of vegetation, potential denning, road density, and winter recreation routes on their habitat. They found that the current viability outcome scores were considerably lower than those estimated for historical conditions (pre-settlement), largely due to the prevalence of roads in both winter and summer.

Motorized recreation and the use of National Forest System roads may influence the habitat use and populations of wolverines. These potential effects include displacement from key habitats, disturbance during critical periods, and an increased risk of mortality (see Wisdom et al. 2000 and Gaines et al. 2003 for a complete list of road and trail associated factors that influence wolverine). The effects of motorized recreation and roads can occur during the non-winter period or during the winter period when snowmobiling or ski-trail grooming occurs.

Indirect Effects

Most of the potential wolverine habitat as modeled by Wales et al. (2011) is in management areas with restricted management potential (e.g., wilderness) (Table 48).

Table 48. Potential Wolverine habitat by Management Area. The shaded Management Areas represent restricted management activities

National Forest	Management Area	Acres
Malheur	1A – Congressionally Designated Wilderness Areas	19,499
	1B – Preliminary Administratively Recommended	2,339
	2A –Wild and Scenic Rivers (Includes Designated, Eligible, and Suitable)	595
	2B – Research Natural Areas	195
	2H – Scenic Areas	3,878
	3A – Nonmotorized Undeveloped	1,000
	3B – Limited Motorized Undeveloped	13,242
	4A – General Forest/Timber/Range	5,245
	5 – Developed Sites and Administrative Areas	15
Malheur Total Acres		46,007
Umatilla	1A – Congressionally Designated Wilderness Areas	92,778
	1B – Preliminary Administratively Recommended	10,277
	2A –Wild and Scenic Rivers (Includes Designated, Eligible, and Suitable)	2,986
	2B – Research Natural Areas	173
	2C – Botanical Areas	188
	2D – Geological Areas	7
	2E – Historical Areas	86
	2H – Scenic Areas	8,607
	2J – Municipal Watersheds	4,574
	3A – Nonmotorized Undeveloped	6,912
	3B – Limited Motorized Undeveloped	26,506
	4A – General Forest/Timber/Range	50,023
	5 – Developed Sites and Administrative Areas	842
Umatilla Total Acres		203,957
Wallowa Whitman	1A – Congressionally Designated Wilderness Areas	186,168
	1B – Preliminary Administratively Recommended	10,720
	2A –Wild and Scenic Rivers (Includes Designated, Eligible, and Suitable)	5
	2B – Research Natural Areas	5,959
	2C – Botanical Areas	929
	2J – Municipal Watersheds	366
	2I – Starkey Experimental Forest and Range	92
	2J – Municipal Watersheds	8,919
	3A – Nonmotorized Undeveloped	17,033
	3B – Limited Motorized Undeveloped	51,354
	4A – General Forest/Timber/Range	46,243
	5 – Developed Sites and Administrative Areas	547
	Hells Canyon National Recreation Area	22,555
Wallowa Whitman Total Acres		350,890
Grand Total Acres		600,855

A Plan component (FLS-1G) prohibits management activities near denning sites; however it is unlikely that management actions would occur in the area and during the time of denning due to lack of access. The Revised Forest Plan will have more area allocated to management areas that would have more restrictive management actions, primarily wilderness and backcountry motorized. These management areas provide few opportunities for potential human disturbance, especially during the time of denning

(winter/early spring) due to snow. Winter motorized access is prohibited in the following Management Areas: 1A, 1B, 1C, 2A, 2B, 2J, and 3A. The percent change in area suitable for over the snow vehicle use from current is estimated at -2 percent on the Malheur NF, -7 percent on the Umatilla NF, and -5 percent on the Wallowa-Whitman NF.

The potential impacts of human disturbance due to the availability of roads and trails to wolverines would be similar on the three national forests, with the exception that summer cross-country travel has been prohibited on the Umatilla NF.

Disturbance caused by the use of roads is will likely be reduced in the identified elk priority areas where there is a guideline to increase elk security when management activities are proposed in those areas (RME – 3G). There is little indication from the Revised Forest Plan that extensive road building will occur. Plan standards and guidelines especially in key watersheds stress no net increases in road densities. Most (greater than 80 percent) of the modeled suitable habitat across the planning area is in wilderness or other management areas with limited management activities (Table 48).

Standards and guidelines of the proposed Revised Forest Plan call for protections of important habitats for wolverines, and wolverines themselves. Management activities are designed to minimize adverse effects and shall not retard recovery of listed and proposed species (RE-5S, FLS-1G).

Because the Wallowa-Whitman National Forest is thought to be occupied, it is possible that individual wolverines could be disturbed by implementing projects under this Revised Forest Plan. However, the Revised Forest Plan is managing habitats towards HRV and the cold forest is relatively close to what occurred historically. Currently, the overall permeability of the planning area for wolverine was rated as moderate to high; meaning that in all likelihood wolverine mobility is not restricted (Wales et al. 2011). There is potential for wolverines from the Rocky Mountain population to enter Oregon from Idaho, Wyoming, or Montana. Although individuals may be impacted, overall management direction of any of the proposed action would likely contribute to habitat conditions for viability and persistence of this species.

Climate Change

The primary threat to the DPS is from habitat and range loss due to climate warming (USDI Fish and Wildlife Service 2011c).

An important climate change adaptation that has been recommended for wolverine is to reduce the negative effects of non-climate related stressors such as the effects of roads (and trails) on habitat (Gaines et al. 2012, Lawler et al. 2014). Reducing the negative effects of roads, habitats can become more resilient to the effects of climate change, and habitat connectivity can be restored allowing wolverines to adjust their ranges as conditions change. The implementation of the Revised Forest Plan includes management direction to make improvements to habitat effectiveness for elk by reducing road impacts in some identified elk priority areas. These improvements in elk security will likely improve habitat effectiveness for wolverine as well.

Cumulative Effects

Since most wolverine habitat is found on remote, high-elevation Forest Service lands, few cumulative effects are expected from lands under private, State or other Federal agency administration. Past, present, and reasonably foreseeable future non-Federal actions that affect wolverine habitat include timber harvest and fuels reduction, recreation, human development, and grazing on private and state lands.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands from the public. This would increase human disturbance and result in areas with relatively low human disturbance on NFS lands becoming more important to wolverine and other wildlife.

Summary of Effects

The implementation of this Revised Forest Plan would make a relatively high contribution to the maintenance and restoration of habitat for wolverines and result in a **may affect, likely to adversely affect** determination.. This would occur because:

- About 80 percent of the habitat on the Wallowa-Whitman identified as wolverine habitat modeled by Wales et al. (2012) occurs in existing wilderness or reserved types of management areas where few vegetation management activities are proposed. Wolverines are not thought to be dependent on specific vegetation or habitat features that might be manipulated by land management (USDI Fish and Wildlife Service 2011) activities.
- Plan components provide adequate protection to ameliorate the identified risks to this species and its habitat from activities proposed.
- The Revised Forest Plan does not substantially alter the current impacts that summer and winter motorized trails and roads have on habitat effectiveness for wolverines.

Wolverine - Effects Within the HCNRA

The effects on the wolverine within the HCNRA were analyzed in the associated CMP FEIS (US Forest Service 2003). Those effects are displayed here (modified slightly to reflect the decision within the ROD).

Effects - HCNRA

The CMP retains greater than 85 percent of the total forest acres within the HCNRA without timber harvest. Excluding large stand-replacing fires, the forested acres would provide large reserves of habitat where little habitat alterations and low human disturbance occur. In these areas, large secluded open spaces would be available for wolverines.

On a larger scale, due to large home range, wolverine may need connectivity corridors between other large reserves, such as the Eagle Cap and Gospel Hump Wildernesses. Implementation of the standards for habitat corridors in the Regional Forester's Amendment #2 (Eastside Screens), 60 percent of hiding cover requirement, and PACFISH riparian buffers would benefit their retention during the next decade.

Natal dens in Idaho and Montana have been found to be most commonly associated with high elevation snow covered talus slopes, boulder gardens, log jams, and other physical structures (Copeland 1996, Hash 1987). Copeland found female wolverines to be extremely sensitive to human disturbance near natal dens from January through May. Cross-country skiers and other recreationists have the potential to disturb these sites and displace females with kits. All potential natal den sites are believed to be located in the Seven Devils area. No recreation occurs in these areas during winter or spring. No impact from recreationists is expected for natal dens in the HCNRA CMP.

The HCNRA provides for a year-round prey base of ungulates. Populations of deer and elk would continue to be managed at their current management objectives. Bighorn sheep reintroductions into HCNRA would add to the numbers of ungulates available to wolverine. The reduction of domestic sheep in most of HCNRA has probably reduced the amount of carrion. **The CMP would have a low impact on reducing the amounts of large ungulates available to wolverine, based on the following rationale.**

The CMP allows roaded access where it already exists and also allows livestock grazing. Both livestock grazing and human disturbance associated with open roads have the ability to affect big game distribution and availability to wolverines. Because big game populations would continue to be managed at their current management objectives, and the reintroductions of bighorn sheep will likely increase big game numbers in the NRA, disturbance to big game populations associated with roaded access for big game hunting and other human activities, along with continuation of current levels of livestock grazing, are not likely to appreciably reduce the availability of big game prey to wolverines on a year-round basis.

The CMP would provide similar levels of alternative prey base, such as rabbits and squirrels. Prescribed burning would enhance most small mammal populations by increasing the quality and quantity of forage. The 100 percent snag level would provide high amounts of standing and down woody material, which many small mammals depend on.

The presence of humans may directly conflict with wolverines (Ruggiero et al. 1994). Open roads would allow greater human access. Hornocker and Hash (1981) found 15 of 18 mortalities on wolverine in Montana were related to trapping near roads. The occurrence of comparatively stable, dense wolverine populations in mountainous areas of British Columbia and the Yukon has been attributed to the availability of inaccessible areas, which act as natural refuges (Ruggiero et al. 1994). Road closures would reduce human disturbance to ungulates, therefore retaining big game use in more areas. This would open up more foraging areas for wolverine, since big game provide part of their prey base. The potential for human disturbance to wolverines and large ungulates is likely to become significantly less than current conditions, due to road closures which are expected to reduce the amount of areas open to vehicles and associated human activity.

Snowmobile use in winter has the potential to increase disturbance to individual wolverines. Hornocker and Hash (1981), suggested that human access on snowmobiles or all-terrain vehicles in winter and early spring could cause wolverine to change their behavior by moving to areas without vehicles. Wolverine and Canada lynx surveys conducted on this Forest from 1992 -1994 has shown a preference by wolverines for big game winter ranges during the winter months.

The CMP would continue to limit general use of snowmobiles in HCNRA by restricting their use to designated routes and specific play areas. These four play areas comprise 6.3 percent of the total HCNRA acreage. At least 93 percent of the HCNRA does not have snowmobile use. Restricting snowmobile use to certain areas represents an improvement over having no specified snowmobile areas.

The CMP plan components that specifically address the protection, enhancement, and management of wolverine include:

Wld-S2: Protect, enhance, and manage wildlife habitat for the recovery of wildlife that are listed as threatened, endangered, or sensitive. Inventory the occurrence and distribution of threatened and endangered species

Wld-G6: Identify and monitor potential wolverine natal den sites. If active natal den sites are found, restrict human use near these sites from January through May.

Wld-G7: Maintain large refugia (greater than 10,000 acres) with low human-caused disturbance for wolverine, Pacific fisher, and pine marten.

In summary, the continued implementation of the CMP would make a relatively high contribution to the maintenance and restoration of habitat for wolverines and result in a **may affect, likely to adversely affect** species determination. This would occur because:

- Greater than 85 percent of the CMP occurs in existing wilderness or reserved types of management areas where few vegetation management activities are proposed. Wolverines are not thought to be dependent on specific vegetation or habitat features that might be manipulated by land management (USDI Fish and Wildlife Service 2011c) activities.
- CMP plan components provide adequate protection to ameliorate the identified risks to this species and its habitat from activities proposed.

Silene Spaldingii

Effects

Spalding's catchfly populations, including populations that may be discovered during the life of the Revised Forest Plan, would be managed according to several desired conditions, standards and guidelines. As described above, the main risk factors potentially effecting *Silene spaldingii* are livestock grazing, invasive species, and fire.

Within the Umatilla National Forest, nearly all known sites of Spalding's catchfly are within management area 3B – backcountry, limited motorized use, where livestock grazing would be a suitable activity. Two Spalding's catchfly patches that have about 200 plants (roughly 3 percent of the Spalding's catchfly plants within the Umatilla National Forest) occupy an area to the north that would be allocated to MA 4A-general forest, which is also suitable for livestock grazing. These Spalding's catchfly populations, including populations that may be discovered during the life of the Revised Forest Plan, would be managed according to standards FLS-15S and FLS-3S as well as other desired conditions, standards and guidelines as described for the Wallowa-Whitman National Forest.

Within the Wallowa-Whitman National Forest, known Spalding's catchfly populations are located in Management area 4A-general forest, which is suitable for livestock grazing.

As projects are planned or revised (including ongoing actions that would be brought into compliance with the Revised Forest Plan upon implementation), all known and new populations that may be discovered during the life of the Revised Forest Plan have protection measures (including desired conditions, standards and guidelines) that will be followed to ensure protection and conservation of Spalding's catchfly populations.

Effects to Spalding's catchfly from livestock grazing

There are three standards and guidelines that are expected to reduce, if not eliminate herbivory of Spalding's catchfly by livestock and result in infrequent, incidental trampling impacts, while maintaining the grassland habitat, including pollinator host plants.

- FLS-15S (Standard): Livestock grazing of occupied *Silene spaldingii* habitat shall not be authorized between July 1 and September 30 (flowering-fruiting period).
- FLS-3S (Standard): Maximum utilization of key forage species shall not exceed 30 percent in occupied habitat of threatened, endangered, proposed or candidate plant species, except where an approved conservation strategy, conservation agreement, or recovery plan recommends an alternate use level.
- FLS-5G (Guideline): New water developments and salting should not be authorized within one-quarter mile of occupied habitat of threatened, endangered, candidate or sensitive plant species to reduce concentrated livestock use and its associated impacts, e.g., excessive trampling, soil compaction and herbivory.

FLS-15S would allow for the Spalding's catchfly to complete its reproductive cycle: flowering, pollination-fertilization, fruit-seed maturation and seed dispersal. Spalding's catchfly would begin seasonal growth during late May into June as a rosette stage with foliage near the ground. By late June stem elongation and initiation of floral buds has begun (Dingledein et al. 2010). A browse study conducted on the Zumwalt Prairie Preserve in northeastern Oregon concluded that livestock were not significant factor affecting the browse rate of Spalding's catchfly (Cullen et al. 2011). This study, conducted earlier in the season during June and into mid-July, corroborates what Forest Service botanists observe: early season grazing has little direct effect to the catchfly with few plants being browsed (Hustafa pers. comm. June 2017). This is likely due to the fact that during early season, catchfly plants are small (in the rosette stage) and largely beyond the reach of livestock that prefer to browse on the taller lush, green vegetation of the early season. However, as the season progresses, browse rates on the catchfly, from both livestock and wild ungulates, increase (Kimoto et al. 2012). Ceasing grazing in occupied Spalding's catchfly habitat from July 1 through September 30 would remove the threat of direct and indirect threats of browsing and trampling, thereby allowing catchfly plants to flower, be pollinated, and mature the capsules to the point of dehiscence and seed dispersal.

FLS-3S is designed to moderate grazing utilization and reduce associated effects of trampling, maintain or improve grassland vigor and health, and maintain other pollinator host plants in occupied habitat. Some research shows that moderate grazing can maintain or improve the forb component of grasslands, but caution that grazing should be carefully planned to the specific plants and pollinators of an area (Black et al. 2011). While Kimoto (2010) observed declines in bumblebee abundance at utilization levels of 22 to 40 percent, a relatively light maximum utilization rate of 30 percent for a portion of the season before or after the Spalding's catchfly main growing season would not be expected to drive bumblebee abundance or their host plants to detrimentally low numbers. Utilization of key forage species would be measured with the same methodology as other portions of a pasture or allotment.

FLS-5G is designed to reduce concentrations of livestock in occupied habitat. This guideline describes that new water developments and salting should not be authorized within one-quarter mile of occupied habitat of threatened, endangered, candidate, or sensitive plant species.

Effects to Spalding's catchfly from Invasive Plants

Forest Plan objective 1.5, "Reduce current infestations of invasive plant species," would contribute to the conservation of Spalding's catchfly by reducing invasive species in and around occupied habitat. Invasive Plant treatment actions designed to reduce infestations may affect Spalding's catchfly. The main concern here is the use of herbicides to treat invasive Plants, which, if applied indiscriminately, may cause mortality or damage to Spalding's catchfly.

Other additional protection measures such as RE-5S, IS-3G and IS-4G, would insure that as invasive plant treatment projects are planned and implemented, adverse effects to Spalding's catchfly would be minimized and recovery would not be retarded. Any invasive plant treatments would be designed to not adversely affect *S. spaldingii*.

Effects to Spalding's catchfly from Prescribed Fire

Revised Forest Plan guideline FLS-7G would require that federally listed, proposed, or candidate plants be avoided during the construction of slash piles or other fuel treatments to protect plants from the extreme temperatures that develop underneath or next to them. Guideline FLS-8G would require federally listed, proposed, or candidate plants be avoided by the construction fire suppression lines for both planned (prescribed) and unplanned fires (wildfire).

These standards and guidelines would permit prescribed fire for situations that may benefit the Spalding's catchfly or its habitat, for example, encroachment from shrubs such as snowberry or ninebark. The net long term effect of prescribed fire would benefit *S. spaldingii*, though some individual plants may be adversely affected in the short-term.

Effects of Plan Components for Other Forest Management Programs That Contribute to Spalding's Catchfly Conservation

Additional standards and guidelines FLS-6S, FLS-7G, FLS-8G, FLS-9S and FLS-11S specify that other potential management activities will avoid adverse effects to this catchfly and other listed species and critical habitat. To do so, road and trail construction and maintenance and timber harvest and associated vegetation management would be designed and carried out in a manner to avoid adverse effects (i.e., would not be likely to adversely affect) the catchfly. An exception would be granted for situations where the silvicultural prescription would benefit the species. Few, if any, of the catchfly populations on National Forest System lands inhabit the forested margins of grasslands. Catchfly may grow immediately adjacent to forest stands at upper elevations of the canyon grasslands or Blue Mountains basins, but most known populations are in open grassland communities, so this scenario would be uncommon.

Minerals management activities associated with both leaseable and locatable minerals are additional potential management activities that require conservation measures be developed under the guideline FLS-14G to protect *Silene spaldingii* populations (as well as other listed species and critical habitat). The goal of this guideline is to minimize to the extent feasible adverse environmental effects to threatened and endangered species. The regulation is not an absolute restriction to avoid adverse effects.

Additionally, there is a guideline (LH-4G) that addresses potential land exchanges: land exchanges should avoid the disposition of occupied habitat of threatened, endangered, candidate, proposed, or sensitive species of plants, aquatic vertebrate and invertebrate species, and terrestrial wildlife. Plan components described in the Revised Forest Plan provide adequate protection to ameliorate the identified risks to this species and its habitat on National Forest System lands.

Climate Change

Primary strategies to address climate change threats focus on increasing resilience to ecological disturbance (wildfire, insects, and nonnative species) (Halofsky and Peterson 2016). Rare and disjunct species and communities require adaptation strategies and tactics focused on encouraging regeneration, preventing damage from disturbance, and establishing refugia.

Overall, the protection and restoration objectives and practices described in the Revised Forest Plan, will promote resilience and conservation of known populations of *Silene spaldingii*.

Cumulative Effects

The effects area includes lands within the proclaimed boundaries of the Umatilla and Wallowa-Whitman National Forest and adjacent lands. Tribal lands exist adjacent the national forests on the Confederated Tribes of the Umatilla Indian Reservation and the Nez Perce Precious Lands. Most catchfly populations are near the forest boundaries of both the Umatilla and Wallowa-Whitman national forests. Actions on adjacent nonfederal lands have a possibility to affect catchfly populations on National Forest System lands, but likely only for those populations nearest the forest boundaries. It is not possible to state what actions are likely to occur on adjacent private or tribal lands, but we assume these lands would be managed as they are today. Nonfederal actions most likely to affect catchfly plants on adjacent National Forest System lands is invasive plant control on adjacent private and tribal lands, as well as county and

state roads leading to and coursing through the national forests. Active weed management programs on adjacent private and tribal lands, as well state and local government roadside weed control, would likely benefit catchfly habitat on federal lands because fewer weed propagules would be available for transport, whether by people, vehicles, wind, or wildlife, and result in establishment in catchfly habitat on the national forests. The effects of other management activities on adjacent private, state and tribal lands is expected to be confined to those lands and not overlap in time and space with catchfly populations on National Forest System lands. The management direction for the Hells Canyon National Recreation Area (HCRNA) would be additive to the direction under the Revised Forest Plan. Standards and guidelines for the management of livestock grazing and invasive plant control within the HCNRA would complement direction under the proposed Revised Forest Plan.

Summary of Effects

The implementation of the Revised Forest Plan would make a relatively high contribution to the maintenance and restoration of habitat for *Silene spaldingii* and result in a **may affect, likely to adversely affect** determination. This would occur because:

- Plan components provide adequate protection to ameliorate the identified risks to this species and its habitat from activities proposed.
- Though many management actions, such as nonnative invasive species abatement or prescribed fire, would assist in the long-term recovery of Spalding's catchfly, these actions may have short-term adverse effects that may impact individual plants or their habitat.
- The USFWS has developed a recovery plan that provides a strategy to protect and recover this species that the Forest Service is implementing in part through this Revised Forest Plan.

Mirabilis Macfarlanei

Effects

MacFarlane's four o'clock is unlikely to inhabit the planning area but its presence cannot be entirely ruled out. Because the species not likely present within the planning area, potential effects to the species are extremely unlikely to occur, and thus discountable. If the MacFarlane's four o'clock were to be discovered in the Revised Forest Plan action area, then the same plan components for federally listed plants (except FLS-15S, which applies specifically to Spalding's catchfly) would apply during the development and implementation of site specific project actions. Because both species grow in grassland habitats, the effects of the plan components to the MacFarlane's four o'clock would be similar as analyzed above for Spalding's catchfly.

Climate Change

Primary strategies to address climate change threats focus on increasing resilience to ecological disturbance (wildfire, insects, nonnative species) (Halofsky and Peterson 2016). Rare and disjunct species and communities require adaptation strategies and tactics focused on encouraging regeneration, preventing damage from disturbance, and establishing refugia.

Overall, the protection and restoration objectives and practices described in this Revised Forest Plan (see effects section for *Silene spaldingii*), will promote resilience and conservation of known populations of *Mirabilis macfarlanei*, if found within the planning area.

Cumulative Effects

Cumulative effects under the ESA are the effects of future state or private activities, not involving federal activities, which are reasonably certain to occur within the action area of the federal action subject to consultation. The action area includes lands within the proclaimed boundaries of the Malheur, Umatilla and Wallowa-Whitman National Forest. Tribal lands exist adjacent the national forests on the Confederated Tribes of the Umatilla Indian Reservation and the Nez Perce Precious Lands. No known MacFarlane's four o'clock populations are within the planning area, though known locations occur within the HCNRA of the Wallowa-Whitman NF.

Within the action area, MacFarlane's four o'clock may occur on public or private land. Potential habitat for MacFarlane's four o'clock exists in private land within the adjacent HCNRA. Since most private lands tend to be managed intensively, these areas may no longer provide habitat for MacFarlane's four o'clock.

It's not possible to state what actions are likely to occur on adjacent private or tribal lands, but we assume they would be managed as they are today. The nonfederal action most likely to affect MacFarlane's four o'clock populations on adjacent National Forest System lands is invasive plant control on adjacent private and tribal lands, as well as county and state roads leading to and coursing through the national forests. Active weed management programs on adjacent private and tribal lands, as well state and local government roadside weed control, would likely benefit MacFarlane's four o'clock habitat on federal lands because fewer weed propagules would be available for transport, whether by people, vehicles, wind or wildlife. The effects of other management activities on adjacent private, state, and tribal lands is expected to be confined to those lands and not overlap in time and space with MacFarlane's four o'clock populations on National Forest System lands.

The management direction for the Hells Canyon National Recreation Area (HCRNA) would be additive to the direction under the proposed action. Standards and guidelines for the management of livestock grazing and invasive plant control within the HCNRA would complement direction under the proposed action for the planning area.

Summary of Effects

MacFarlane's four o'clock is unlikely to inhabit the planning area but its presence cannot be entirely ruled out. Because the species not likely present within the planning area, potential effects to the species are extremely unlikely to occur, and thus discountable. Therefore, with the implementation of the Revised Forest Plan, our determination is a **may affect, not likely to adversely affect** the MacFarlane's four o'clock.

If the MacFarlane's four o'clock were to be discovered in the Revised Forest Plan action area, then the same plan components for federally listed plants (except FLS-15S, which applies specifically to Spalding's catchfly) would apply during the development and implementation of site specific project actions. Because both species grow in grassland habitats, the effects of the plan components to the MacFarlane's four o'clock would be the same as analyzed above for Spalding's catchfly. This call was made because:

- It is highly unlikely *Mirabilis macarlanei* occurs in the planning area.
- Plan components provide adequate protection to ameliorate the identified risks to this species and its habitat from activities proposed.
- Though many management actions, such as nonnative invasive species abatement or prescribed fire, would assist in the recovery of MacFarlane's four o'clock, these actions may have short-term adverse effects that may impact individual plants or their habitat, while promoting the long term recovery of the species.

- The USFWS has developed a recovery plan that provides a strategy to protect and recover this species that the Forest Service is using to protect and recover this species.

Whitebark Pine

Effects

Subalpine parkland habitats are generally a high vulnerability group with exposure to environmental change from climatic and fire regime factors (Miller-Struttmann et al. 2015, Munson and Sher 2015). Whitebark pine is exposed to threats from insect and disease, as well as environmental changes (Devine et al. 2012). Additionally, this group of species has exposure to livestock grazing, recreational activity, hydrologic regime alteration, and plant collecting.

The desired conditions for whitebark pine are to ensure that the distribution and abundance of whitebark pine structural stages, age classes, and density classes are consistent with their natural range of variability. Whitebark pine habitats are ecologically resilient, sustainable, and compatible with natural disturbance processes. Whitebark pine populations and the threats to those populations exist at levels that do not warrant protection under the Endangered Species Act.

The desired future conditions of the Revised Forest Plan are to maintain or enhance existing populations are mediated by application of plan components. These include protective standards and guidelines, as well as implementation of plant monitoring that targets population and habitat conditions and trends (FLS-6S, FLS-7G, FLS-8G, FLS-9S, FLS-11S, FLS-12S, , , LH-4G). An additional guideline, DP-2G, encourages management of unplanned ignitions as appropriate to achieve desired conditions. In some cases, managed fire can be used to encourage whitebark pine regeneration.

Large, high-severity fires have the potential to severely reduce or even eliminate cone-bearing whitebark pine across an extensive landscape (Aubry et al. 2008). Conifers of other species such as subalpine fir, that have grown into whitebark stands during the period of modern fire suppression often facilitate these types of events by changing the fuel characteristics in the area. In some cases, these relatively young encroaching conifer trees have grown in excess of 21 inches dbh. The proposed action incorporates specific management direction (OF-1G – Guideline) to accommodate situations where encroaching conifers larger than 21 inches dbh can be cut, while also placing restrictions on the harvesting of older trees. This guideline would not be anticipated to substantially restrict whitebark restoration activities because conifers that are generally targeted for removal would be trees of other species which have encroached relatively recently due to fire suppression (i.e., less than 150 years old), and are not likely to be larger than 21 inches dbh.

Under the proposed action, additional areas would be allocated to MA 1B (i.e., recommended wilderness) from the existing condition. Until final decisions are made by Congress, these area would be managed to protect wilderness characteristics.

The levels of recommended wilderness designation included in this proposed action may affect the management techniques available. Restoration within wilderness or wilderness-like areas may have to rely heavily on burning or wildfire management.

The Blue Mountains national forests have all implemented some levels of active restoration efforts for whitebark pine over the previous planning period. Restoration activities for this species would likely continue or intensify, contingent upon funding.

Climate Change

The predicted impacts of warming temperatures include a severe decline in suitable habitat; increased mountain pine beetle activity; an increase in the number, intensity, and extent of wildfires; and perhaps an increase in white pine blister rust-related mortality (Aubry et al. 2008).

Cumulative Effects

The areas occupied by whitebark pine are primarily either in wilderness, proposed wilderness, or backcountry. There will be very few management activities in these management areas.

Past, present, and reasonably foreseeable future non-federal actions that affect whitebark pine habitat include timber harvest, fuels reduction, and grazing on private and state lands. These activities may reduce fuel loadings which would reduce the risk of large wildfires. Actions such as thinning to reduce bark beetle outbreaks will also beneficially affect nearby populations of whitebark pine.

Summary of Effects

The USFS requests formal conference for whitebark pine because we want to streamline future compliance with Section 7 of the ESA for the Revised Forest Plan should whitebark pine be listed under the ESA.

The conservation outcome of implementation of the Revised Forest Plan is a **may effect, likely to adversely affect** determination. This determination was made because:

- The Revised Forest Plan specifies maintenance, conservation, and promotion of whitebark pine populations and plan components provide significant protection measures to ameliorate the identified risks to this species and its habitat from proposed activities.
- Though many management actions, such as thinning competitors or prescribed fire, would assist in the long-term recovery of whitebark pine, these actions may have short-term adverse effects that may impact individual plants and their habitat.

Whitebark Pine Effects within the HCNRA

As described for the wolverine above, the CMP retains greater than 85 percent of the total forest acres within the HCNRA without timber harvest. Known locations of whitebark pine within the CMP and the allocations of management areas are displayed in Figure 72. Known locations are generally within wilderness land allocations. Excluding large stand-replacing fires, the forested acres would provide large reserves of habitat where little habitat alteration and low human disturbance occur. In these areas, whitebark pine will be protected from direct human disturbance.

As described above for whitebark pine within the Revised Forest Plan area, restoration activities will likely continue or intensify, contingent upon funding.

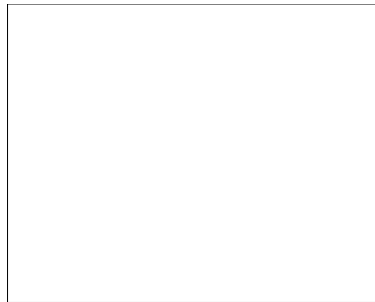


Figure 74. Distribution of whitebark pine within the Hells Canyon HCNRA

Existing CMP plan components include components to protect and restore federally listed and sensitive species:

TES-O2: Manage habitat and populations of all FS sensitive plant species to ensure their continued existence and viability in the HCNRA. Ensure that all actions do not contribute to the species becoming federally listed threatened and endangered under the ESA. (Forest Plan, FSM 2670)

TES-S1: When evaluating ongoing and new actions, survey probable habitat for rare plants. Mitigate potential conflicts or modify the project to ensure the protection of rare plants and their associated habitat (Forest Plan, FSM 2670).

TES-O4: Conduct habitat improvement projects for federally listed species. These may include fencing, burning, closing roads, treatment of noxious weeds, plant propagation, or other actions.

TES-S2: Monitor population trends and habitat conditions for federally listed threatened, endangered or proposed plant species.

TES-S3: Manage habitat and populations of FS sensitive species consistent with conservation agreements or conservation strategies. (New)

In the absence of conservation agreements or strategies, manage sensitive plant species to ensure their continued viability in the planning area. (Forest Plan, FSM 2670) Additionally, the Regional Forester's Amendment #2 (Eastside Screens) to the CMP includes protection measures of all trees greater than 21 inches dbh. The conservation of large whitebark pine trees will benefit this species.

The whitebark pine conservation outcome for implementation of the CMP as amended is a **may effect, likely to adversely affect** determination. This determination was made because:

- The CMP as amended describes maintaining, conserving and promoting federally listed species, and plan components provide significant protection measures to ameliorate the identified risks to this species and its habitat from activities proposed.
- Though many management actions such as thinning competitors or prescribed fire would assist in the long-term recovery of whitebark pine, these actions may have short-term adverse effects that may impact individual plants and their habitat.

Conclusion – Determination of Effects

Summary of Effects Determinations by Species

Table 50. ESA effect determinations for listed, proposed, and candidate species, designated critical habitat, and MSA effect determinations for essential fish habitat¹

Aquatic Species	ESA Listing Status	Determination of Effects		
		Individuals	Critical Habitat	Essential Fish Habitat
Fish Species				
Bull Trout	Threatened	LAA ²⁷	LAA	--
Snake River Spring/Summer Chinook Salmon	Threatened	LAA	LAA	AE
Snake River fall Chinook salmon	Threatened	NLAA	NLAA	AE
Middle Columbia River Steelhead	Threatened	LAA	LAA	--
Middle Columbia River Chinook Salmon	--			AE
Coho Salmon	--	--	--	AE
Snake River Basin Steelhead	Threatened	LAA	LAA	--
Wildlife Species				
Grey Wolf	Endangered	NLAA	--	--
Wolverine	Proposed	LAA	--	--
Plant Species				
Spaldings catchfly (<i>Silene spaldingii</i>)	Threatened	LAA	--	--
Macfarlane's Four O'Clock (<i>Mirabilis macfarlanei</i>)	Threatened	NLAA	--	--
Whitebark Pine (<i>Pinus albicaulis</i>)	Candidate	LAA	--	--

¹Determinations also apply to lands within the Hells Canyon NRA.

²⁷ NE No Effect; NLAA May Effect, Not Likely to Adversely Affect; LAA Likely to Adversely Affect; AE Adverse Effect

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Appendices

Appendix A – Blue Mountains Aquatic and Riparian Conservation Strategy

Appendix B – Crosswalk of PACFISH/INFISH and Blues ARCS

Appendix C – PIBO Monitoring Data from Malheur National Forest, March 2016

Appendix D – PIBO Monitoring Data from Umatilla National Forest, March 2016

Appendix E – PIBO Monitoring Data from Wallowa-Whitman National Forest, March 2016

Appendix F – Hells Canyon NRA CMP Management Direction

Appendix G – Species Distribution Maps

Appendix H - Regional Aquatic and Riparian Conservation Strategy Guideline for Annual Livestock Use and Disturbance Indicators (GM-3)

Appendix I – List of Properly Functioning Subwatersheds by Forest

Appendix J – Strongholds for ESA Listed Aquatic Species

Appendix K – Blue Mountains National Forests - Land Management Plans for the Malheur, Umatilla and Wallowa-Whitman National Forests, August 2017