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FISH AND WILDLIFE SERVICE
Oregon Fish and Wildlife Office
2600 SE 98th A venue, Suite 100
Portland, Oregon 97266
Phone: (503) 231-6179 FAX: (503) 231-6195

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Mr. Tom Montoya
Forest Supervisor
Wallowa-Whitman National Forest
P.O. Box 907
Baker City, OR 97814

Mr. Eric Watrud
Forest Supervisor
Umatilla National Forest
72510 Coyote Road
Pendleton, OR 97801

Mr. Steve Beverlin
Forest Supervisor
Malheur National Forest
P.O. Box 909
John Day, OR 97845

Subject: Endangered Species Act Section 7 Formal and Informal Consultation on the Revised Blue Mountains Forest Plans in Northeast Oregon on the Wallowa-Whitman, Umatilla and Malheur National Forests (FWS reference 01EOFW00-2018-F-0108)

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

This document transmits the Fish and Wildlife Service's (Service) Biological Opinion and Concurrence Opinion (collectively, Opinion) on the proposed Blue Mountains Forest Plans (BMFP), for the Wallowa-Whitman, Umatilla, and Malheur National Forests (BMF), including the portion of the Ochoco National Forest administered by the Malheur National Forest. This Opinion addresses effects on the threatened bull trout *(Salvelinus confluentus)* and its critical habitat, and the threatened Spalding's catchfly *(Silene spaldingii)*. Also included are an informal consultation that addresses effects on the endangered gray wolf *(Canis lupus)*, and a Conference Opinion on the candidate whitebark pine *(Pinus albicaulis)* and the proposed wolverine *(Gulo gulo)*, as requested by the BMFs, in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Finally, the BMFs requested formal consultation on effects to bull trout and its critical habitat for implementation of the Wallowa-Whitman National Forest's Hells Canyon National Recreation Area Comprehensive Management Plan. Table 1 in the enclosed document identifies the effects determinations on all species mentioned above.

The Service received an initial request on August 30, 2017, for formal consultation in the form of a biological assessment (Assessment) on the BMFP. On November 13, 2017, the BMF provided an addendum identifying modifications to "grazing management guideline (GM-3)". The November 13, 2017, addendum also included a request to complete our review of the Assessment and to finalize formal programmatic consultation on the BMFP; formal consultation commenced on November 13, 2017. On February 1, 2018, the BMF provided a second addendum identifying minor, but necessary modifications.

The Service agrees with the BMFs that the proposed action is a framework programmatic action, a Federal action that approves a framework for the development of future actions that will be authorized, funded, or carried out at a later time. Any take of a listed species would not occur unless and until those future action(s) are authorized, funded, or carried out and subject to further section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Therefore, the Service is not providing an incidental take statement with this Opinion.

This Opinion is based on information provided in the August 30, 2017 Assessment, August 2017 Aquatic and Riparian Conservation Strategy (ARCS), November 13, 2017, and February 1, 2018 addendums, draft EIS for the draft revised BMFP, Level 1 and 2 meetings, emails, and other sources of information. A complete administrative record for this consultation is on file at the Service's La Grande Field Office in La Grande, Oregon.

The BMFs are encouraged to continue to explore opportunities to manage proactively for the benefit of native fish, wildlife and plant species, and to promote the conservation of listed species pursuant to section 7(a)(1) of the ESA. If you have any questions about this Opinion/Concurrence, or require more information regarding this consultation, please contact Suzanne Anderson or me at (541) 962-8584.

Sincerely,

Paul Henson

Paul Henson
State Supervisor

Enclosure

cc:
Kathy Ramsey, Umatilla National Forest, kramsey@fs.fed.us
Scott Turo, Confederated of the Tribes Warm Springs Reservation, Madras, Oregon, scott.turo@ctwsbnr.org
Amanda Rogerson, Nez Pperce Tribe, amandar@nezperce.org
Heidi McRoberts, Nez Perce Tribe, Lapwai, Idaho, heidim@nezperce.org
Andie Huber, Confederated Tribes Umatilla Indian Reservation, Pendleton, Oregon, AudieHuber@ctuir.org
Erica Maltz, Burns-Paiute Tribes, Burns, Oregon, Erica.maltz@burnspaiute-nsn.gov
Suzanne Anderson, US Fish & Wildlife Service, La Grande, Oregon, Suzanne_Anderson@fws.gov

Endangered Species Act – Section 7 Consultation
Biological Opinion
for
For the Revised Blue Mountains National Forest Plans
Malheur, Umatilla and Wallowa-Whitman National Forests
(FWS Reference Number 01EOFW00-2018-F-0108)

Prepared by the La Grande Field Office
U. S. Fish and Wildlife Service
La Grande, Oregon

Paul Henson

Paul Henson, Ph.D, State Supervisor

May 29, 2018

Date

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INTRODUCTION

This document represents the U.S. Fish and Wildlife Service's (Service) Biological Opinion, Concurrence, and Conference Opinion (collectively, Opinion) on the proposed Blue Mountains Forest Plan (BMFP), in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 C. 1531 *et seq*.) (ESA). The BMFP includes the revised Forest Plans for the Malheur, Umatilla, and Wallowa-Whitman National Forests (collectively, the Blue Mountains Forests, or BMF), including the portion of the Ochoco National Forest administered by the Malheur National Forest. This Opinion addresses effects of the BMFP on the threatened bull trout (*Salvelinus confluentus*) and its critical habitat, and threatened Spalding's catchfly *(Silene spaldingii)*; Informal consultation addresses effects of the BMFP on the Endangered gray wolf *(Canis lupus)* and the Threatened Macfarlane's Four O'Clock *(Mirabilis macfarlanei*); and two unlisted species: the candidate whitebark pine *(Pinus albicaulis)* and the proposed wolverine *(Gulo gulo)* are addressed in Conference Opinions (Table 1).

The Service received an initial request on August 30, 2017 for formal consultation in the form of a biological assessment (Assessment) on the BMFP. On November 13, 2017, the BMF provided an addendum identifing modifications to "grazing management guideline (GM-3)". On February 1, 2018, the BMF provided a second addendum identifying minor but necessary modifications. The November 13, 2017, addendum also included a request to complete our review of the Assessment and to finalize formal programmatic consultation on the BMFP. Formal consultation commenced on November 13, 2017.

This Opinion is based on information provided in the August 30, 2017 Assessment, August 2017 Aquatic and Riparian Conservation Strategy (ARCS), November 13, 2017, and February 1, 2018 addendums, draft EIS for the draft revised BMFP, Level 1 and 2 meetings, emails, and other sources of information. The administrative record for the BMFP consultation includes a complete record of these documents, meetings, processes, and conference calls, which is located within, and is available from, the La Grande Field Office, La Grande, Oregon.

The list of species and DCH addressed in this Opinion are found in Table 1. Federal agencies under Section 7 of the ESA are required to consult on effects to all endangered or threatened species. Per a Memorandum of Agreement (2000) on ESA consultation for Plan revisions, the Forest Service agreed to conference on proposed and candidate species, so these species are included in this Opinion.

Table 1. Species and Critical Habitat Covered in the Biological Opinion.

Species	Listing Status Listing Date and Reference	Recovery Plan	Action Area	Determination of Effects
Bull Trout (*Salvelinus confluentus*)	Threatened 6/10/1998 (63 FR 31647)	Final Recovery Plan 9/28/2015	BMF/HCNRA	LAA

Species	Listing Status Listing Date and Reference	Recovery Plan	Action Area	Determination of Effects
Bull Trout Critical Habitat	Designated 9/30/2010 (75 FR 2269) Effective 11/17/2010	Final Recovery Plan 9/28/2015	BMF/HCNRA	LAA
Gray Wolf *(Canis lupus)*	Endangered *(west of Highway 395 only)* 5/5/2011 (76 FR 25590) No critical habitat designated	--	UNF and MNF west of HWY 395	NLAA
Spalding's Catchfly *(Silene spaldingii)*	Threatened 10/10/2001 (66 FR 51597) No critical habitat designated	Recovery Plan 9/7/2007	UNF and WWWNF	LAA
Whitebark Pine *(Pinus albicaulis)*	Candidate 07/19/2011 (76 FR 10166)	--	BMF/HCNRA	LAA
Wolverine (*Gulo gulo*)	Proposed 2/04/2013 (78 FR 7864)	--	BMF/HCNRA	LAA

Goals and Overview of the Programmatic Section 7 Consultation Process
This proposed BMFP is a Federal action that provides a framework for the development of future, site-specific actions on the three BMFs that will be authorized, funded, or carried out and subject to the requirements of section 7 (including incidental take statements), as appropriate, at a later time (50 CFR 402, p. 26833). The purpose of this section 7 consultation is to determine if the framework action will jeopardize listed species or adversely modify or destroy designated critical habitat, evaluate the BMFP for its consistency with the conservation of listed, proposed, and candidate species, and provide a framework that will serve to inform project-level consultations that will occur at a later date. Therefore, this Opinion uses a framework programmatic approach to evaluate the BMFP. This Opinion presents the Service's broad-scale examination of potential impacts of the overall BMFP framework on listed, proposed, and candidate species and designated critical habitat, and examines how the BMFP aligns with the survival and recovery needs of those species and the conservation function of designated critical habitat occurring in the action area.

Future actions that will be authorized, funded, or carried out consistent with this overall program and that may affect listed resources will be evaluated through future, more project or site-specific section 7 consultations. During those subsequent project-level consultations, if incidental take is reasonably certain to occur and the proposed action is compliant with the requirements of section 7(a)(2) of the ESA, then an action-specific Incidental Take Statement will be provided.

Bull trout and its critical habitat occur on all three BMFs. The gray wolf is Federally-listed in the western 2/3rds of Oregon as defined by a boundary line that extends south from the Washington border along Highway (Hwy) 395 to Burns, then continues south on Hwy 78 to Burns Junction, and continues south on Hwy 95 to the Nevada border. Wolves east of this line are not Federally listed. Critical habitat for gray wolf has not been designated. The threatened Spalding's catchfly occurs on the Wallowa-Whitman and Umatilla National forests. Critical habitat for this listed plant species has not been designated. The wolverine is proposed for listing as a threatened species and currently occurs on the WWNF, and may occur on the Umatilla and Malheur national forests. Whitebark pine is a Federal candidate species and occurs on all three forests within the action area. The Forest Service (FS) requested conferencing on these two non-listed species.

The BMFP for the Malheur, Umatilla, and Wallowa-Whitman National forests will replace all current Forest Plan direction for Federally listed, proposed, and candidate species and designated critical habitat on the forests. PACFISH, INFISH, and Eastside Screens[1] that amended current Forest Plans' direction and consultation on those strategies will be transitioned to the individual Forests' BMFPs (except for the portion of the Wallowa-Whitman inside the HCNRA), beginning after receipt of the Opinion and the signing of the individual forests' records of decision (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 BMFs propose to transition all current plans and activities to the new BMFP direction, via the following process. BMFP revised direction will apply to all projects that have decisions made on or after the implementation date of the final RODs. 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". Therefore, ongoing activities (such as grazing) subject to annual operating instructions will be made consistent with the BMFP in the year following the signing of the Final RODs for the BMFPs. Additionally, ongoing contracts, authorizations of occupancy and use, or other instruments not subject to annual operating instructions that will expire within five years of the implementation date of the final ROD (where ESA listed species or habitat may be

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

affected) will be made consistent with BMFP direction within one year of the implementation date. Finally, ongoing contracts, authorizations of occupancy and use, or other instruments that will expire more than five years after the implementation date of the final ROD will be made consistent with BMFP direction within five years of the implementation date (where ESA listed species or habitat may be affected).
The November 13, 2017, addendum to the BA additionally proposed, for implementing grazing management guideline GM-3G (defined below), a schedule of 5 to 7 years (within 5 years re-evaluate allotments with ESA species, within 7 years non-ESA allotments) that allows the Forest Service (FS) time to incorporate data to confirm watershed condition framework (WCF) condition class ratings prior to assigning indicator values from the guideline. During this transition period, all existing project level terms and conditions from previous ESA consultation biological opinions will remain in effect until the consultation expires or a new decision takes the place of the one consulted on.

The BMFP has requested conferencing on a “may affect” determination for the proposed wolverine, and the candidate species, whitebark pine. Under 50 CFR section 402.10, the Service has the option to conference for effects to proposed species or proposed critical habitat in accordance with the procedures for consultation as identified in 50 CFR section 402.14. The conference consultation can be written as if the proposed species is listed in a final rule such that the effect determination threshold is at the “may affect” level, as opposed to the “jeopardy or adverse modification” level described in 50 CFR section 402.10. The conference may be adopted as a final consultation when the species or critical habitat is designated, but only if no significant new information is developed and no significant changes to the Federal action are made that would alter the effect determinations.

For individual actions covered by previously completed section 7 consultations under the ESA, the issuance of this Opinion does not automatically constitute a trigger for re-initiation. If the previously completed section 7 consultation included site-specific project design features that are still applicable (i.e., the extent and scale of effects will not change under the BMFP), then reinitiation is not triggered solely based on issuance of this Opinion. Actions that have not completed section 7 consultation (i.e., receiving either a final letter of concurrence or a biological opinion) as of the effective date of the Forest Service’s RODs will be amended such that they are consistent with the proposed BMFP and consultation will be completed according to this framework programmatic Opinion.

In 2002, regional executives from the USFS, National Marine Fisherise Service, and Service agreed that Revised Forest Plans for the BMFs would include a long-term aquatic conservation strategy that would replace the PACFISH/INFISH interim strategies and associated consultations (USFS et al. 2002). The proposed long-term strategy that the BMFs subsequently developed is the ARCS, a key element of the BMFP (Appendix A of the Assessment). The ARCS builds off of the strategies in PACFISH/INFISH and also includes an active watershed restoration component. Appendix A of the Assessment provides a comprehensive crosswalk between the components and directions of PACFISH/INFISH versus those of the proposed ARCS (e.g., comparison of standard widths for riparian habitat conservation areas bordering fish-bearing streams under PACFISH versus under the ARCS).

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

Hells Canyon National Recreation Area Comprehensive Management Plan

The Assessment proposes to retain the Hells Canyon National Recreation Area (HCNRA) 2003 Comprehensive Management Plan (CMP) without modification, into the BMFP, as applicable to WWNF, including retaining existing PACFISH, INFISH, and Eastside Screens direction for future actions in the CMP. At the time of the HCNRA CMP consultation covered all listed species within the HCNRA, including bull trout. Therefore, the previous consultation on the effects of implementing the 2003 CMP are still valid and in effect, with the following exceptions. This consultation will update the 2003 CMP record by including consultation on designated critical habitat (DCH) for bull trout and reinitiation of consultation on bull trout, as well as a Conference Opinion for the proposed wolverine and candidate whitebark pine (Table 1). Downstream effects in these areas are expected to be similar to those described in the 2003 consultations.

Consultation History

This BO is based on correspondence and discussions with the Forest Service, National Marine Fisheries Service (NMFS), and the Service from 2003 to 2018. A brief history of the consultation is included below:

- March 2003 - The Service received a copy of the regional Aquatic Conservation Strategy and informal consultation was initiated.
- August 2008 - The Service received a copy of the draft BMF's ARCS and framework for incorporating into Forest Plan Revisions.
- January 2011 – June 2015 – Periodic meetings were held to discuss Service and NMFS comments and recommendations on the proposed action, the draft BMF's ARCS, and the consultation process and timeline.
- January 2016 – September 2017 – Starting in January 2016, Level 1 meetings were held intensively to make progress on the draft proposed action, BMF's ARCS, and the contents of the Assessment.
- September 1, 2017 –The Service received the August 30, 2017 final Draft Assessment, appendices, and ARCS.
- October 31, 2017 – Forest Service made changes to the grazing GM-3G Guideline.
- November 13, 2017 – Forest Service sent out cover letter, addendum, and Appendix H showing changes to the proposed action.

- December 6, 2017 –The Service sent a 30-day sufficiency letter stating November 13, 2017 as the start date for formal consultation.
- December 2017 – March 2018–The Service received final versions and addendums of the proposed action.

CONCURRENCE

GRAY WOLF

1.0 Action Area

The Action Area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The BMFP will be applied to Section 7 consultation of planned projects for all lands within the BMFs that are within the gray wolf federally listed endangered zone (Figure 1). No critical habitat for gray wolf occurs in the action area.

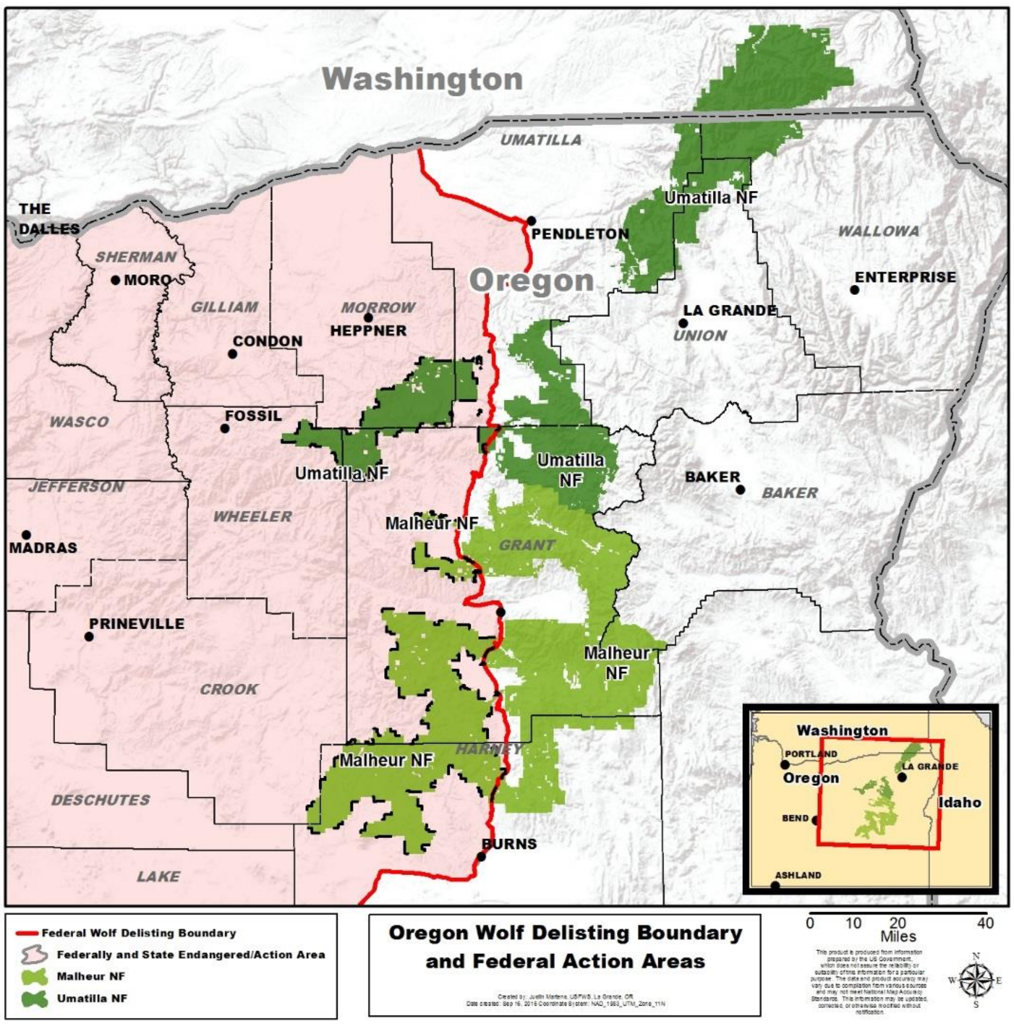

Figure 1. Area and Location Map of Umatilla and Malheur National Forest. The Federal Listing Boundary is Shown in Red, and the Action Area is all Umatilla and Malheur Forest Lands west of the Red Line (Highway 395).

As of 2016, no known wolf activity areas or packs have been documented on those portions of the MNF west of State Highway 395, the area where wolves are listed as federally endangered. On the UNF 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. Wolf packs exist on the WWNF but fall outside the federally listed area. Therefore, it is expected that wolves will occupy those areas of the UNF and MNF in the very near future, so the likelihood of having federally listed wolves on these Forests in the years to come is very high (unless they get delisted).

2.0 Conservation Measures and Indirect Effects
The gray wolf is considered a habitat generalist in terms of vegetation and terrain (Mech 1970 and Mladenoff *et al.* 1995) and has existed in a wide variety of landscapes from desert, grasslands, forest, and arctic tundra. In Oregon, telemetry data has shown current wolf packs are widely distributed and pack territories encompass a multitude of the habitat types (ODFW 2016); wolf distribution is largely attributed to density and abundance of prey, and minimal human persecution. While these factors are not mutually exclusive, some combination may be an important factor in determining how a proposed action may affect wolf behavior. Wolves are highly mobile, opportunistic animals that range across large areas, commonly traveling over ten miles a day and hundreds of miles a month as they pursue food (Boyd and Pletscher 1999, Mech and Boitani 2003). Therefore, the proposed action is expected to have little to no known measurable effect on wolves within the action area.

All of the known wolf territories in Oregon were established and are presently located in areas where there are active livestock grazing allotments, roads, and ongoing vegetation and fuels management ativities; and all of these activities have been implemented and/or present for decades. There is no indication that any of these activites are impairing wolf recovery, as the population has continuously increased since the re-population of wolves in 2008.

There are limited studies that address the effects of landscape changes, vegetation management (logging, prescribed fire, or other management activites implemented by resource managers), or livestock grazing on wolf survival, reproductive success, or dispersal. While modeling exercises have suggested that wolves may be displaced in the short- or long-term due to cumulative human actions and habitat fragmentation (Paquet et al., 1996) it is difficult to attribute wolf movements, impacts to individual wolves, or reproductive success to any specific activity and determine an impact. Wolves may avoid or not be present in a particular area during a forest activity, but attributing wolf absence to a small scale (relative to wolf home range size) forest activity lacks current scientific support. In essence, there are a multitude of factors that may influence a wolf's or a pack's use of a landscape, and attributing avoidance of an area by wolves as a response to any particular activity, in most cases, is not feasible. However, when there are known wolves in an area, the BMFP provides guidance to minimize interactions between denning wolves and forest activities (SD-6G, RE-5S, RF-13S).

Effects to wolves may be more meaningfully evaluated at a larger scale (i.e. regional scale); therefore, it is difficult to make a link between small-scale project-specific vegetation or rangeland management activites, changes in prey abundance, and effects to wolves at any ecologically meaningful scale. As demonstrated by the scientific literaute, wolves are closely tied to prey and primarily prey upon deer and elk (Keith 1983, Fuller 1989, Fuller et al. 1992), but are not likely currently limited by prey species or abundance in the action area given their flexibility for prey utilization.

BMFP components include DCs to provide for a natural range of habitats for all native and desired nonnative wildlife species. The DCs 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. A complete list of BMFP components has been provided for the gray wolf in Appendix D.

The potential impacts of motorized use on roads to wolves will be similar on the Umatilla and Malheur National forests with the exception of summer cross-country travel that has been prohibited on the UNF. Standard *RE-5S* gives direction to minimize adverse effects to all ESA listed and proposed species. Proposed projects will 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. Guideline *SD-6G* prohibits management activities near denning sites and rendezvous sites. The porposed action will have more area allocated to management areas that will 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 BMFP that extensive road building will occur. BMFP standards and guidelines, especially in key watersheds, stress no net increase in road densities (*KW-1S*).

The risk from over snow vehicle (OSV) use is slightly reduced from the current conditions due to the amount of area where OSVs are allowed. And 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 BMFs, 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. One standard and three guidelines are directed toward alleviating wolf livestock interactions which can lead to human intervention (*SD-7G, SD-8G, SD-9G, FLS-16S*).

Illegal killing of individual wolves is outside the scope of the BMFP and is not considered an effect of the BMFP. The Service does not currently authorize any lethal control of wolves in the action area west of Highway 395, where wolves are still listed. Any non-lethal control of listed wolves must be initiated by the Service and will 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 will be so small as to be unmeasurable, given the size of their territories, their wide-ranging movements, their adaptability and availability of other prey. The BMFP does not authorize predator control.

3.0 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 or future Forest activities will negatively affect the wolf population. In addition, there are no known wolf packs (or activity areas) at this time in the federally listed parts of the UNF and MNF, therefore, there are limited possibility of impacts to listed gray wolf populations.

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.

4.0 Findings and Conclusions

The BMFs have determined, and the Service concurs, that the BMFP proposed management activities ***may affect, but are not likely to adversely affect*** the gray wolf. The Service's concurrence is based on the following:

- The Service has acknowledged that habitat is not the primary issue regarding wolves, but rather their acceptance by humans.
- BMFP components provide adequate protection to ameliorate the identified risks to this species and its habitat.
- Further evaluations will occur at the project level for any proposal that may affect this species or its habitat.
- Wolves are habitat generalists and any disturbance or temporary impediment to wolves or prey abundance and distribution is expected to be short-term, negligible, or non-existent.
- Because any changes in roads associated with vegetation management activities and the duration and location of increased motorized use are so slight in relation to the existing road system and human use, any short-term impacts are not expected to result in a measurable increased risk to wolves from potential negative human-wolf interactions.

- Appendix D provides a complete list of BMFP components for the gray wolf that will offset potential adverse effects to both individual wolfs and wolf packs.

BIOLOGICAL OPINION

1.0 PROPOSED ACTION

A Federal action means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States or upon the high seas (50 CFR 402.02). The BMFP provides land management direction that will be incorporated into separate Forest Plans for the Malheur (and a portion of the Ochoco National Forest that is managed by the Malheur), Umatilla, and Wallowa-Whitman National Forests, and provide guidance of programs, practices, uses, decision-making and projects for approximately the next 15 years. The BMFP identifies the entire proposed action, and is incorporated herein by reference. The following is a brief summary of the entire proposed action.

1.1 Action Area

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). In delineating the action area, we evaluated the farthest reaching physical, chemical, and biotic indirect effects of the action on the environment. The action area therefore includes all federal land managed or administered by the Malheur (and parts of Ochoco), Umatilla, and Wallowa-Whitman national forests. The BMFs overlay 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. Portions of these counties, outside of the BMF lands, are part of the action area where indirect effects of the action may occur.

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

The MNF is comprised of about 1.7 million acres in the southern Blue Mountains, including an adjacent 240,000-acre portion of the Ochoco National Forest (ONF). The MNF Emigrant Creek Ranger District will administer this portion of the ONF under the revised MNF Plan. The 1.4 million-acre UNF straddles the Oregon-Washington border. It is the northern-most national forest in the action area. Located on the eastern edge of the Blue Mountains, the WWNF consists of more than 2.4 million acres, which includes the HCNRA. The WWNF Plan, in combination with the 652,488 acre HCNRA and its CMP, constitute an integrated resource management plan for the WWNF.

The BMFs 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 ten 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).

1.2 Hells Canyon National Recreation Area and Comprehensive Management Plan

The HCNRA CMP will be rolled into the revised WWNF Plan. Consultation to update the CMP ESA compliance will include review of Plan effects to designated critical habitat for bull trout and reinitiation of consultation on bull trout, as well as the effects to proposed wolverine and to the candidate whitebark pine. This consultation updates the past determination of NLAA for effects to bull trout, to LAA for both bull trout and its designated critical habitat.

Located on the eastern edge of the Blue Mountains, the WWNF consists of more than 2.4 million acres, which includes the HCNRA. The WWNF Plan, in combination with the HCNRA CMP, constitutes an integrated resource management plan for the WWNF. 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 WWNF. There are 652,488 acres within the HCNRA boundary, which is approximately 28 percent of the land under the administration of the WWNF. About 33,000 acres of privately-owned land occur within the HCNRA. Additionally, approximately 117,073 acres of the Nez Perce and 24,000 acres of the Payette national forests occur in the HCNRA, and are managed by the WWNF.

The WWNF Plan, including the HCNRA CMP, currently guides management on the HCNRA by the WWNF (USDA Forest Service 2003). The 1990 WWNF Plan was amended to incorporate the 2003 HCNRA CMP. Other Forest Plan amendments to the WWNF Plan (expecially PACFISH, INFISH, and Eastside Screens), and terms and conditions related to consultation on the 2003 CMP in accordance with the ESA, provide existing management direction for the HCNRA.

A complete description of the DCs, goals and objectives, standards and guidelines, and management areas that guide management of the HCNRA are found in Appendix F of the Assessment. A list of species assessed in the 2004 Opinion for the HCNRA CMP is provided in Table 2 of the Assessment. These species will not be addressed further in this Opinion, except as identified above.

1.3 BMFP Components

The BMNF Plan includes plan components that will guide resource management projects for all actions during the life of the individual BMFPs. These BMFP components include desired conditions, objectives, standards and guidelines, suitability, and management areas.

1.3.1 Goals and Desired Conditions

The desired conditions (DC) are goals describing the social, economic, and ecological attributes toward which management of the land and resources of the BMFP is to be directed.

To be consistent with the DCs of the BMFP, a project or activity, when assessed at the appropriate spatial scale (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 DCs of a plan without adversely affecting progress toward, or maintenance of, other DCs; or
- Be neutral with regard to progress toward plan DCs; or

- Maintain or make progress toward one or more of the DCs over the long term, even if the project or activity will adversely affect progress toward or maintenance of one or more DCs in the short-term; or
- Maintain or make progress toward one or more of the DCs over the long term, even if the project or activity will adversely affect progress toward other DCs in a negligible way over the long-term.

The project documentation should explain how the project is consistent with DCs and describe any short-term or negligible long-term adverse effects the project may have concerning the maintenance or attainment of any applicable DCs. If a project will adversely affect progress toward one or more DCs in more than a negligible way or short-term way, a BMFP Amendment will be required.

It is not expected that all projects or activities will contribute to all DCs and objectives. It should also be recognized that some projects designed to contribute to some DCs and objectives may have consequences considered adverse to the achievement of other DCs 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, DCs, or objectives, over the life of the BMFP. If the project or activity is found to appreciably reduce opportunities to maintain or achieve any goals, DCs, or objectives over the long term, it is not consistent with the BMFP.

Where a project or activity is proposed that is not consistent with the BMFP, 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 Forest-wide DCs pertain to the conservation and recovery of listed, proposed, and candidate species and their critical habitats and will be implemented on the BMFs.

1.3.1.1 Federally Listed and Sensitive Species DCs

DC (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 DC: 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.

Terrestiral Wildlife DC: 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.

Plantc DC: 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 DC: 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.

1.3.1.2 Other Forest-Wide DCs that Benefit Listed, Proposed, and Candidate Species and Their Critical Habitats

The following Forest-wide DCs will benefit the conservation of listed, proposed, and candidate species and their critical habitats. These DCs 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 DCs 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 DCs 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.

1.3.1.3 All Watersheds DCs

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

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

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

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

1.3.1.4 Hydrologic Function DCs

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.

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.

1.3.1.5 Wetland Function and Groundwater-dependent Ecosystem Function DCs

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

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

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

Ground-Water Dependent Ecosystem DC-2: The aquifer supplying water to groundwater-dependent ecosystems is not 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.

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.

1.3.1.6 Stream Channel Function DCs

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

Stream Channel Function 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.

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

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

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.

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.

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.

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.

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

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

1.3.1.7 Aquatic Habitat Function DCs

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.

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.

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.

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.

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

Aquatic Function DC-6: The potential for large wood recruitment to streams from within forested riparian areas, and from low-order streams to higher-order streams, is similar to the potential in reference watersheds containing the same (riparian) forest vegetation types. Scale: watershed.

Aquatic Function DC-7: Aquatic habitats in which the distribution of conditions (e.g., bank stability; substrate size; pool depths, size, and frequencies; channel morphology; 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.

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.

1.3.1.8 Species Diversity DCs

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.

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.

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.

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.

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.

Terrestrial Surrogat 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.

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 DCs: 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.

1.3.1.9 Invasive Species DCs

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.

1.3.1.10 Water Use DCs

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.

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.

1.3.1.11 Water Quality DCs

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.

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.

1.3.1.12 Riparian Function DCs

RMA 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.

RMA 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.

RMA 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.

RMA 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.

RMA 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: cubwatershed.

RMA 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.

RMA 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.

1.3.1.13 Whitebark Pine DCs

DC (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.

1.3.1.14 Rocky Mountain Elk DCs

DC (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.

1.3.1.15 Roads and Trails DCs

DC (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.

1.3.2 Objectives

Objectives are concise projections of measurable, time-specific intended outcomes. Objectives are the means of measuring progress toward achieving or maintaining DCs. The objectives represent just some of the expected outcomes or actions required to accomplish movement toward DCs. Those objectives that support the conservation and recovery of listed, proposed, and candidate species and their critical habitats are provided in Table 2. 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 expected to be accomplished during the first decade of the BMFP period, unless otherwise indicated within the objective statement. Variation in achieving objectives may occur during the next 15 years 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 BMFP if it contributes to or does not prevent the attainment of any applicable objectives. The project documentation should identify any applicable objective(s) to which the project contributes and document that the project does not prevent the attainment of any objectives. In some cases, project or activities may not directly relate to any plan objectives. In that case, the project or activity must at least not hinder the attainment of BMFP objectives, or be inconsistent with the intent of BMFP objectives.

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.

Table 2. 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

Objective	Malheur	Umatilla	Wallowa-Whitman
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
• 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

Objective	Malheur	Umatilla	Wallowa-Whitman
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	-	-
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			

Objective	Malheur	Umatilla	Wallowa-Whitman
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 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 7 years of Plan approval, improve elk security to within Desired Condition range (30-100%) throughout 50% of the priority subwatershed. 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 7 years of Plan approval, improve elk security to within Desired Condition range (30-100%) throughout 50% of the priority subwatershed. 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 7 years of Plan approval, improve elk security to within Desired Condition range (30-100%) throughout 50% of the priority subwatershed. 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

1.3.3 Standards and Guidelines

Standards are constraints upon project and activity decision making. Standards are established to help achieve or maintain DCs and objectives, and to ensure project activities on National Forest System (NFS) lands comply with applicable laws, regulations, Executive orders, and agency directives.

A project or activity must be consistent with all standards applicable to the type of project or activity 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 BMFP amendment. The project documentation should support that the project is consistent with all applicable standards.

Guidelines provide operational practices and procedures that are applied to project and activity decision making to help achieve DCs and objectives, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

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 DCs and objectives.

Guidelines are explicitly identified in the BMFP. Guidelines are constraints on project and activity decision-making that allow for departure from its terms, so long as the purpose of the guideline is met. Guidelines are established to help achieve or maintain a DC or conditions, to avoid or mitigate undesireable effects, or to meet applicable legal requirements. The project documentation must support that the project is consistent with all applicable guidelines.

The following standards and guidelines were designed to conserve and recover listed, proposed, and candidate species and their critical habitats on the BMFs, 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 above, under Fish. These standards and guidelines apply to all future management projects and activities on the Forests.

1.3.3.1 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 recovery[2] of listed, and proposed, and candidate species

[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.

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

1.3.3.2 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.

1.3.3.3 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.

1.3.3.4 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:

- 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.

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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).

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).

1.3.3.5 Rocky Mountain Elk

The following elk standard and two guidelines constrain human use by closing motorized routes and seasonal road closures that may also indirectly benefit the wolverine.

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.

1.3.3.6 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 RMAs within the long term aquatic and riparian conservation strategy (ARCS, Appendix A of Assessment). The listed, proposed, and candidate fish species standards and guidelines contained in the ARCS are considered plan components and are described in further detail below.

1.3.4 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. The BMFP 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 BMFP 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 BMFP.

1.3.5 Suitability of Areas

National Forest System lands are identified as "generally suitable" for various uses. Suitability describes the appropriateness of applying certain resource management practices or uses (e.g., grazing, recreation, fuels reduction) to a particular area of land. An area will be identified as generally suitable for uses that are compatible with DCs and objectives for that area.

Suitable uses are identified for each MA in the BMFP to help refine suitable uses and guide management. A project with the purpose of timber production may only occur in an area identified as suitable for timber production. The documentation for the project must 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 BMFP suitability determinations in either of two ways:

1. The project or activity is a use identified in the BMFP as suitable for the location where the project or activity is to occur; or
2. The project or activity is not a use identified in the BMFP as suitable or unsuitable for the location (i.e., the plan is silent on the use), but the responsible official determines in the NEPA document that the use is appropriate for that location's DCs and objectives.

However, if a project or activity is specified in the BMFP as not suitable for the area, an amendment to the forest plan is required.

1.3.6 Forest-wide Monitoring

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

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

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

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

The second category of monitoring in the BMFP is monitoring specific to the implementation of the BMFP itself. The BMFP uses monitoring to answer the following key questions:

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

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

- To answer the question, “What is the status and trend of stream temperatures?”, the BMFs will monitor water temperature annually and evaluate trends at 10-year intervals, using USFS temperature records, other agencies’ temperature data, and USFS Rocky Mountain Research Station water temperature models.

- The BMFs will use PIBO effectiveness monitoring to answer the question, “What is the status and trend of riparian vegetation conditons?”, based on annual and 5-year monitoring data.
- To answer the question, “What is the status and trend of aquatic habitat?”, the BMFs will use both PIBO effectiveness monitoring data and miles of stream habitat improved, measured annually and every 5 years.

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

1.3.7 Management Areas

The Federal action includes the designation of Management Areas (MAs), which are broadly described areas where general management intent is similar (see Table 2). The MAs have specific DCs. The purpose of MAs is to provide consistent guidance for similar portions of NFS lands when implementing or continuing management activities. Forest-wide BMFP components apply within the MAs.

Some MAs, such as RMAs, overlap with other MAs. It is important to note that overlapping MAs result in the total acreage of all MAs being greater than the official National Forest System acreages. For example, several research natural areas and wild and scenic rivers overlap into congressionally designated wilderness areas (pg 44, 45 of Assessment). Combinations of activities or uses are dependent on site-specific conditions, making it unreasonable to include all combinations and the applicable plan direction within the BMFP. Therefore, applicability of BMFP direction is guided by the principle that, where management areas overlap, the most restrictive plan direction applies.

The BMFP also includes areas with special designations because of unique or special characteristics, such as Nationally Designated Trails, Scenic Byways, Botanical Areas, or Wild and Scenic Rivers. Each special area may have specific management guidance (in addition to that listed in the BMFP) from underlying statute or other designation document, or in FS directives. In the event that a plan component for an area with special designation and a forest-wide component conflict, the more restrictive plan component prevails.

All MAs are displayed in Table 3 and DCs for each MA are identified following the table. Only those standards or guidelines that specifically apply to each MA and that help conserve listed, proposed, and candidate species are identified. Forest-wide standards and guidelines that apply to listed, proposed, and candidate species also apply to future projects conducted within each individual MA.

Table 3. Management Areas on the MNF, UMF, WWNF and Those Acres of ONF Administered by the MNF.

Management Area	Malheur Acres*	Umatilla Acres*	Wallowa-Whitman Acres*
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 General Forest)	149,500	119,900	190,100
5 - Developed Sites and Administrative Areas	2,200	7,500	7,700

*The figures in the table are rounded to the nearest 100 acres and to the nearest whole mile. 2F and 2G show miles.

The following description of components of the proposed action include the DCs, objectives, and standards and guidelines that are most relevant to understanding the beneficial and adverse effects on the species in later sections of the Opinion. Even though we've only highlighted a subset of the DCs, objectives, and standards and guidelines, the proposed action includes the BMFP as a whole.

1.3.7.1 Congressionally Designated Wilderness Areas

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 eight designated wilderness areas within the BMFs (Table 4). Management plans for individual wilderness areas remain in place, and if management plan components conflict with BMFP components, the more restrictive will apply.

Table 4. 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 Areas[2]	
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 from the 1990 forest plans (USDA FS 1989, 1989a, 1989b, and 1990) and have not been recalculated using the most current GIS technology.
2. Wilderness area acres within the HCNRA are not included in this table. Wilderness acres within the HCNRA, as well as for other HCNRA management area allocations, are provided in a table in Assessment (pg 103 of Appendix F1 under Management Area Direction). Management for wilderness and other management areas within the HCNRA will continue to be managed under the 1990 Forest Plan as amended by PACFISH, INFISH, Eastside Screens, and the CMP.

The DCs for wilderness and other management direction includes:

> *DC:* 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.

DC (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 DC: 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 DC: 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 DC: 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.

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.

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.

Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species

> *RE-5S:* Minimize adverse effects to ESA listed, proposed, and candidate species and Their designated and proposed critical habitat in accordance with Fores Service authorities.Management activities shall not retard recovery of listed, and proposed, and candidate species and their designated and proposed critical habitat in the long-term, in accordance with Forest service authorities. Federally listed, proposed, and candidate species shall be manage in accordance with their recovery or other conservation plans, in accordance with Forest Service authorities.
>
> *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.

1.3.7.2 Recommended Wilderness Areas

These areas are lands that have been identified and evaluated through the forest planning process as suited for recommendation for addition to the national wilderness preservation system. Wilderness characteristics are protected until Congress either designates the area as part of the National Wilderness Preservation System or the area is released from consideration. If Congress has not acted by the next planning effort, these areas may be further evaluated for wilderness designation.

Subject to the United States mining and leasing laws, recommended wilderness are open to mineral entry. Recommended wilderness must be segregated from mineral entry or withdrawn from mineral entry before congressional designation as “Wilderness.” Until that time, mining claims may be filed in recommended wilderness areas. Upon designation as wilderness by Congress, designated wilderness areas are legislatively withdrawn from all mineral entry under the mining and leasing laws, subject to valid claims.

Management direction is to protect and maintain the social and ecological characteristics that provide the basis for the wilderness recommendation.

These areas are lands that have been identified and evaluated through the forest planning process as suited for recommendation for addition to the national wilderness preservation system.

The DCs for Recommended Wilderness and other management direction includes:

> *DC:* 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.

DC: 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.

DC (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 (pg 26 of Assessment).

Aquatic Desired Condition: 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 (pg 26 of Assessment).

Terrestrial Wildlife DC: 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 (pg 26 of Assessment).

Plants DC: 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 (pg 27 of Assessment).

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 (pg 31 of Assessment).

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.

Standards Applicable to Listed, Proposed, and Candidate Species

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

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.

1.3.7.3 Wilderness Study Area

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 WWNF 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 Wallowa-Whitman Ranger District. The 1991 BLM wilderness study process included the NFS 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.

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

> *DC:* 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.

> *DC:* 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.

DC (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 Desired Condition: 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 DC: 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 DC: 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.

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.

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.

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.

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.

1.3.7.4 Wild and Scenic River (includes Designated, Eligible, and Suitable Rivers)

This MA 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). It also applies to rivers identified as eligible or suitable for designation. The Act requires that a deatailed 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 FS as eleiglble 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 BMFs, 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 Tables 8-10 of Assessment). Management plans for individual designated rivers remain in place, and if management plan components conflict with Forest Plan components, the more restrictive will apply.

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 DC 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.

> *DC:* 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).

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.
>
> 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.

1.3.7.5 Research Natural Areas
Research Natural Areas (RNA), whether established or proposed, are a part of a national network of ecological areas designated in perpetuity for research and education and/or to maintain biological diversity on NFS lands. They are established to provide for study and protection of a full range of habitat types and remain in a relatively unaltered condition for non-manipulative research, observation, and study.

Management activities in an RNA must be consistent with the purposes for which the RNA was established (or proposed), or specifically to maintain the values of the RNA. Purposes and values specific to a RNA are identified in establishment reports. In the absence of an establishment report, purposes and values are those identified in the FS directives for RNAs. BMFP direction applies, whether the RNA is established or proposed. The Forest Supervisor approves or disapproves management activities within the areas in coordination with the Pacific Northwest Research Station director.

Research, study, observation, monitoring, and educational activities that are nondestructive and non-manipulative are generally allowed within RNAs. While RMAs 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 BMF are displayed in Table 11 of the Assessment.

There is one DC and it should be protective of wildlife, watershed, aquatic and riparian habitats:

> *DC:* Research natural areas and proposed RNAs 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 RNA was established. Recreational uses do not threaten or interfere with the purposes for which the RNA is established. The recreation opportunity spectrum depends on the surrounding management areas.

Standards Applicable to Listed, Proposed, and Candidate Species

> *MA 2B-1S:* Management activities shall not be authorized that inhibit the purpose for the research natural area establishment.
>
> *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.

1.3.7.6 Botanical Areas

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 BMFs is displayed in Table 12 of the Assessment.

Botanical areas may also include National Natural Landmarks (NNL). The NNL program was established in 1962 and is part of the United States 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.

There is one DC and it should be protective of wildlife, watershed, aquatic and riparian habitats:

> *DC:* 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.

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.
>
> *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.

1.3.7.7 Geological Areas

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 BMFs is displayed in Table 13 of the Assessment.

The following DCs should be protective of wildlife, watershed, aquatic and riparian habitats:

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

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.

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.

1.3.7.8 Historical areas

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 BMFs is displayed in Table 14 of the Assessment.

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

A Guideline applicable to Listed, Proposed, and Candidate Species:

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.

1.3.7.9 Scenic Byways and All-American Roads

The National Scenic Byways Program is a part of the United States Department of Transportation. The program is a grassroots, collaborative effort established to help recognize, preserve, and enhance selected roads throughout the United States. The United States 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 preserve, protect, interpret, and promote the intrinsic qualities of designated byways. Table 15 of the Assessment displays the miles of designated national and state scenic byways within the BMFs. Each of the scenic byways has additional mileage outside of NFS boundaries, however management direction applies only to the portions within NFS lands.

DCs: 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.

1.3.7.10 Nationally Designated Trails

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 of the Assessment displays trails designated within the BMFs.

DCs: 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.

A Guideline applicable to Listed, Proposed, and Candidate Species:

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.

1.3.7.11 Scenic Areas

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 BMFs (see Table 17 of Assessment).

DCs: 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.

A Guideline 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.

1.3.7.12 Starkey Experimental Forest and Range

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.

> *DC:* 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.

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.

1.3.7.13 Municipal Watersheds

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.

Five communities in the BMFs have water systems that derive water supplies directly from NFS lands. Table 18 of the Assessment identifies those designated municipal watersheds, by National Forest. Management of the municipal watersheds is guided by existing agreements between the individual cities and either the Secretary of Agriculture or the USFS. Actions that can 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.

The definition of municipal watershed in current FS 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.

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

Standards 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.

1.3.7.14 Backcountry (nonmotorized use) and Backcountry (motorized use)

The BMFP includes approximately 128,600 acres in the Backcountry and 496,600 acres in the Backcountry Motorized MAs (Table 3). The only difference between the two areas is the suitability for non-motorized and motorized recreation. Backcountry non-motorized MA emphasizes non-motorized recreation opportunities and can include foot, horse, and mechanized (e.g., mountain bikes) modes of travel. Backcountry motorized MA emphasizes summer and winter motorized recreation opportunities and can include off-highway vehicles, motorcycles, jeeps, and over-snow vehicles.

The prohibitions stated in the 2001 Roadless Area Conservation Rule for timber harvest and road building apply to Backcountry (both nonmotorized and motorized use) that overlap with inventoried roadless areas. Backcountry areas (both nonmotorized and motorized) that do not overlap with inventoried roadless areas are not subject to the Roadless Area Conservation Rule.

The DCs and Standards for Backcountry (nonmotorized) and Backcountry (motorized) are:

> *MA 3A-DC (non-motorized use):* 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, cyclists. The scenic integrity of these areas is high. The recreation opportunity spectrum in MA 3A is semiprimitive or primitive nonmotorized.
>
> *MA 3B-DC (motorized used):* 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.
>
> *Riparian Management Area DC-1:* Riparian management areas within any given watershed reflect a natural composition of native flora and fauna and a distribution of physical, chemical, and biological conditions appropriate to natural disturbance regimes affecting the area. Scale: subwatershed.
>
> *Riparian Management 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.

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.

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.

Roads and Trails DC (unnumbered): 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. 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.

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.

MA 3A-1S and MA 3B-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).

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.

1.3.7.15 General Forest

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.

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 Plans) 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 is anticipated to see an increase in silvicultural activities to reduce departure from and thereby move toward DCs, and an increase in fire and fuels management to reduce fuel loadings and risk to wildland urban interfaces (WUIs).

> *DC:* 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.

Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species:

> *MA4A-1S:* As directed by the National Forest MA, 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.

1.3.7.16 Riparian Management Areas (300/150/100 foot buffer)

Riparian management areas 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. Riparian management area MA (4B) overlay all other management areas and therefore are not mapped nor are their acreages calculated.

Riparian management areas are used as the primary framework (coarse filter) that provides for riparian and aquatic ecosystem diversity by conserving biophysical processes at the landscape and watershed scales. Management activities within RMAs are to be designed to protect, maintain or enhance existing functional conditions or restore degraded conditions for aquatic and riparian dependent species.

Riparian management areas parallel the stream network and include areas necessary for maintaining hydrologic, geomorphic, and ecologic processes that influence riparian and aquatic systems. Unstable and potentially unstable areas in headwaters and along streams are primary source areas for coarse wood, fine and coarse particulate organic matter, and sediment (FEMAT 1993). Riparian management areas occur at the margins of standing and flowing water, intermittent stream channels, and ephemeral ponds, springs, and wetlands.

Fish-bearing streams: RMAs consist of the stream and the area on each side of the stream, extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest. In degraded or incised streams, the RMA should extend from the edge of the active channel to the outer extent of the former floodplain. RMA widths along fish-bearing streams will not be less than described here.

Permanently flowing non-fish-bearing streams: RMAs consist of the stream and the area on each side of the stream, extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet total, including both sides of the stream channel), whichever is greatest. In degraded or incised streams, the RMA should extend from the edge of the active channel to the outer extent of the former floodplain.

Constructed ponds and reservoirs, and wetlands greater than one acre: RMAs consist of the body of water or wetland and the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or the extent of unstable and potentially unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the wetland greater than one acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is greatest.

Lakes and natural ponds: RMAs consist of the body of water and the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or to the extent of unstable and potentially unstable areas, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance, whichever is greatest.

Seasonally flowing or intermittent streams, wetlands, seeps and springs less than one acre, and unstable and potentially unstable areas: This category applies to features with high variability in size and site-specific characteristics. At a minimum, these RMAs should 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 or wetland, extending from the edges of the stream channel to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest. A site-potential tree height is the average maximum height of the tallest dominant trees for a given site class.

Intermittent streams are defined as any non-permanent flowing drainage feature having a definable channel and evidence of annual scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two physical criteria. Including intermittent streams, springs, and wetlands within RMAs is important for full implementation of the ARCS. Accurate identification of these features is critical to the correct implementation of the strategy and protection of the intermittent stream and wetland functions and processes. Identification of these features is difficult at times due to the lack of surface water or wet soils during dry periods. Fish-bearing intermittent streams are distinguished from non-fish-bearing intermittent streams by the presence of any species of fish for any duration. Many intermittent streams may be used as spawning and rearing streams, refuge areas during flood events in larger rivers and streams or travel routes for fish emigrating from lakes. In these instances, the plan components for fish-bearing streams would apply to those sections of the intermittent stream used by the fish.

Riparian management areas overlay all other MAs. Management within RMAs is guided by DCs, standards, and guidelines. The management direction for RMAs are described in detail in Appendix A of the Assessment (ARCS) and Appendix A of this Opinion compares the differences between the ARCS and existing PACFISH/INFISH guidance.

The standards and guidelines cover a variety of management activities including: 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. Table 20 in the Assessment describes suitable uses for RMAs.

The DCs and standards and guidelines that apply to RMAs apply to all riparian MAs.

> *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.

> *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.

> *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.

> DC (Unnumbered from BMFP): 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.

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.

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.

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.

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.

DC (Unnumbered from BMFP): 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 plants 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.

Standards and Guidelines Applicable to Listed, Proposed, and Candidate Species:

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.[6] Short-term adverse effects from project activities may occur when they support long-term recovery of riparian management area desired conditions.[7] Exceptions to this standard include situations where Forest Service authorities are limited (Alaska National Interest Lands Conservation Act {ANILCA}, 1872 Mining law, valid state water right, etc.). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of desired conditions to the extent possible within Forest Service authorities. Use ARCS Attachment B (e.g. diagnostic indicators and RMA ecological process and function descriptions) to assist in determining compliance with this standard.

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

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

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6 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 1998b, 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).

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

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, 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.

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 shall not occur in riparian management areas, unless they are associated with projects designed to improve riparian management areas conditions. These features should:

- be of minimum size,
- be located outside the active floodplain, and
- avoid negative effects to large wood, bank integrity, temperature, and sediment levels.

TM-4G: Yarding activities should achieve full suspension over the active channel; unless other alternatives will have less damage to riparian areas and stream channels.[8]

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.
TM-7S: Timber harvest on lands not suitable for timber production should 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.

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.

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

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.

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 DCs should be applied.[9] Specific indicators and indicator values should be prescribed and adjusted, if needed, in a manner that reflects both existing conditions and DCs and the natural potential of the specific geo-climatic, hydrologic and vegetative setting in which they are being applied[10]. Indicators and indicator values should be adapted over time based on long-term monitoring and evaluation of conditions and trends. Alternative use and disturbance indicators and values, including those in current ESA consultation documents or non-ESA allotment management plans or allotment 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 attained[11] and riparian vegetation is in late-seral conditions[12], protect or

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9- 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).

10- Indicator values for specific sites should be determined based on consideration of local conditions including, but not limited to, the degree of departure between existing and desired conditions, the current and desired rate of improvement, site sensitivity to grazing, grazing season, the presence of special status species (e.g., ESA-listed species, Regional Forester's sensitive species) that are sensitive to grazing, whether or not water quality standards and related requirements (e.g., 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.

11- 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.

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

maintain those conditions by managing annual livestock grazing use and disturbance as follows[13]:

- maintain a minimum of 4-inch residual stubble height[14] of key herbaceous species on the greenline;
- utilize no more than 30-45 percent of deep-rooted herbaceous vegetation in the active floodplain[15] and, as needed, in other critical portions of the riparian management area;
- limit streambank alteration[16] 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 conditions, 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 greenline
   - follow the criteria for utilization of deep-rooted herbaceous vegetation, streambank alteration, and use of woody species described in (1).

3. Where desired conditions for water quality, aquatic habitat, and/or riparian vegetation have not been attained and conditions are not moving towards those desired conditions, enable recovery by managing annual livestock grazing use and disturbance as follows:
   - maintain a minimum of 6-inch residual stubble height of key herbaceous species on the greenline;

13- 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.

14- 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.

15- 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).

16- 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 percent and
- limit use of woody species to no more than 20-30 percent of current year's leaders along streambanks and, as needed, in other critical portions of the riparian management area.

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.

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.

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 discretional authorities (Alaska National Interest Lands Conservation Act, the General Mining Act of 1872, valid State water rights, etc). 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 no structures, support facilities, or roads exists, 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 (USDA FS 2012)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 resources[17]". A likelihood that a threatened or endangered species "take" (defined in Section 3[18] of the ESA of 1973 as amended) incidental to the mining activity is an example of a significant resource disturbance. Other significant disturbances that do not involve incidental take might involve effects on channel stability or stream hydraulics.
- If the District Ranger determines that placer mining operations are causing or will likely cause significant disturbance to surface resources, the District Ranger shall contact and inform the operator to seek voluntary compliance with 36 CFR 228 mining regulations and to cease operations until compliance.

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 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.

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17 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

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 cm or less (Busse *et al.* 2005).

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 historic sites, developed recreation areas, special use permit areas that have structures, and historic 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.

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.

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

1.3.7.17 Developed Sites and Administrative Areas

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.

DC: 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.

Communications Sites DC: 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 DC: 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 DC: 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 concessionaire-operated campgrounds.

Permitted Recreation Facilities DC: 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 DC:*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 DC: 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).

1.3.8 Aquatic and Riparian Conservation Strategy (ARCS)
The ARCS is described in detail in Appendix A of the Assessment and Appendix A of this Opinion compares the ARCS to the existing direction expected under PACFISH/INFISH.

The Assessment introduces the ARCS as follows: The ARCS focuses broad-scale aquatic resource protection, coupled with strategically-focused active restoration in priority areas (USDA Forest Service 2005a). The ARCS includes DCs, objectives, riparian management areas, standards and guidelines, a key watershed network, watershed analysis, watershed protection and restoration, and monitoring and adaptive management.

The five elements of the BMF's ARCS include: 1) RMAs, 2) key watersheds, 3) watershed analysis, 4) watershed restoration, and 5) monitoring.

1.3.8.1 Riparian Management Areas (RMAs)
RMAs were previously described under Management Areas.

1.3.8.2 Key Watersheds
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 other species of local or regional concern. Therefore, key watersheds may also be designated based upon the presence of high-quality habitat for these species. Key watersheds compliment the management direction provided by other ARCS elements and plan components because they are 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.

There are 209 watersheds identified as key watersheds in the three BMFs. These key watersheds are located in 19 of the 22 subbasins that include NFS lands in the Blue Mountains. Tables 22, 23, and 24 in the Assessment list the names and other details of the key watersheds by subbasin.

The Plan includes three specific DCs for key watersheds:

> *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.

There are three standards specific to key watersheds as follows:

> *KW-1S:* In key watersheds or subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species that are functioning properly[18] 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 construction is proposed in that subwatershed, and shall not be offset by reductions in open-road densities in other subwatersheds.

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18 "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.

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.

1.3.8.3 ARCS - Watershed Analysis

Watershed analysis is an interdisciplinary analysis of the status and trends of watershed and aquatic ecosystem conditions, and the hydrologic, geomorphic, and biological processes that strongly influence them. Watershed analysis provides a basis for 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 BMF ARCS, including management of RMAs and key watersheds, implementation of watershed restoration, and compliance with plan components.

The watershed analysis process, as described in the Federal Guide to watershed analysis (Regional Ecosystem Office, 1995), includes six steps to be conducted in an interdisciplinary process: 1) characterizing the study watershed; 2) identifying important water and aquatic resources and key management issues and questions associated with them; 3) describing current resource conditions and trends and the dominant biophysical processes (natural and human-caused) responsible for them; 4) comparing and contrasting those conditions with applicable reference conditions; 5) synthesizing and interpreting that information; and 6) identifying opportunities and making management recommendations to maintain or restore watershed and aquatic resouces when those conditions are consistent with or trending towards DCs or otherwise to improve those resource conditons. This process involves characterizing the study watershed, describing past and current conditons, assessing trends, synthesizing information, and making management recommendations. The result is a better understanding of watershed structure and function and a set of recommendations that help inform future management actions within and around the watershed. The result includes ensuring that management activities in Key Watersheds and RMAs maintain, restore, or enhance aquatic and riparian resources (USDA Forest Service 2016, pg 60-61)

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 BMFs estimated the number of new or updated watershed analyses expected to be completed during the life of the BMFP 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 BMFP; (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). Note that timber harvest in not currently suitable in RMAs; suitable activities or uses in RMAs may be adjusted based on watershed analysis.

As described in the ARCS, watershed analysis will be updated or conducted prior to:

- Implementation of Watershed Restoration Action Plans in 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. It is expected that RMA widths will not be less than described in the designating riparian management areas section.

1.3.8.4 ARCS - Restoration Priorities and Guidance

Priority watersheds are a subset of the key watersheds with the intention of prioritizing restoration over the life of the BMFP. There are 75 priority watersheds identified (Tables 22, 23, 24 of Assessment) across the three BMFs within the range of listed fish. Priority watersheds identified 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 BMFs 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 BMFP. 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.

In 2010, the national forests throughout the United States were mandated to assess the current condition of NFS watersheds utilizing the Watershed Condition Framework (WCF; Potyondy and Geier 2010). A full description of the WCF is available at: http://www.fs.fed.us/biology/watershed/condition_framework.html.

1.3.8.5 ARCS - Watershed Condition Framework Priority Watersheds

Watershed Condition Framework (WFC) watersheds are subset of priority watersheds, wherein near-term (approximately 5 years) restoration actions are focused. 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.

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) will be developed as informed by watershed analysis within each of these drainages to ensure limiting factors and important areas are protected and restored.

1.3.8.6 ARCS - Watershed Protection and Restoration

Key watersheds are a priority for restoration and specific restoration objectives have been identified for Key Watersheds. As described in the ARCS, watershed analysis will be updated or conducted prior to:

- Implementation of watershed restoration action plans in WCF priority watersheds
- Proposed timber salvage or construction of facilities in RMAs
- Construction of permanent system roads in RMAs
- Proposed changes to RMA widths. It is expected that RMA widths will not be less than described in the Designating Riparian Management Areas section.

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 BMFs 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 5^{th} 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 UNF include Granite Creek and Big Wall Creek in the John Day basin, and the Upper Tucannon watershed in the Tucannon River subbasin. On the WWNF, Upper Catherine Creek and the Upper Grande Ronde watersheds were selected as focus watersheds for active restoration per the ARS, while the MNF 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 United States 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 BMF 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.
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.

To successfully fulfuill FS responsibilities to maintain and restore water resources such as clean, cold water and healthy fish populations, restoration work should be implemented across boundaries with willing neighbors and other partners. 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.

1.3.8.7 ARCS - Monitoring and Adaptive Management

Per the 2012 Planning Rule (36 CFR 219), the ARCS includes both broad-scale and Forest plan level monitoring. Specific elements are focused on deteremining whether restoration objectives are being attained, whether water quality BMPs and other standards and guidelines are being implemented and are effective at the site-scale, determining the status and trend of watershed conditions and aquatic ecosystems, assessing changes in the distribution of ESA-listed aquatic species and species of concern, and tracking the status and trend of stream temperature.

The ARCS defines the types of management decisions that will be informed by monitoring information at various temporal, spatial and administrative scales. Biennial evaluations of monitoring results will be provided to the Service.

Monitoring questions ask whether management in the BMFP area is maintaining or progressing toward DCs and meeting objectives. Monitoring questions may be designed to pertain directly to DCs or to relate to objectives or guidelines. Monitoring information in the BMFP set of documents may be changed or updated as appropriate. Such changes and updates require a plan amendment or revision. Monitoring questions identify specific BMFP direction to monitor and evaluate. The monitoring questions specify the information that is essential for measuring BMFP accomplishments and effectiveness. The associated evaluation process determines whether the observed changes are consistent with the DCs and what adjustments may be needed, if any. The monitoring plan includes monitoring conducted in compliance with other laws, policies, and site-specific decisions.

Attachment A, Table 2 of the ARCS lists the monitoring questions. Several questions and indicators from that table that are relevant to the Opinion species are listed below.

Watershed Condition Monitoring Questions

- What is the status and trend of water quality?
- What is the status and trend of stream temperature?
- What is the status and trend of streamflows?
- Are watershed/aquatics standards and guidelines and BMPs being implemented at project sites (e.g., range, roads, recreation, and vegetation management)?
- Are watershed/aquatics standards and guidelines and BMPs effective at achieving desired on-site conditions at project sites (e.g., range, roads, recreation, and vegetation management)?
- What is the status and trend of watershed condition in all watersheds and in key watersheds?

Aquatic Habitat Monitoring Questions

- What is the status and trend of riparian vegetation condition?
- What is the status and trend of aquatic habitat?
- What is the status and trend of aquatic habitat connectivity and accessibility for aquatic species?

Invasive Species Monitoring Questions

- What is the change in the distribution of known sites for selected aquatic and riparian invasive species?

Species Diversity and Species Habitat Monitoring Questions

- What is the condition, trend and distribution in habitats for aquatic surrogate species (steelhead, spring Chinook salmon, bull trout, and redband trout)? Designated critical habitats coincide with habitats for steelhead, spring chinook salmon and bull trout in subbasins occupied by listed populations.
- What is the condition and trend of white bark pine?

Status of Surrogate Species Monitoring Questions

- What are the trends in source habitat and risk factors for boreal owl (UMA only), western bluebird, and fox sparrow?
- What are the trends in source habitat and risk factors for Cassin's finch?
- What is the trend of northern goshawk (alternative C only)?
- What are the trends in whitebark pine survival and recruitment?

Climate Change Monitoring Questions

- Does new scientific information related to climate change indicate a need to change plan components?

Multiple Use Opportunities Monitoring Questions

- Are hydrologically connected roads being addressed consistent with plan direction?
- Are watershed/aquatic restoration projects (e.g., road decommissioning, passage improvements, riparian stream habitat improvements, etc.) being implemented at a rate consistent with forest plan objectives?

2.0 ANALYTICAL FRAMEWORK

Effects of the action refer to the permanent or temporary direct and indirect effects of an action on the species and/or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action that will be added to the environmental baseline. Indirect effects are those that are caused by the proposed action, occur later in time, but are still reasonably certain to occur.

The Endangered Species Act Consultation Handbook (USFWS & NMFS 1998, p. xvi), states a "*may affect*" determination is required when a proposed action may pose any effects to individuals of a listed species or to its designated critical habitat. When any adverse effects to individuals of a listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, a "*may affect, likely to adversely affect*" determination is appropriate. However, when effects to listed species or critical habitat are expected to be discountable or insignificant, "*may affect, is not likely to adversely affect*" is the appropriate conclusion. Insignificant effects relate to the size of the impact and should never reach the level where potential injury to the species would occur. Discountable effects, as described in the consultation handbook, are those extremely unlikely to occur. Based on best judgment, a person would not: 1) be able to meaningfully measure, detect, or evaluate insignificant effects; or 2) expect discountable effects to occur.

Direct and indirect effects: Direct effects are the immediate consequences of the proposed action. Direct effects are not expected from the BMFPs, as these Plans do not propose any specific projects or activities. Indirect effects are caused by the action, occur later in time and are reasonably certain to occur.

Interrelated and interdependent actions: Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interrelated actions are related to the Federal action, but do not depend on the Federal action. Interdependent actions are those that might occur independently of the larger action, but which have no independent utility apart from the action under consideration. Interdependent actions depend on the Federal action and have no independent utility apart from the Federal action.

2.1 Analytical Framework for the Jeopardy Determination

The following analysis relies on four components to support the jeopardy determination for each of the species considered in this Opinion, including those that are Proposed or Candidate species: (1) the Status of the Species, which evaluates the species' range-wide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which evaluates the condition of the species in the action area, the factors responsible for that condition, and the role of the action area in the species survival and recovery; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the species.

In accordance with the implementing regulations for section 7 and Service policy, the jeopardy determination is made in the following manner: the effects of the proposed Federal action are evaluated with the aggregate effects of everything that has led to a species' current status and, for non-federal activities in the action area, those actions likely to affect the a species in the future, to determine if, given the aggregate of all of these effects, implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

The following analysis places an emphasis on using the range-wide survival and recovery needs of the species and the role of the action area in meeting those needs as the context for evaluating the effects of the proposed Federal action combined with other relevant effects. In short, a nonjeopardy determination is warranted if the proposed action is consistent with maintaining the role of habitat and the species population in the action area for the species' survival and recovery. The jeopardy determination is made on the range-wide scale of the species.

2.2 Analytical Framework for the Adverse Modification Determination

Section 7(a)(2) of the ESA requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to destroy or to adversely modify designated critical habitat. A final rule revising the regulatory definition of "destruction or adverse modification of critical habitat" was published on February 11, 2016 (USFWS and NMFS 2016). The final rule became effective on March 14, 2016. The revised definition states: "Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features."

The destruction or adverse modification analysis in this biological opinion relies on four components: (1) the *Status of Critical Habitat*, which describes the range-wide condition of designated critical habitat for a listed species in terms of the key components of the critical habitat that provide for the conservation of the listed species, the factors responsible for that condition, and the intended value of the critical habitat overall for the conservation/recovery of the listed species; (2) the *Environmental Baseline*, which analyzes the condition of the critical habitat in the action area, the factors responsible for that condition, and the value of the critical habitat in the action area for the conservation/recovery of the listed species; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated and interdependent activities on the key components of critical habitat that provide for the conservation of the listed species, and how those impacts are likely to influence the value of the affected critical habitat units for the conservation/recovery of the listed species; and (4) Cumulative Effects, which evaluate the effects of future non-federal activities that are reasonably certain to occur in the action area on the key components of critical habitat that provide for the conservation of the listed species and how those impacts are likely to influence the value of the affected critical habitat units for the conservation/recovery of the listed species.

For purposes of making the destruction or adverse modification determination, the effects of the proposed Federal action, together with any cumulative effects, are evaluated to determine if the value of the critical habitat rangewide for the conservation/recovery of the listed species would remain functional or would retain the current ability for the key components of the critical habitat that provide for the conservation of the listed species to be functionally re-established in areas of currently unsuitable but capable habitat.

Note: Past designations of critical habitat have used the terms "primary constituent elements" (PCEs), "physical and biological features" (PBFs) or "essential features" to characterize the key components of critical habitat that provide for the conservation of the listed species. The new critical habitat regulations (USFWS and NMFS 2016, p. 7216) discontinue use of the terms "PCEs" or "essential features" and rely exclusively on use of the term PBFs for that purpose because that term is contained in the statute. To be consistent with that shift in terminology and in recognition that the terms PBFs, PCEs, and essential habit features are synonymous in meaning, we are only referring to PBFs herein. Therefore, if a past critical habitat designation defined essential habitat features or PCEs, they will be referred to as PBFs in this document. This does not change the approach outlined above for conducting the ‘‘destruction or adverse modification’’ analysis, which is the same regardless of whether the original designation identified PCEs, PBFs or essential features.

BULL TROUT CHAPTER

2.3 Status of the Species – Bull Trout

2.3.1 Taxonomy

The bull trout is a native char found in the coastal and intermountain west of North America. Dolly Varden (*Salvelinus malma)* and bull trout were previously considered a single species and were thought to have coastal and interior forms. However, Cavender (1978) described morphometric, meristic and osteological characteristics of the two forms, and provided evidence of specific distinctions between the two. Despite an overlap in the geographic range of bull trout and Dolly Varden in the Puget Sound area and along the British Columbia coast, there is little evidence of introgression (Haas and McPhail 1991, p. 2191). The Columbia River Basin is considered the region of origin for the bull trout. From the Columbia, dispersal to other drainage systems was accomplished by marine migration and headwater stream capture. Behnke (2002, p. 297) postulated dispersion to drainages east of the continental divide may have occurred through the North and South Saskatchewan Rivers (Hudson Bay drainage) and the Yukon River system. Marine dispersal may have occurred from Puget Sound north to the Fraser, Skeena and Taku Rivers of British Columbia.

2.3.2 Species Description

Bull trout have unusually large heads and mouths for salmonids. Their body colors can vary tremendously depending on their environment, but are often brownish green with lighter (often ranging from pale yellow to crimson) colored spots running along their dorsa and flanks, with spots being absent on the dorsal fin, and light colored to white under bellies. They have white leading edges on their fins, as do other species of char. Bull trout have been measured as large as 103 centimeters (41 inches) in length, with weights as high as 14.5 kilograms (32 pounds) (Fishbase 2015, p. 1). Bull trout may be migratory, moving throughout large river systems, lakes, and even the ocean in coastal populations, or they may be resident, remaining in the same stream their lives (Rieman and McIntyre 1993, p. 2; Brenkman and Corbett 2005, p. 1077). Migratory bull trout are typically larger than resident bull trout (USFWS 1998a, p. 31668).

2.3.3 Legal Status

The coterminous United States population of the bull trout (*Salvelinus confluentus*) was listed as threatened on November 1, 1999 (USFWS 1999a). The threatened bull trout generally occurs in the Klamath River Basin of south-central Oregon; the Jarbidge River in Nevada; the Willamette River Basin in Oregon; Pacific Coast drainages of Washington, including Puget Sound; major rivers in Idaho, Oregon, Washington, and Montana, within the Columbia River Basin; and the St. Mary-Belly River, east of the Continental Divide in northwestern Montana (Bond 1992, p. 4;

Brewin and Brewin 1997, pp. 209-216; Cavender 1978, pp. 165-166; Leary and Allendorf 1997, pp. 715-720).

Throughout its range, the bull trout are threatened by the combined effects of habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, grazing, the blockage of migratory corridors by dams or other diversion structures, poor water quality, entrainment (a process by which aquatic organisms are pulled through a diversion or other device) into diversion channels, and introduced non-native species (USFWS 1999a, p. 58910). Although all salmonids are likely to be affected by climate change, bull trout are especially vulnerable given that spawning and rearing are constrained by their location in upper watersheds and the requirement for cold water temperatures (Battin *et al*. 2007; Rieman *et al*. 2007; Porter and Nelitz. 2009, pp. 4-8). Poaching and incidental mortality of bull trout during other targeted fisheries are additional threats.

2.3.4 Life History
The iteroparous reproductive strategy of bull trout has important repercussions for the management of this species. Bull trout require passage both upstream and downstream, not only for repeat spawning but also for foraging. Most fish ladders, however, were designed specifically for anadromous semelparous salmonids (fishes that spawn once and then die, and require only one-way passage upstream). Therefore, even dams or other barriers with fish passage facilities may be a factor in isolating bull trout populations if they do not provide a downstream passage route. Additionally, in some core areas, bull trout that migrate to marine waters must pass both upstream and downstream through areas with net fisheries at river mouths. This can increase the likelihood of mortality to bull trout during these spawning and foraging migrations.

Growth varies depending upon life-history strategy. Resident adults range from 6 to 12 inches total length, and migratory adults commonly reach 24 inches or more (Goetz 1989, p. 30; Pratt 1985, pp. 28-34). The largest verified bull trout is a 32-pound specimen caught in Lake Pend Oreille, Idaho, in 1949 (Simpson and Wallace 1982, p. 95).

Bull trout typically spawn from August through November during periods of increasing flows and decreasing water temperatures. Preferred spawning habitat consists of low-gradient stream reaches with loose, clean gravel (Fraley and Shepard 1989, p. 141). Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989, pp. 15-16; Pratt 1992, pp. 6-7; Rieman and McIntyre 1996, p. 133). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992, p. 1). After hatching, fry remain in the substrate, and time from egg deposition to emergence may surpass 200 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows (Pratt 1992, p. 1; Ratliff and Howell 1992, p. 10).

Early life stages of fish, specifically the developing embryo, require the highest inter-gravel dissolved oxygen (IGDO) levels, and are the most sensitive life stage to reduced oxygen levels. The oxygen demand of embryos depends on temperature and on stage of development, with the greatest IGDO required just prior to hatching.

A literature review conducted by the Washington Department of Ecology (WDOE 2002, p. 9) indicates that adverse effects of lower oxygen concentrations on embryo survival are magnified as temperatures increase above optimal (for incubation). Normal oxygen levels seen in rivers used by bull trout during spawning ranged from 8 to 12 mg/L (in the gravel), with corresponding instream levels of 10 to 11.5 mg/L (Stewart *et al*. 2007, p. 10). In addition, IGDO concentrations, water velocities in the water column, and especially the intergravel flow rate, are interrelated variables that affect the survival of incubating embryos (ODEQ 1995, Ch. 2 pp. 23-24). Due to a long incubation period of 220+ days, bull trout are particularly sensitive to adequate IGDO levels. An IGDO level below 8 mg/L is likely to result in mortality of eggs, embryos, and fry.

2.3.5 Population Structure

Bull trout exhibit both resident and migratory life history strategies. Both resident and migratory forms may be found together, and either form may produce offspring exhibiting either resident or migratory behavior (Rieman and McIntyre 1993, p. 2). Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. The resident form tends to be smaller than the migratory form at maturity and also produces fewer eggs (Goetz 1989, p. 15). Migratory bull trout spawn in tributary streams where juvenile fish rear 1 to 4 years before migrating to either a lake (adfluvial form), river (fluvial form) (Fraley and Shepard 1989, p. 138; Goetz 1989, p. 24), or saltwater (anadromous form) to rear as subadults and to live as adults (Brenkman and Corbett 2005; McPhail and Baxter 1996, p. i; WDFW *et al*. 1997, p. 16). Bull trout normally reach sexual maturity in 4 to 7 years and may live longer than 12 years. They are iteroparous (they spawn more than once in a lifetime). Repeat- and alternate-year spawning has been reported, although repeat-spawning frequency and post-spawning mortality are not well documented (Fraley and Shepard 1989, p. 135; Leathe and Graham 1982, p. 95; Pratt 1992, p. 8; Rieman and McIntyre 1996, p. 133).

Bull trout are naturally migratory, which allows them to capitalize on temporally abundant food resources and larger downstream habitats. Resident forms may develop where barriers (either natural or manmade) occur or where foraging, migrating, or overwintering habitats for migratory fish are minimized (Brenkman and Corbett 2005, pp. 1075-1076; Goetz *et al*. 2004, p. 105). For example, multiple life history forms (*e.g.*, resident and fluvial) and multiple migration patterns have been noted in the Grande Ronde River (Baxter 2002, pp. 96, 98-106). Parts of this river system have retained habitat conditions that allow free movement between spawning and rearing areas and the mainstem Snake River. Such multiple life history strategies help to maintain the stability and persistence of bull trout populations to environmental changes. Benefits to migratory bull trout include greater growth in the more productive waters of larger streams, lakes, and marine waters; greater fecundity resulting in increased reproductive potential; and dispersing the population across space and time so that spawning streams may be recolonized should local populations suffer a catastrophic loss (Frissell 1999, pp. 861-863; MBTSG 1998, p. 13; Rieman and McIntyre 1993, pp. 2-3). In the absence of the migratory bull trout life form, isolated populations cannot be replenished when disturbances make local habitats temporarily unsuitable. Therefore, the range of the species is diminished, and the potential for a greater reproductive contribution from larger size fish with higher fecundity is lost (Rieman and McIntyre 1993, p. 2).

Whitesel *et al*. (2004, p. 2) noted that although there are multiple resources that contribute to the subject, Spruell *et al*. (2003) best summarized genetic information on bull trout population structure. Spruell *et al*. (2003) analyzed 1,847 bull trout from 65 sampling locations, four located in three coastal drainages (Klamath, Queets, and Skagit Rivers), one in the Saskatchewan River drainage (Belly River), and 60 scattered throughout the Columbia River Basin. They concluded that there is a consistent pattern among genetic studies of bull trout, regardless of whether examining allozymes, mitochondrial DNA, or most recently microsatellite loci. Typically, the genetic pattern shows relatively little genetic variation within populations, but substantial divergence among populations. Microsatellite loci analysis supports the existence of at least three major genetically differentiated groups (or evolutionary lineages) of bull trout (Spruell *et al*. 2003, p. 17). They were characterized as:

- "Coastal", including the Deschutes River and all of the Columbia River drainage downstream, as well as most coastal streams in Washington, Oregon, and British Columbia. A compelling case also exists that the Klamath Basin represents a unique evolutionary lineage within the coastal group.
- "Snake River", which also included the John Day, Umatilla, and Walla Walla rivers. Despite close proximity of the John Day and Deschutes Rivers, a striking level of divergence between bull trout in these two systems was observed.
- "Upper Columbia River" which includes the entire basin in Montana and northern Idaho. A tentative assignment was made by Spruell *et al*. (2003, p. 25) of the Saskatchewan River drainage populations (east of the continental divide), grouping them with the upper Columbia River group.

Spruell *et al*. (2003, p. 17) noted that within the major assemblages, populations were further subdivided, primarily at the level of major river basins. Taylor *et al*. (1999) surveyed bull trout populations, primarily from Canada, and found a major divergence between inland and coastal populations. Costello *et al*. (2003, p. 328) suggested the patterns reflected the existence of two glacial refugia, consistent with the conclusions of Spruell *et al*. (2003, p. 26) and the biogeographic analysis of Haas and McPhail (2001). Both Taylor *et al*. (1999, p. 1166) and Spruell *et al*. (2003, p. 21) concluded that the Deschutes River represented the most upstream limit of the coastal lineage in the Columbia River Basin.

More recently, the Service identified additional genetic units within the coastal and interior lineages (Ardren *et al*. 2011, p. 18). Based on a recommendation in the Service's 5-year review of the species' status (USFWS 2008, p. 45), the Service reanalyzed the 27 recovery units identified in the draft bull trout recovery plan (USFWS 2002a, p. 48) by utilizing, in part, information from previous genetic studies and new information from additional analysis (Ardren *et al*. 2011). In this examination, the Service applied relevant factors from the joint Service and NMFS Distinct Population Segment (DPS) policy (USFWS 1996) and subsequently identified six draft recovery units that contain assemblages of core areas that retain genetic and ecological integrity across the range of bull trout in the coterminous United States. These six draft recovery units were used to inform designation of critical habitat for bull trout by providing a context for deciding what habitats are essential for recovery (USFWS 2010, p. 63898). The six draft recovery units identified for bull trout in the coterminous United States include: Coastal, Klamath, Mid-Columbia, Columbia Headwaters, Saint Mary, and Upper Snake. These six draft recovery units were also identified in the Service's revised recovery plan (USFWS 2015a, p. vii) and designated as final recovery units.

2.3.6 Population Dynamics

Although bull trout are widely distributed over a large geographic area, they exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993, p. 4). Increased habitat fragmentation reduces the amount of available habitat and increases isolation from other populations of the same species (Saunders *et al*. 1991). Burkey (1989) concluded that when species are isolated by fragmented habitats, low rates of population growth are typical in local populations and their probability of extinction is directly related to the degree of isolation and fragmentation. Without sufficient immigration, growth for local populations may be low and probability of extinction high (Burkey 1989; Burkey 1995).

Metapopulation concepts of conservation biology theory have been suggested relative to the distribution and characteristics of bull trout, although empirical evidence is relatively scant (Rieman and McIntyre 1993, p. 15; Dunham and Rieman 1999; Rieman and Dunham 2000). A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994, pp. 189-190). For inland bull trout, metapopulation theory is likely most applicable at the watershed scale where habitat consists of discrete patches or collections of habitat capable of supporting local populations; local populations are for the most part independent and represent discrete reproductive units; and long-term, low-rate dispersal patterns among component populations influences the persistence of at least some of the local populations (Rieman and Dunham 2000). Ideally, multiple local populations distributed throughout a watershed provide a mechanism for spreading risk because the simultaneous loss of all local populations is unlikely. However, habitat alteration, primarily through the construction of impoundments, dams, and water diversions has fragmented habitats, eliminated migratory corridors, and in many cases isolated bull trout in the headwaters of tributaries (Rieman and Clayton 1997, pp. 10-12; Dunham and Rieman 1999, p. 645; Spruell *et al*. 1999, pp. 118-120; Rieman and Dunham 2000, p. 55).

Human-induced factors as well as natural factors affecting bull trout distribution have likely limited the expression of the metapopulation concept for bull trout to patches of habitat within the overall distribution of the species (Dunham and Rieman 1999). However, despite the theoretical fit, the relatively recent and brief time period during which bull trout investigations have taken place does not provide certainty as to whether a metapopulation dynamic is occurring (*e.g*., a balance between local extirpations and recolonizations) across the range of the bull trout or whether the persistence of bull trout in large or closely interconnected habitat patches (Dunham and Rieman 1999) is simply reflective of a general deterministic trend towards extinction of the species where the larger or interconnected patches are relics of historically wider distribution (Rieman and Dunham 2000, pp. 56-57). Recent research (Whiteley *et al*. 2003) does, however, provide genetic evidence for the presence of a metapopulation process for bull trout, at least in the Boise River Basin of Idaho.

2.3.7 Diet

Bull trout are opportunistic feeders, with food habits primarily a function of size and life-history strategy. Fish growth depends on the quantity and quality of food that is eaten, and as fish grow their foraging strategy changes as their food changes, in quantity, size, or other characteristics (Quinn 2005, pp. 195-200). Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macrozooplankton, and small fish (Boag 1987, p. 58; Donald and Alger 1993, pp. 242-243; Goetz 1989, pp. 33-34). Subadult and adult migratory bull trout feed on various fish species (Donald and Alger 1993, pp. 241-243; Fraley and Shepard 1989, pp. 135, 138; Leathe and Graham 1982, pp. 13, 50-56). Bull trout of all sizes other than fry have been found to eat fish half their length (Beauchamp and VanTassell 2001, p. 204). In nearshore marine areas of western Washington, bull trout feed on Pacific herring (*Clupea pallasi*), Pacific sand lance (*Ammodytes hexapterus*), and surf smelt (*Hypomesus pretiosus*) (Goetz *et al*. 2004, p. 105; WDFW *et al*. 1997, p. 23).

Bull trout migration and life history strategies are closely related to their feeding and foraging strategies. Migration allows bull trout to access optimal foraging areas and exploit a wider variety of prey resources. For example, in the Skagit River system, anadromous bull trout make migrations as long as 121 miles between marine foraging areas in Puget Sound and headwater spawning grounds, foraging on salmon eggs and juvenile salmon along their migration route (WDFW *et al*. 1997, p. 25). Anadromous bull trout also use marine waters as migration corridors to reach seasonal habitats in non-natal watersheds to forage and possibly overwinter (Brenkman and Corbett 2005, pp. 1078-1079; Goetz *et al*. 2004).

2.3.8 Status and Distribution

The historical range of bull trout includes major river basins in the Pacific Northwest at about 41 to 60 degrees North latitude, from the southern limits in the McCloud River in northern California and the Jarbidge River in Nevada to the headwaters of the Yukon River in the Northwest Territories, Canada (Cavender 1978, pp. 165-166; Bond 1992, p. 2). To the west, the bull trout's range includes Puget Sound, various coastal rivers of British Columbia, Canada, and southeast Alaska (Bond 1992, p. 2). Bull trout occur in portions of the Columbia River and tributaries within the basin, including its headwaters in Montana and Canada. Bull trout also occur in the Klamath River basin of south-central Oregon. East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta and Montana and in the MacKenzie River system in Alberta and British Columbia, Canada (Cavender 1978, pp. 165-166; Brewin *et al*. 1997).

Each of the following recovery units (below) is necessary to maintain the bull trout's distribution, as well as its genetic and phenotypic diversity, all of which are important to ensure the species' resilience to changing environmental conditions. No new local populations have been identified and no local populations have been lost since listing.

The final recovery plan (USFWS 2015a) designates six bull trout RUs as described above. These units replace the 5 interim RUs previously identified (USFWS 1999a). The Service will address the conservation of these final RUs in our section 7(a)(2) analysis for proposed Federal actions. The recovery plan (USFWS 2015a, identified threats and factors affecting the bull trout within these RUs. A detailed description of recovery implementation for each RU is provided in separate RU Implementation Plans (USFWS 2015b-g), which identify conservation actions and recommendations needed for each core area, FMO areas, historical core areas, and research needs areas. Each of the following RUs (below) is necessary to maintain the bull trout's distribution, as well as its genetic and phenotypic diversity, all of which are important to ensure the species' resilience to changing environmental conditions.

2.3.8.1 Mid-Columbia Recovery Unit

The Mid-Columbia Recovery Unit (RU) comprises 24 bull trout core areas, as well as two historically occupied core areas and one research needs area. The Mid-Columbia RU is recognized as an area where bull trout have co-evolved with salmon, steelhead, lamprey, and other fish populations. Reduced fish numbers due to historic overfishing and land management changes have caused changes in nutrient abundance for resident migratory fish like the bull trout. The RU is located within eastern Washington, eastern Oregon, and portions of central Idaho. Major drainages of the RU that fall within the action area are the John Day River, Umatilla River, Walla Walla River, Grande Ronde River, and Imnaha River.

The Mid-Columbia RU can be divided into four geographic regions (Table 5): (1) the Lower Mid-Columbia, which includes all core areas that flow into the Columbia River below its confluence with the Snake River; (2) the Upper Mid-Columbia, which includes all core areas that flow into the Columbia River above its confluence with the Snake River; (3) the Lower Snake, which includes all core areas that flow into the Snake River between its confluence with the Columbia River and Hells Canyon Dam; and (4) the Mid-Snake, which includes all core areas in the Mid-C RU that flow into the Snake River above Hells Canyon Dam. These geographic regions are composed of neighboring core areas that share similar bull trout genetic, geographic (hydrographic), and/or habitat characteristics. Conserving bull trout in geographic regions allows for the maintenance of broad representation of genetic diversity, provides neighboring core areas with potential source populations in the event of local extirpations, and provides a broad array of options among neighboring core areas to contribute recovery under uncertain environmental change (USFWS 2015d, pp. C-1-2).

Table 5. Geographic Regions and Associated River Basins Occupied by Bull Trout in the Mid-Columbia Recovery Unit. (River Basins within the Action Area in Bold)

Lower Mid-Columbia	*Upper Mid-Columbia*	*Lower Snake*	*Middle Snake*
John Day River	Salmo River	Clearwater River	**Powder River**
Umatilla River	Methow River	**Tucannon River**	**Pine Creek**
Walla Walla River	Entiat River	**Asotin Creek**	Indian Creek
Touchet River	Wenatchee River	**Grand Ronde River**	Wildhorse Creek
	Yakima River	**Imnaha River**	

Lower Mid-Columbia Region

In the Lower Mid-Columbia Region, core areas are distributed along the western portion of the Blue Mountains in Oregon and 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 (USFWS 2015c, pp. C-5-6).

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 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 (USFWS 2015c, p. C-7).

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 (USFWS 2015c, p. C-7).

The current demographic status of bull trout in the Mid-Columbia RU is highly variable at both the RU and geographic region scale. Some core areas, such as the Umatilla, Asotin, and Powder Rivers, contain populations so depressed they are likely suffering from the deleterious effects of small population size. Conversely, strongholds do exist within the recovery unit, predominantly in the Lower Snake geographic area. Populations in the Imnaha, Little Minam, Clearwater, and Wenaha Rivers are likely some of the most abundant. These populations are all completely or partially within the bounds of protected wilderness areas and have some of the most intact habitat in the RU. Status in some core areas is relatively unknown, but all indications in these core areas suggest population trends are declining, particularly in the core areas of the John Day Basin (USFWS 2015d, p. C-5).

2.3.8.2 Upper Snake Recovery Unit

The Upper Snake RU includes portions of central Idaho, northern Nevada, and eastern Oregon. Of the seven major drainages found in the Upper Snake RU, the Malheur River is the only major drainage found in the action area, containing two core areas and eight local populations. Three major bull trout life history expressions are present in the Upper Snake RU, adfluvial[19], fluvial[20], and resident populations. Large areas of intact habitat exist primarily in the Salmon drainage, as this is the only drainage in the Upper Snake RU that still flows directly into the Snake River; most other drainages no longer have direct connectivity due to irrigation uses or instream barriers. Bull trout in the Salmon basin share a genetic past with bull trout elsewhere in the Upper Snake RU. Historically, the Upper Snake RU is believed to have largely supported the fluvial life history form; however, many core areas are now isolated or have become fragmented watersheds, resulting in replacement of the fluvial life history with resident or adfluvial forms. The Weiser River, Squaw Creek, Pahsimeroi River, and North Fork Payette River core areas contain only resident populations of bull trout (USFWS 2015f, pp. E-1-2). The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, dams, mining, forest management practices, nonnative species, and agriculture (*e.g.*, water diversions, grazing). Conservation measures or recovery actions implemented include instream habitat restoration, instream flow requirements, screening of irrigation diversions, and riparian restoration.

Malheur River Core Areas

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 (Upper Malheur and North Fork Malheur) 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 two of the 22 core areas and eight of the 206 local populations in the RU. 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 RU, 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 (USFWS 2015f, p. E-9).

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19 Adfluvial: Life history pattern of spawning and rearing in tributary streams and migrating to lakes or reservoirs to mature.

20 Fluvial: Life history pattern of spawning and rearing in tributary streams and migrating to larger rivers to mature.

2.3.9 Emerging Threats
Climate change was not addressed as a known threat when bull trout was listed. The 2015 bull trout recovery plan and RU Implementation Plans summarize the threat of climate change and acknowledges that some extant bull trout core area habitats will likely change (and may be lost) over time due to anthropogenic climate change effects, and use of best available information will ensure future conservation efforts that offer the greatest long-term benefit to sustain bull trout and their required coldwater habitats (USFWS 2015a, p. vii and pp. 17-20; USFWS 2015b-g).

Global climate change and the related warming of global climate have been well documented (IPCC 2007; ISAB 2007; Combes 2003). Evidence of global climate change/warming includes widespread increases in average air and ocean temperatures and accelerated melting of glaciers, and rising sea level. Given the increasing certainty that climate change is occurring and is accelerating (IPCC 2007, p. 253; Battin *et al*. 2007, p. 6720), we can no longer assume that climate conditions in the future will resemble those in the past.

Patterns consistent with changes in climate have already been observed in the range of many species and in a wide range of environmental trends (ISAB 2007; Hari *et al*. 2006; Rieman *et al*. 2007). In the northern hemisphere, the duration of ice cover over lakes and rivers has decreased by almost 20 days since the mid-1800's (Magnuson *et al*. 2000, p. 1743). The range of many species has shifted poleward and elevationally upward. For cold-water associated salmonids in mountainous regions, where their upper distribution is often limited by impassable barriers, an upward thermal shift in suitable habitat can result in a reduction in range, which in turn can lead to a population decline (Hari *et al*. 2006).

In the Pacific Northwest, most models project warmer air temperatures and increases in winter precipitation and decreases in summer precipitation. Warmer temperatures will lead to more precipitation falling as rain rather than snow. As the seasonal amount of snow pack diminishes, the timing and volume of stream flow are likely to change and peak river flows are likely to increase in affected areas. Higher air temperatures are also likely to increase water temperatures (ISAB 2007, pp. 15-17). For example, stream gauge data from western Washington over the past 5 to 25 years indicate a marked increasing trend in water temperatures in most major rivers. Climate change has the potential to profoundly alter the aquatic ecosystems upon which the bull trout depends via alterations in water yield, peak flows, and stream temperature, and an increase in the frequency and magnitude of catastrophic wildfires in adjacent terrestrial habitats (Bisson *et al*. 2003, pp 216-217).

All life stages of the bull trout rely on cold water. Increasing air temperatures are likely to impact the availability of suitable cold water habitat. For example, ground water temperature is generally correlated with mean annual air temperature, and has been shown to strongly influence the distribution of other chars. Ground water temperature is linked to bull trout selection of spawning sites, and has been shown to influence the survival of embryos and early juvenile rearing of bull trout (Baxter 1997, p. 82). Increases in air temperature are likely to be reflected in increases in both surface and groundwater temperatures.

Climate change is likely to affect the frequency and magnitude of fires, especially in warmer drier areas such as are found on the eastside of the Cascade Mountains. Bisson *et al*. (2003, pp. 216-217) note that the forest that naturally occurred in a particular area may or may not be the forest that will be responding to the fire regimes of an altered climate. In several studies related to the effect of large fires on bull trout populations, bull trout appear to have adapted to past fire disturbances through mechanisms such as dispersal and plasticity. However, as stated earlier, the future may well be different than the past and extreme fire events may have a dramatic effect on bull trout and other aquatic species, especially in the context of continued habitat loss, simplification and fragmentation of aquatic systems, and the introduction and expansion of exotic species (Bisson *et al*. 2003, pp. 218-219).

Migratory bull trout can be found in lakes, large rivers and marine waters. Effects of climate change on lakes are likely to impact migratory adfluvial bull trout that seasonally rely upon lakes for their greater availability of prey and access to tributaries. Climate-warming impacts to lakes will likely lead to longer periods of thermal stratification and coldwater fish such as adfluvial bull trout will be restricted to these bottom layers for greater periods of time. Deeper thermoclines resulting from climate change may further reduce the area of suitable temperatures in the bottom layers and intensify competition for food (Shuter and Meisner 1992. p. 11).

Bull trout require very cold water for spawning and incubation. Suitable spawning habitat is often found in accessible higher elevation tributaries and headwaters of rivers. However, impacts on hydrology associated with climate change are related to shifts in timing, magnitude and distribution of peak flows that are also likely to be most pronounced in these high elevation stream basins (Battin *et al*. 2007, p. 6720). The increased magnitude of winter peak flows in high elevation areas is likely to impact the location, timing, and success of spawning and incubation for the bull trout and Pacific salmon species. Although lower elevation river reaches are not expected to experience as severe an impact from alterations in stream hydrology, they are unlikely to provide suitably cold temperatures for bull trout spawning, incubation and juvenile rearing.

As climate change progresses and stream temperatures warm, thermal refugia will be critical to the persistence of many bull trout populations. Thermal refugia are important for providing bull trout with patches of suitable habitat during migration through or to make feeding forays into areas with greater than optimal temperatures.

There is still a great deal of uncertainty associated with predictions relative to the timing, location, and magnitude of future climate change. It is also likely that the intensity of effects will vary by region (ISAB 2007, p 7) although the scale of that variation may exceed that of States. For example, several studies indicate that climate change has the potential to impact ecosystems in nearly all streams throughout the State of Washington (ISAB 2007, p. 13; Battin *et al*. 2007, p. 6722; Rieman *et al*. 2007, pp. 1558-1561). In streams and rivers with temperatures approaching or at the upper limit of allowable water temperatures, there is little if any likelihood that bull trout will be able to adapt to or avoid the effects of climate change/warming. There is little doubt that climate change is and will be an important factor affecting bull trout distribution. As its distribution contracts, patch size decreases and connectivity is truncated, bull trout populations that may be currently connected may face increasing isolation, which could accelerate the rate of local extinction beyond that resulting from changes in stream temperature alone (Rieman *et al*. 2007, pp. 1559-1560). Due to variations in land form and geographic location across the range of the bull trout, it appears that some populations face higher risks than others. Bull trout in areas with currently degraded water temperatures and/or at the southern edge of its range may already be at risk of adverse impacts from current as well as future climate change.

The ability to assign the effects of gradual global climate change to bull trout or to a specific location on the ground is beyond our technical capabilities at this time.

2.3.10 Conservation Needs

The 2015 recovery plan for bull trout established the primary strategy for recovery of bull trout in the coterminous United States: (1) conserve bull trout so that they are geographically widespread across representative habitats and demographically stable in six recovery units; (2) effectively manage and ameliorate the primary threats in each of six recovery units at the core area scale such that bull trout are not likely to become endangered in the foreseeable future; (3) build upon the numerous and ongoing conservation actions implemented on behalf of bull trout since their listing in 1999, and improve our understanding of how various threat factors potentially affect the species; (4) use that information to work cooperatively with our partners to design, fund, prioritize, and implement effective conservation actions in those areas that offer the greatest long-term benefit to sustain bull trout and where recovery can be achieved; and (5) apply adaptive management principles to implementing the bull trout recovery program to account for new information (USFWS 2015a, p. v.).

Information presented in prior draft recovery plans published in 2002 and 2004 (USFWS 2002a, 2004, 2004a) have served to identify recovery actions across the range of the species and to provide a framework for implementing numerous recovery actions by our partner agencies, local working groups, and others with an interest in bull trout conservation.

The 2015 recovery plan (USFWS 2015a) integrates new information collected since the 1999 listing regarding bull trout life history, distribution, demographics, conservation successes, etc., and integrates and updates previous bull trout recovery planning efforts across the range of the single DPS listed under the Act.

The Service has developed a recovery approach that: (1) focuses on the identification of and effective management of known and remaining threat factors to bull trout in each core area; (2) acknowledges that some extant bull trout core area habitats will likely change (and may be lost) over time; and (3) identifies and focuses recovery actions in those areas where success is likely to meet our goal of ensuring the certainty of conservation of genetic diversity, life history features, and broad geographical representation of remaining bull trout populations so that the protections of the Act are no longer necessary (USFWS 2015a, p. 45-46).
To implement the recovery strategy, the 2015 recovery plan establishes categories of recovery actions for each of the six RUs (USFWS 2015a, p. 50-51):

1. Protect, restore, and maintain suitable habitat conditions for bull trout.
2. Minimize demographic threats to bull trout by restoring connectivity or populations where appropriate to promote diverse life history strategies and conserve genetic diversity.
3. Prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout.
4. Work with partners to conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks, and considering the effects of climate change.

Bull trout recovery is based on a geographical hierarchical approach. Bull trout are listed as a single DPS within the five-state area of the coterminous United States. The single DPS is subdivided into six biologically-based recover units: (1) Coastal Recovery Unit; (2) Klamath Recovery Unit; (3) Mid-Columbia Recovery Unit; (4) Upper Snake Recovery Unit; (5) Columbia Headwaters Recovery Unit; and (6) Saint Mary Recovery Unit (USFWS 2015a, p. 23). A viable recovery unit should demonstrate that the three primary principles of biodiversity have been met: representation (conserving the genetic makeup of the species); resiliency (ensuring that each population is sufficiently large to withstand stochastic events); and redundancy (ensuring a sufficient number of populations to withstand catastrophic events) (USFWS 2015a, p. 33).

Each of the six RUs contain multiple bull trout core areas, 116 total, which are non-overlapping watershed-based polygons, and each core area includes one or more local populations.

Currently there are 109 occupied core areas, which comprise 611 local populations (USFWS 2015a, p. 3). There are also six core areas where bull trout historically occurred but are now extirpated, and one research needs area where bull trout were known to occur historically, but their current presence and use of the area are uncertain (USFWS 2015a, p. 3). Core areas can be further described as complex or simple (USFWS 2015a, p. 3-4). Complex core areas contain multiple local bull trout populations, are found in large watersheds, have multiple life history forms, and have migratory connectivity between spawing and rearing habitat and FMO habitat. Simple core areas are those that contain one bull trout local population. Simple core areas are small in scope, isolated from other core areas by natural barriers, and may contain unique genetic or life history adaptations.

A local population is a group of bull trout that spawn within a particular stream or portion of a stream system (USFWS 2015a, p. 73). A local population is considered to be the smallest group of fish that is known to represent an interacting reproductive unit. For most waters where specific information is lacking, a local population may be represented by a single headwater tributary or complex of headwater tributaries. Gene flow may occur between local populations (*e.g.*, those within a core population), but is assumed to be infrequent compared with that among individuals within a local population.

2.3.11 Recovery Units and Local Populations
The final recovery plan (USFWS 2015) designates six bull trout recovery units as described above. These units replace the 5 interim recovery units previously identified (USFWS 1999). The Service will address the conservation of these final recovery units in our section 7(a)(2) analysis for proposed Federal actions. The recovery plan (USFWS 2015), identified threats and factors affecting the bull trout within these units. A detailed description of recovery implementation for each recovery unit is provided in separate RUIPs (USFWS 2015a-f), which identify conservation actions and recommendations needed for each core area, forage/ migration/ overwinter areas, historical core areas, and research needs areas. Each of the following recovery units (below) is necessary to maintain the bull trout's distribution, as well as its genetic and phenotypic diversity, all of which are important to ensure the species' resilience to changing environmental conditions.

2.3.11.1 Mid-Columbia Recovery Unit
The Mid-Columbia recovery unit implementation plan describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015c). The Mid-Columbia Recovery Unit is located within eastern Washington, eastern Oregon, and portions of central Idaho. The Mid-Columbia Recovery Unit is divided into four geographic regions: Lower Mid-Columbia, Upper Mid-Columbia, Lower Snake, and Mid-Snake Geographic Regions. This recovery unit contains 24 occupied core areas comprising 142 local populations, two historically occupied core areas, one research needs area, and seven FMO habitats (USFWS 2015, pg. 47; USFWS 2015c, p. C-1–4). The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, agricultural practices (e.g. irrigation, water withdrawals, livestock grazing), fish passage (e.g. dams, culverts), nonnative species, forest management practices, and mining. Conservation measures or recovery actions implemented include road removal, channel restoration, mine reclamation, improved grazing management, removal of fish barriers, and instream flow requirements.

2.3.11.2 Upper Snake Recovery Unit
The Upper Snake recovery unit implementation plan describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015e, entire). The Upper Snake Recovery Unit is located in central Idaho, northern Nevada, and eastern Oregon. The Upper Snake Recovery Unit is divided into seven geographic regions: Salmon River, Boise River, Payette River, Little Lost River, Malheur River, Jarbidge River, and Weiser River. This recovery unit contains 22 core areas and 207 local populations (USFWS 2015, p. 47), with almost 60 percent being present in the Salmon River Region. The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, dams, mining, forest management practices, nonnative species, and agriculture (e.g., water diversions, grazing). Conservation measures or recovery actions implemented include instream habitat restoration, instream flow requirements, screening of irrigation diversions, and riparian restoration.

2.4 Status of Bull Trout Critical Habitat
Past designations of critical habitat have used the terms "primary constituent elements" (PCEs), "physical and biological features" (PBFs) or "essential features" to characterize the key

components of critical habitat that provide for the conservation of the listed species. The new critical habitat regulations (81 FR 7214) discontinue use of the terms "PCEs" or "essential features" and rely exclusively on use of the term PBFs for that purpose because that term is contained in the statute. To be consistent with that shift in terminology and in recognition that the terms PBFs, PCEs, and essential habit features are synonymous in meaning, we are only referring to PBFs herein. Therefore, if a past critical habitat designation defined essential habitat features or PCEs, they will be referred to as PBFs in this document. This does not change the approach outlined above for conducting the ''destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified PCEs, PBFs or essential features.

2.4.1 Current legal status of the critical habitat

The Service published a final critical habitat designation for the coterminous United States population of the bull trout on October 18, 2010 (USFWS 2010); the rule became effective on November 17, 2010. A justification document was also developed to support the rule and is available on our website (USFWS 2010a)(http://www.fws.gov/pacific/bulltrout). The scope of the designation involved the species' coterminous range, which includes the Coastal, Klamath, Mid-Columbia, Upper Snake, Columbia Headwaters and St. Mary's RU population segments. Rangewide, the Service designated reservoirs/lakes and stream/shoreline miles as bull trout critical habitat (**Table 6**). Designated bull trout critical habitat is of two primary use types: (1) spawning and rearing; and (2) foraging, migration, and overwintering.

Table 6. Stream/Shoreline Distance and Reservoir/Lake Area Designated as Bull Trout Critical Habitat.

State	Stream/Shoreline Miles	Stream/Shoreline Kilometers	Reservoir/ Lake Acres	Reservoir /Lake Hectares
Idaho	8,771.6	14,116.5	170,217.5	68,884.9
Montana	3,056.5	4,918.9	221,470.7	89,626.4
Nevada	71.8	115.6	-	-
Oregon[1]	2,835.9	4,563.9	30,255.5	12,244.0
Oregon/Idaho[2]	107.7	173.3	-	-
Washington	3,793.3	6,104.8	66,308.1	26,834.0
Washington (marine)	753.8	1,213.2	-	-
Washington/Idaho	37.2	59.9	-	-
Washington/Oregon	301.3	484.8	-	-
Total[3]	19,729.0	31,750.8	488,251.7	197,589.2

[1]No shore line is included in Oregon
[2]Pine Creek Drainage which falls within Oregon
[3]Total of freshwater streams: 18,975

The 2010 revision increases the amount of designated bull trout critical habitat by approximately 76 percent for miles of stream/shoreline and by approximately 71 percent for acres of lakes and reservoirs compared to the 2005 designation.

The final rule also identifies and designates as critical habitat approximately 1,323.7 km (822.5 miles) of streams/shorelines and 6,758.8 ha (16,701.3 acres) of lakes/reservoirs of unoccupied habitat to address bull trout conservation needs in specific geographic areas in several areas not occupied at the time of listing. No unoccupied habitat was included in the 2005 designation. These unoccupied areas were determined by the Service to be essential for restoring functioning migratory bull trout populations based on currently available scientific information. These unoccupied areas often include lower main stem river environments that can provide seasonally important migration habitat for bull trout. This type of habitat is essential in areas where bull trout habitat and population loss over time necessitates reestablishing bull trout in currently unoccupied habitat areas to achieve recovery.

The final rule continues to exclude some critical habitat segments based on a careful balancing of the benefits of inclusion versus the benefits of exclusion. Critical habitat does not include: 1) waters adjacent to non-federal lands covered by legally operative incidental take permits for habitat conservation plans (HCPs) issued under section 10(a)(1)(B) of the ESA, in which bull trout is a covered species on or before the publication of this final rule; 2) waters within or adjacent to Tribal lands subject to certain commitments to conserve bull trout or a conservation program that provides aquatic resource protection and restoration through collaborative efforts, and where the Tribes indicated that inclusion would impair their relationship with the Service; or 3) waters where impacts to national security have been identified (USFWS 2010, p. 63903). Excluded areas are approximately 10 percent of the stream/shoreline miles and 4 percent of the lakes and reservoir acreage of designated critical habitat. Each excluded area is identified in the relevant Critical Habitat Unit (CHU) text, as identified in paragraphs (e)(8) through (e)(41) of the final rule. It is important to note that the exclusion of waterbodies from designated critical habitat does not negate or diminish their importance for bull trout conservation. Because exclusions reflect the often complex pattern of land ownership, designated critical habitat is often fragmented and interspersed with excluded stream segments.

2.4.2 Conservation Role and Description of Critical Habitat

The conservation role of bull trout critical habitat is to support viable core area populations (USFWS 2010, p. 63898). The core areas reflect the metapopulation structure of bull trout and are the closest approximation of a biologically functioning unit for the purposes of recovery planning and risk analyses. CHUs generally encompass one or more core areas and may include FMO areas, outside of core areas, that are important to the survival and recovery of bull trout. Thirty-two CHUs within the geographical area occupied by the species at the time of listing are designated under the revised rule. Twenty-nine of the CHUs contain all of the physical or biological features (PBFs) identified in this final rule and support multiple life-history requirements. Three of the mainstem river units in the Columbia and Snake River basins contain most of the PBFs necessary to support the bull trout's particular use of that habitat, other than those PBFs associated with PBFs 5 and 6, which relate to breeding habitat.

The primary function of individual CHUs is to maintain and support core areas, which: (1) contain bull trout populations with the demographic characteristics needed to ensure their persistence and contain the habitat needed to sustain those characteristics (Rieman and McIntyre 1993, p. 19); (2) provide for persistence of strong local populations, in part, by providing habitat conditions that encourage movement of migratory fish (MBTSG 1998, pp. 48-49; Rieman and McIntyre 1993, pp. 22-23); (3) are large enough to incorporate genetic and phenotypic diversity, but small enough to ensure connectivity between populations (Hard 1995, pp. 314-315; Healey and Prince 1995, p. 182; MBTSG 1998, pp. 48-49; Rieman and McIntyre 1993, pp. 22-23); and (4) are distributed throughout the historic range of the species to preserve both genetic and phenotypic adaptations (Hard 1995, pp. 321-322; MBTSG 1998, pp. 13-16; Rieman and Allendorf 2001, p. 763; Rieman and McIntyre 1993, p. 23).

2.4.3 Physical and Biological Features 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 our 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 PBFs, as described within USFWS 2010, are essential for the conservation of bull trout. A summary of those PBFs follows.

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.
2. 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.
3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
4. 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.
5. Water temperatures ranging from 2 °C to 15 °C, 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.
6. 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.
7. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.
8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
9. Sufficiently low levels of occurrence of non-native predatory (*e.g.*, lake trout, walleye, northern pike, smallmouth bass); interbreeding (*e.g.*, 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 CHUs also contain most of the PBFs necessary to support bull trout, with the exception of those associated with PBFs 1 and 6. Additionally, all except PBF 6 apply to 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 Service assumes in many cases this is the full-pool 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 (m) (33 ft) relative to the mean low 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 m 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 PBFs 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 (USFWS 2010, pp. 63898:63943; USFWS 2004a, pp. 140-193; USFWS 2004b, pp. 69-114). The Service's evaluation must be conducted at the scale of the entire critical habitat area designated, unless otherwise stated in the final critical habitat rule (USFWS and NMFS 1998, Ch. 4 p. 39). 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, we consider all 32 CHUs to contain features or areas essential to the conservation of the bull trout (USFWS 2010, pp. 63898:63901, 63944). Therefore, if a proposed action would alter the PBFs 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 (USFWS 2010, pp. 63898:63943).

2.4.4 Current Critical Habitat Condition Rangewide

The condition of bull trout critical habitat varies across its range from poor to good. Although still relatively widely distributed across its historic range, the bull trout occurs in low numbers in many areas, and populations are considered depressed or declining across much of its range (Ratliff and Howell 1992; Schill 1992, p. 40; Thomas 1992, p. 28; Buchanan *et al*. 1997, p. vii; Rieman *et al*. 1997, pp. 15-16; Quigley and Arbelbide 1997, pp. 1176-1177). This condition reflects the condition of bull trout habitat. The decline of bull trout is primarily due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management practices, impoundments, dams, water diversions, and the introduction of nonnative species (USFWS 1998a, pp. 31648-31649; USFWS 1999a, p. 17111).

There is widespread agreement in the scientific literature that many factors related to human activities have impacted bull trout and their habitat, and continue to do so. Among the many factors that contribute to degraded PBFs, those which appear to be particularly significant and have resulted in a legacy of degraded habitat conditions are as follows: (1) fragmentation and isolation of local populations due to the proliferation of dams and water diversions that have eliminated habitat, altered water flow and temperature regimes, and impeded migratory movements (Dunham and Rieman 1999, p. 652; Rieman and McIntyre 1993, p. 7); (2) degradation of spawning and rearing habitat and upper watershed areas, particularly alterations in sedimentation rates and water temperature, resulting from forest and rangeland practices and intensive development of roads (Fraley and Shepard 1989, p. 141; MBTSG 1998, pp. ii - v, 20-45); (3) the introduction and spread of nonnative fish species, particularly brook trout and lake trout, as a result of fish stocking and degraded habitat conditions, which compete with bull trout for limited resources and, in the case of brook trout, hybridize with bull trout (Leary *et al*. 1993, p. 857; Rieman *et al*. 2006, pp. 73-76); (4) in the Coastal-Puget Sound region where amphidromous bull trout occur, degradation of mainstem river FMO habitat, and the degradation and loss of marine nearshore foraging and migration habitat due to urban and residential development; and (5) degradation of FMO habitat resulting from reduced prey base, roads, agriculture, development, and dams.

2.5 Environmental Baseline – Bull Trout and Bull Trout Critical Habitat

The BMFs fall within two recovery units identified in the final recovery plan: the Mid-Columbia and the Upper Snake. Bull trout population characteristics within each subbasin are summarized by regions. Only those regions and associated river basins found within the action area are provided in Tables 7 and 8.

Table 7. Geographic Regions and Associated River Basins Occupied by Bull Trout in the Mid-Columbia Recovery Unit Found Within the Action Area.

Lower Mid-Columbia	Lower Snake	Middle Snake
John Day River	Tucannon River	Powder River
Umatilla River	Asotin Creek	
Walla Walla River	Grand Ronde River	
Touchet River	Imnaha River	

Table 8. Geographic Regions and Associated River Basins Occupied by Bull Trout in the Upper Snake Recovery Unit Found Within the Action Area.

Geographic Region	# Core Areas	# Local Populations
Malheur River	2	8

2.5.1 Middle Columbia Recovery Unit

2.5.1.1 Lower Mid-Columbia Region

In the Lower Mid-Columbia Region, core areas are distributed along the western portion of the Blue Mountains in Oregon and Washington. 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 (Recovery Plan).

In core areas adjoining the Snake River (*e.g.*, Grande Ronde, Imnaha, Powder, Pine, Indian, and Wildhorse), effects of the Snake River dams and various tributary reservoirs on bull trout movement should be assessed; two-way fish passage should be established if feasible to restore population connectivity within or between core areas. Brook trout are identified as a factor impacting bull trout within multiple core areas in the Mid-Columbia RU. In this RU the level of effect from brook trout on bull trout is site-specific and variable depending on a number of factors (*e.g.*, baseline habitat condition, amount of available habitat, bull trout access to refugia, brook trout densities, and water temperature). At sites where effects of brook trout are significant and control actions are feasible, brook trout populations should be reduced to minimize these effects. High priority areas include the John Day, Powder and Umatilla basins.

Measures to prevent spread of brook trout to new streams should be considered and implemented where appropriate (Recovery Plan).

Effective monitoring programs are needed to determine whether recovery actions for bull trout are successful and to help determine where and when recovery criteria have been achieved. Monitoring may include assessing distribution, population status, life history, migratory movements, and genetic characteristics of bull trout in each recovery unit. In addition, evaluating monitoring efforts, management practices such as those for water diversion screening, grazing, timber harvest, and riparian management should be evaluated for their effectiveness in reducing impacts on bull trout. For example, the identification of core areas and watersheds within the Mid-Columbia RU that are most likely to maintain habitats suitable for bull trout over the foreseeable future under probable climate change scenarios will also help guide the allocation of bull trout conservation resources to improve the likelihood of success (Recovery Plan).

The Imnaha, Wenaha, Wenatchee, and Clearwater River basins currently contain the healthiest and most stable bull trout populations in the RU and should be particularly managed to maintain these populations and prevent introduction of new threats. Some basins, such as the Walla Walla and Touchet Rivers and Lookingglass Creek, have been intensively monitored resulting in long-term datasets that allow for current assessment of status and trend. More common however is sporadic monitoring or information collected incidental to monitoring other species like salmon. Many core areas in the Mid-Columbia RU, such as all three of the core areas in the John Day, the Minam, and Upper Grande Ronde have had little to no monitoring for many years and the status of bull trout in these basins is uncertain (Recovery Plan).

It is clear that a greater emphasis needs to be made on standardizing monitoring and evaluation of bull trout populations across this RU in order to develop sufficient demographic information to assess status and trend, and response to recovery actions.

2.5.1.2 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 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.

2.5.2 Upper Snake Recovery Unit

2.5.2.1 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 RU. 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.

Brook trout are widespread on the MNF and the primary threat and number one limiting factor to bull trout recovery in the Upper Malheur River (USFWS 2015e). The presence of brook trout pose a particular threat to bull trout through hybridization, species competition, and predation (BPT 2016, Gunckel 2002). Bull trout and brook trout will hybridize resulting in hybrid offspring that are often, but not always sterile. Where hybridization occurs declines in the bull trout populations or even local extirpations have occurred (USFWS 2015a). Brook trout may have a competitive advantage over bull trout and displace bull trout into higher elevation streams, especially at warmer water temperatures (Rieman *et al.* 2006, McMahon *et al.* 2007, Rodtka and Volpe 2007).

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.

2.5.3 Conservation Role of the Action Area for Bull Trout

The Bull Trout Recovery Plan (USFWS 2015a) identified four elements to consider when assessing long-term viability (extinction risk) of bull trout populations: 1) number of local populations; 2) adult abundance (defined as the number of spawning fish present in a core area in a given year); 3) productivity, or the reproductive rate of the population; and 4) connectivity (as represented by the migratory life history form).

In the final recovery plan (USFWS 2015a), the goal for recovering bull trout is managing threats to ensure sufficient distribution and abundance throughout their range so that protection under the Act is no longer necessary. When this is achieved, it is expected that:

- Bull trout will be geographically widespread across representative habitats and demographically stable;
- The genetic diversity and diverse life history forms of bull trout will be generally conserved; and
- Cold water habitats essential to bull trout will be conserved and connected.

Bull trout are present in three subbasins associated with the MNF. Within these three subbasins, the majority of bull trout spawning and rearing habitat is located in National Forest System lands and is in variable condition. Current habitat quality, quantity and connectivity of spawning and rearing habitats within the MNF for multiple bull trout populations, when combined with improving riparian and aquatic habitat trends within National Forest System lands, indicate that habitat connectivity, quantity and quality for bull trout within National Forest System lands are being maintained and are contributing to recovery of bull trout viability.

Bull trout spawning and rearing habitat within the Umatilla National Forest is in fair condition and supports multiple, well-distributed populations in multiple subbasins, based on species distribution, habitat and local population conditions averaged across National Forest System lands in each subbasin. Headwater habitats for bull trout in National Forest System lands in most subbasins are high quality, though the total amount of such habitat varies by subbasin. An inventory of culverts in National Forest System roads within the Umatilla National Forest in 2000 and 2001 revealed fish passage concerns created by a number of culverts, but very few problems were identified in subwatersheds occupied by bull trout. Current habitat quality, quantity and connectivity of spawning and rearing habitats within the Umatilla National Forest for multiple bull trout populations, when combined with improving riparian and aquatic habitat trends within National Forest System lands, indicate that habitat connectivity, quantity and quality for bull trout within National Forest System lands are being maintained and are contributing to recovery of bull trout viability.

Bull trout spawning and rearing habitat within the Wallowa-Whitman National Forest is in fair condition, other than in the Hells Canyon and Powder River subbasins where habitats are extremely limited and fragmented by mainstem dams and reservoirs. Current habitat quality, quantity and connectivity of spawning and rearing habitats within the Wallowa-Whitman National Forest for bull trout populations, when combined with improving riparian and aquatic habitat trends within National Forest System lands, indicate that habitat quality for bull trout within National Forest System lands is being maintained and is contributing to recovery of bull trout viability.

Specific actions to achieve the recovery goals are identified for the Malheur River Core Areas in the Upper Snake Recovery Unit Implementation Plan within USFWS (2015d). These actions to address threats are displayed in Appendix B.

Out of a total of 32 criticial habitat units (CHUs), there are portions of nine CHUs that occur on Forest Service ownership on the BMF. Therefore, the BMF has a relatively small contribution to bull trout conservation, given the size of the range of the species.

2.6 Effect of the Action – Bull Trout and Bull Trout Critical Habitat

2.6.1 Effects to Bull Trout

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

Bull trout are wide spread across the three forests of the BMFP. The bull trout recovery plan (USFWS 2015a) and designated critical habitat for the bull trout (USFWS 2015a, entire) clearly expect conservation efforts for the bull trout within the sub-basins (Table 42 in Assessment). While proposed restoration and protective actions in the BMFPs will likely benefit bull trout, future actions implemented under the BMFP in the sub-basins will be more likely to affect additional individual bull trout as BMFP and other recovery actions increase bull trout distribution and population numbers.

2.6.2 Effects of the Management Areas and ARCS

2.6.2.1 Management Areas

The BMFP, 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 BMFP components describe the management intent and sideboards placed on management activities either Forest-wide or specific to a MA. The BMFP components include the BMF ARCS that will replace the current direction provided by PACFISH and INFISH. This Opinion assesses the MAs and plan components, in particular the plan components contained in the BMF ARCS, for their conservation value to listed bull trout and potential effects (indirect effects of the BMFP) to listed bull trout that may occur during future implementation of the BMFP. Because the BMFP is a framework consultation that is programmatic in nature and does not directly authorize any actions, no specific incidental take resulting from the expected effects of implementing the BMFP can be reasonably certain to occur or quantified by adopting the BMFP. Any future land management activities that occur through implementing the BMFP will be subject to more project-specific section 7 consultation where specific effects to listed bull trout and designated critical habitat will be analyzed using the jeopardy and adverse modification analytical frameworks described earlier, and any resulting incidental take of listed bull trout will be quantified.

The MAs that were considered especially relevant to the effects on bull trout 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).

MAs 1A, 1B, 1C Wilderness Management Area Designations: The BMFP has recommended new wilderness MAs, increasing protected wilderness values by two percent on the Malheur, one percent on the Umatilla, and one percent on the Wallowa-Whitman NFs. This small increase in areas with wilderness-like values will contribute to the conservation efforts of listed bull trout by providing a high level of habitat protection, since the intent of wilderness is to preserve and protect areas in their natural condition. This should result in beneficial effects to bull trout and their designated critical habitat since most of these management designations are in watersheds that are functioning appropriately, albeit in subbasins that are mostly functioning at risk.

Standards and guidelines that provide additional protection within this MA include the following, and how they relate to threats to the species.

The intent of *Wild and Scenic MA2A-1G and MA2A-2S* is to protect riparian areas within the Wild and Scenic River (WSR) corridors by limiting access consistent with Outstanding Remarkable Values (ORVs) and DCs, both of which include listed fish and their habitats. In addition, *Wild and Scenic 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-1G:* New proposals for outfitting and guiding special use permits or recreation event permits should be approved only when the special use or event is consistent with ORVs, wild and scenic rivers DCs, and when a need is identified and capacity is available.
>
> *MA2A*-2S: Hitching or tethering of horses or other saddle or pack animals to trees, except for loading or unloading, shall not be authorized at campsites within wild and scenic river corridors.
>
> *MA2A-3S*: New roads and motorized trails shall not be authorized within wild classifications of Wild and Scenic River management allocations.
>
> *MA2A-4S:* Hazard trees felled at trailheads or watercraft put-in/takeout locations within river segments classified as wild rivers will be left where they fall, or moved to an ecologically desirable location.
>
> *MA2A-5S*: Mining of common minerals shall not be authorized.

Back Country and Back Country Motorized
The BMFP identifies 128,600 acres and 496,600 to the backcountry and backcountry motorized MAs respectively. The only difference between the two areas is the suitability for non-motorized and motorized recreation. Backcountry emphasizes non-motorized recreation opportunities and can include foot, horse, and mechanized (e.g., mountain bikes) modes of travel. Backcountry motorized emphasizes summer and winter motorized recreation opportunities and can include off- highway vehicles, motorcycles, jeeps, and over-snow vehicles.

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 of Assessment) for 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.

General Forest
The General forest MA comprises the largest acres (2,715,100 acres) of any MA within the BMFP suitable for timber harvest. This MA also contains the highest bull trout distribution of any MA. The potential for adverse effects will be minimized through the use of standards and guidelines described below. These potential adverse effects will occur at the subwatershed scale, a "watershed function effect" as the effect will be occurring on upslope areas primarily outside the RMAs. These effects will be from timber harvest and associated harvesting methods, temporary road construction and use, and prescribed fire.

The intent of timber harvest and silvicultural management program is to create forest and non-forest vegetation structure that contributes to the species diversity, species compositions, and structural diversity of native plant communities. It is also the intent of the BMFP that active management, such as wood product removal, wildland fire use, vegetation treatments will be used to meet DCs and not impair DCs.
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 poulations, 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 poulations (Sestrich et al. 2011, Rieman et al. 2003, Rieman et al. 1995).

Vegetation management activities can cause adverse effects to listed bull trout and critical habitats; however, the RMA DCs, standards and guidelines have the potential to reduce long-term adverse effects. Projects will not be consistent with *WM-1S* and *RMA-1S* if effects do not maintain baseline conditions when they are within DCs. When baselines are outside of DCs, projects must restore or not retard attainment of DCs 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 DCs and federally listed species.

The BMFP standards and guidelines that specidically guide vegetation management to prevent or minimize adverse effects are as follows: *RE-5S, TM-10S, FM-10S, FM-9G, TM1S, TM-2S, TM-3G, TM-4S,* and *TM-5S*. Proper implementation of the BMFP 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.

2.6.2.2 Combined Effects of MAs

Vegetation management to restore vegetation to conditions as may be expected under historic and anticipated disturbance regimes, is expected to improve watershed condition if the desired road densities are attained. The extent to which watershed conditions may improve will depend upon the amount of vegetation treatments that occur within a subwatershed and the ability of the Forest to achieve the road DCs within fiscal and social constraints.

Motorized recreation is allowed in the Backcountry Motorized MA, plus the current levels of mechanized recreation are allowed in Recommended Wilderness areas. 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. Sediment may continue to be delivered to streams and aquatic habitat due to the use of the existing motorized trail and road system. The level of effect on aquatic habitat will likely depend upon the ability of the BMF to maintain roads and trails. Within the first decade of the BMFP, a BMF objective is to reduce road-related sedimentation and hydrologic connectivity of the road system by 30-35 miles for each forest (Table 2).

ARCS (Appendix A of Assessment)

The ARCS plan components, including DCs, standards and guidelines, objectives, the designation of RMAs and key watersheds, the identification of suitable uses within RMAs and monitoring provide a comprehensive approach for conserving aquatic species and habitat (listed above). The BMFP 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 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 ARCS, with a more comprehensive set of DCs, standards and guridelines and objectives than were included in INFISH is expected to be more effective at restoring ecologically healthy watersheds, riparian and aquatic habitats. The differences between the ARCS and INFISH are described in Appendix A.

The ARCS addresses important aspects of the Recovery Plan (USFWS 2015) for bull trout. Management activities in RMAs will be designed to protect, maintain, or enhance water quality and the ecological health of aquatic and riparian ecosystems and associated resources.

Forest-wide DCs, standards and guidelines are to be applied Forest-wide in all MAs. The Forest-wide water resources plan components are in addition to BMFP components that are specific to RMAs and key watersheds. The Forest-wide DCs and standards and guidelines are to work in concert with the BMFP 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 the BMFP implementation.

The intent of the BMF ARCS is to provide for the ecological integrity of watersheds, riparian, and aquatic habitats. To be consistent with the DCs of the BMFP, a project or activity, when assessed at the appropriate spatial scale described in the BMFP, must be designed to meet one or more of the following conditions:

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

Therefore all management activities implemented during the life of the BMFP must be designed to meet the DCs. "…must be designed to maintain desired conditions when within them, and/or move toward them" where not currently met.

The goal of the standards and guidelines is to minimize long-term impacts to aquatic resources from management actions by the BMFP. The BMFP defines and lists several forest-wide aquatic and/or watershed DCs, standards and guidelines that will support aquatic and riparian habitats relevant to bull trout, and these are also listed in the proposed action section of this Opinion. The DCs are summarized below.

> *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.

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 conditons over and above PACFISH and INFISH.

The BMFP includes two watershed standards that apply forest-wide. These two standards constrain management activities and will benefit the bull trout conservation.

Standard WM-1S: When watershed function desired conditions are being achieved and watersheds are "functioning properly" projects shall maintain those conditions. When watershed function desired conditions are not yet achieved or watersheds have impaired function or are "functioning-at-risk" and to the degree that project activities would contribute to those conditions, projects shall restore or not retard attainment of desired conditions. Short-term adverse effects from project activities may occur when they support or do not diminish long-term recovery of watershed function desired conditions and federally listed species. Exceptions to this standard include situations where Forest Service authorities are limited. In those cases, project effects shall be minimized and not retard attainment of desired conditions for watershed function, to the extent possible within FS authorities. Use ARCS Attachment B (Use of the Matrix of Pathways and Watershed Indicators and Watershed Condition Framework to Replace riparian management objectives) to assist in determining compliance with this standard.

The Assessment found the condition of subwatersheds on the BMFs are generally "functioning at risk" or impaired water quality". The percentage of subwatersheds with ESA listed fish and critical habitat and functioning at risk are 98 percent for the Malheur, 95 percent for the Wallow-Whitman, and 79 percent for the Umatilla NFs.

TM-8G: In watersheds in which stream channels and aquatic habitats are in properly functioning condition, forest vegetation within RMAs shuld 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.

Seven standards and guidelines address watershed restoration, hydrologic processes, and fire suppression chemicals in areas occupied by bull trout or their habitats.

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.

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.

Fuels Management M-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-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.

The forest-wide management direction described above should conserve bull trout critical habitat and minimize adverse effects to the bull trout.

Riparian Management Areas (RMAs)
RMA plan components apply anywhere there are aquatic (streams, lakes, ponds, weltands, etc.) features and unstable or potentially unstable terrain. RMAs are established to protect the

ecological processes and conditions, and the important functions riparian zones provide to aquatic habitat including:

- The input of fine organic matter and nutrients to aquatic habitat.
- Providing for bank stability.
- Filtering sediment due to surface erosion thus controlling the amount reaching the aquatic system.
- A source of large woody debris.
- Shading the aquatic habitat thus helping to control water temperature.
- Controlling the microclimate within the riparian zone and adjacent to the aquatic habitat.
- Recognition of small and intermittent streams and managing unstable lands to account for aquatic function and values.

The proposed action section of this Opinion describes the RMA size for fish-bearing streams; permanently flowing non-fish-bearing stream; constructed ponds and reservoirs, and wetlands greater than one acre; lakes and natural ponds; and discusses the approach for intermittent streams. RMAs are a separate MA identified for riparian areas, emphasizing their importance on the landscape. RMAs are portions of a watershed where riparian-dependent resources receive primary emphasis and management activities are subject to specific standards and guidelines. Management activities within RMAs protect, maintain or enhance existing functional conditions or restore degraded conditions for aquatic and riparian-dependent species. Appendix A of this Opinion also compares those buffers in the ARCS to INFISH buffers.

The BMFP includes RMAs with DCs, and standards and guidelines. The BMFP includes nine DCs specific to RMAs that are a benefit to bull trout conservation by accounting for maintaining natural processes and the functions of the RMAs:

> *Riparian Management Area DC-1:* Riparian management areas within any given watershed reflect a natural composition of native flora and fauna and a distribution of physical, chemical, and biological conditions appropriate to natural disturbance regimes affecting the area. Scale: Subwatershed.
>
> *Riparian Management DC-2:* The species composition and structural diversity of native plant communities in riparian management areas, including wetlands, provides adequate side channels, pools, undercut banks and unembedded substrates. These conditions result in a variety of depths, gradients, velocities, and structure for seasonal thermal regulation, nutrient filtering, appropriate rates of erosion, and channel migration and supplies amounts and distributions of coarse woody debris and fine particulate organic matter sufficient to sustain physical complexity and stability. Scale: Watershed scale for forestwide planning; subwatershed scale for project planning.
>
> *Riparian Management Area DC-3:* Key riparian processes and conditions (including slope stability and associated vegetative root strength, bank stability, wood delivery to streams, and, within the riparian management areas, input of leafy and other organic

matter to aquatic and terrestrial systems, solar shading, microclimate, and water quality) are operating consistent with natural disturbance regimes. Scale: Subwatershed.

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

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

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

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

All nine DCs need to be considered in all land management activities that occur within an RMA, and focus on maintaining natural processes and providing healthy riparian and aquatic habitats.

The following standards and guidelines are important to the conservation of riparian and aquatic habitat and necessary to protect bull trout and its critical habitat during management activities and to provide habitat conditions for bull trout recovery:

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.[21] Short-term adverse effects from project activities may occur when they support long-term recovery of riparian management area desired conditions.[22] Exceptions to this standard include situations where Forest Service authorities are limited (Alaska National Interest Lands Conservation Act {ANILCA}, 1872 Mining law, valid state water right, etc.). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of desired conditions to the extent possible within Forest Service authorities. Use ARCS Attachment B (i.e. diagnostic indicators and RMA ecological process and function descriptions) to assist in determining compliance with this standard.

Standard *RMA-1S* helps protect riparian areas during livestock grazing in riparian areas by maintaining riparian vegetation with sufficient plant cover, rooting depth and vigor thus protecting against accelerated erosion and allowing for the deposition of overbank sediment necessary to maintain stream banks.

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

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21 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 1998b, 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).

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

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.

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.

Standard RF-5S will help conserve bull trout by requiring road maintenance activities to ensure they reduce the risk to soil, hydrologic function as well as riparian and aquatic function.

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.

Reeves (*et al.*) 2016 provide a review of the current science surrounding riparian functions and processes (BA p.171). 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 Sweeny and Newbold (2014) of stream side buffers and concluded, overall, buffers ≥30 m (98 feet) wide are needed to protect the physical, chemical, and biological integrity of small streams. Sweeny and Newbold (2014) also state their review found that sediment trapping was ~65 and ~85% for a 10- and 30-m buffer, respectively, concluding 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 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).
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 BMFP, with the associated DCs, 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. The RMAs will allow for careful management to achieve riparian, aquatic and landscape-scale DCs while protecting the important ecological processes. All the ecological functions for which the RMAs are established for fish-bearing streams also apply to intermittent streams (Reeves *et al.* 2016). The protections are expected to provide benefits directly to bull trout individuals through improved habitat, but also to species that bull trout forage on.

Watershed Analysis (WA)

The Assessment states that 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 which 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.

Most of the BMFs are covered by some form of WA, although many of those analyses are dated and likely no longer characterize current conditions. Table 6 of the ARCS lists watersheds with WA with completion dates ranging from 1994 to 2006. The MNF has about 57% of the forest covered by WA conducted between 1995 and 2002. The Interagency supported Region 6 Federal Guide for Watershed Analysis (1995), defines the procedure used within the Pacific Northwest for evaluating the geomorphic and ecological processes operating within watersheds and is used to assess the condition and trend of watershed, riparian, and aquatic ecosystems and provide the basis for watershed-scale protection and/or restoration. The guide goes on to say "It provides the watershed context for fishery protection, restoration, and enhancement efforts". This type of focused analysis has not been conducted on the MNF since 2004. Some recent MNF assessments for grazing state they include some of the same components and considerations being evaluated and analyzed for "landscape scale analysis for accelerated restoration on the MNF, however not all the key questions, analysis and synthesis that was provided by (standardized) WA occurs during landscape analysis".

The BMFP anticipates that some older WAs will be updated. The Assessment states watershed updates should refine components that do not address current issues, resource conditions, science and policy, and/or reflect contemporary management opportunities. The Assessment does not link the updates or changes to existing analysis to address "watershed context for fishery protection, restoration, and enhancement efforts".

The desired outcome of WAs is an efficient, effective analysis that provides a better understanding of watershed structure and function and a set of recommendations that help inform future management actions within and around the watershed. To achieve this goal, line officers should guide analysis teams throughout the analysis process, ensuring that the analysis focuses on the most critical issues and questions and that the scope, type and level of analysis is aligned with management needs and available financial resources and staff. This is critical to avoiding common pitfalls observed in previous analyses, which included unconstrained scope and level of detail.

Watershed analysis will now be required in any watershed when salvage logging and facility/road construction occur in RMAs. This implies decision makers must weigh the investment to complete a new or focused analysis of watershed conditions against the need to build roads and facilities, and complete salvage logging. Watershed analysis should provide information to put the management effects in context of current baseline aquatic conditions, with regard to the potential, and help them avoid or minimize adverse effects to aquatic and riparian dependent resources in order to remain consistent with BMFP guidance.

Watershed analysis will be updated or developed when substantial aquatic or terrestrial restoration programs occur in WCF priority watersheds. Note the Assessment does not define “substantial”. Watershed analysis should lead to informed Watershed Restoration Action Plans (WRAPs) by identifying limiting factors and important areas and activities that could be implemented or avoided to protect and restore watershed conditions. These WRAPS should align restoration actions with relevant ESA-recovery plans.

Summary: WA is now required in any watershed when the above activities (4 bullets) occur in RMAs. The Assessment states the FS expects these activities will be infrequent due to the cost investment required of a standardized WA. If a decision maker moves forward with WA, 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 BMFP guidance.

There are two forestwide watershed standards that need to be considered in all land management activities, and focus on maintaining natural processes and providing healthy riparian and aquatic habitats.

> *WM-1S:* When watershed function[23] desired conditions are being achieved and watersheds are functioning properly[24], projects shall maintain[25] those conditions. When

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

24 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 1998b), and to the respectively equivalent to “properly functioning” or

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 restore[26] or not retard attainment[27] of desired conditions. Short-term[28] adverse effects from project activities may occur when they support or do not diminish long-term[29] 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}, 1872 Mining law, valid state water right, etc.). In those cases, project effects shall be minimized and not retard attainment of desired conditions for watershed function, to the extent possible within Forest Service authorities. Use ARCS Attachment B 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.

Appendix A of the Assessment lists the full suite of standards and guidelines which apply to management activities in riparian areas, such as minimizing temporary roads in RMAs and applying herbicides and other chemicals only to maintain, protect, or enhance aquatic and riparian resources or to restore native plant communities in a manner that does not harm aquatic or riparian resources. These more specific standards and guidelines support the fundamental direction from RMA-1S to restore or not retard attainment of DCs in RMAs.

Key and Priority Watersheds

"at risk" or "not properly functioning" categories within the matrix of pathways and indicators used by NMFS (1996).

25 See glossary for definitions of "maintain" and "degrade".

26 See glossary for definitions of "restore".

27 See glossary for definitions of "retard attainment".

28 See glossary for definition of "short-term adverse effects"

29 See glossary for definition of "long-term recovery".

Key watersheds are a subset of the watersheds across the BMFs and are designated at the subwatershed scale. 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 BMFs. They are a network of watersheds that are designed to serve as strongholds for important aquatic resources and are crucial to threatened and endangered aquatic species and provide high quality water important for maintenance of downstream populations. Management in key watersheds emphasizes minimizing risk and maximizing passive and active restoration or preservation of watershed function and aquatic and riparian habitat.

Unlike PACFISH/INFISH where all critical habitat was included in key watersheds, the new definition of key watershed does not address all ESA listed fish watersheds. However, Forest-wide and RMA plan components are expected to provide high quality water and protect the riparian and watershed ecological processes that can contribute to providing downstream habitat conditions for bull trout.

> *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.

Key Watershed DC-1, Key Watershed DC -2 and Key Watershed DC-3 provide a clear description of the purpose of the BMFP key watersheds and will contribute to short-term conservation and long-term recovery of bull trout. *Key Watershed DC-2* and *Standard KW-1S* addresses the threat roads, a key threat specific to bull trout, pose to watershed processes and aquatic habitat.

> *Standard KW-1S:* In key watersheds or subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species that are functioning properly[30] there shall be no net increase (1 mile of road-related risk reduction for every

30 "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

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

Priority Watersheds

Priority Watersheds are a subset of key watersheds prioritized for restoration over the life of the BMFP (15 years). Key and Priority watersheds are the primary areas where restoration will take place under the objectives for each of the BMFs, as provided in Table 2. The objectives 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 in 54 watersheds, 110 sites where riparian function will be improved, improving riparian vegetation condition on 1800 acres, and restoring 421 miles of stream habitat. However, objectives are not commitments but are based on actual budget.

The strength of the priority watershed network is that it centers on subwatersheds that contain listed bull trout and their designated critical habitat. Of the 75 priority watersheds identified across the BMFs within the range of listed fish, 44% contain bull trout critical habitat (567.02 miles). Priority watersheds are the priority for restoration, and are used to target implementation of active restoration work over the next 10-15 years. Other key watersheds may or may not need restoration, as they represent the best habitat currently available. Any additional priority watersheds would be selected from among key watersheds once current priority watersheds have needed work completed. These actions will benefit all native species on the BMFs, as well as bull trout through improved conditions for habitat and forage.

Watershed restoration objectives apply to priority watersheds supporting bull trout, and would also apply to any other key watersheds supporting bull trout which may be subsequently prioritized for restoration. The restoration objectives may directly contribute to bull trout conservation, and have been provided in the ARCS. In addition, there are two guidelines and three standards that apply to all watershed restoration projects:

Forest Service, 2011b. Local inventory, assessment and monitoring data and information can be used to refine initial classifications made per WCF.

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

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

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

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

Standard RE-5S: Minimize adverse effects to ESA listed, proposed, and candidate species and their designated and proposed critical habitat in accordance with Forest Service authorities. Management activities shall not retard recovery[31] 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.

Watershed Protection and Restoration
The ARCS commits to a long-term watershed protection and restoration program. Watershed protection will be accomplished by implementing key standards and guidelines that minimize the risk of effects. The use of BMPs and focused WAs will also be used in conjuction with standards and guidelines to achieve DCs for water quality and fish habitat. *RMA-1S, WM-1S, RE-3S,* and *RE-5S* provide protection and restoration to watershed function and riparian areas and aquatic resouces within the RMAs. *RE-3S* requires not using mitigation or planned restoration as a substitute for preventing long-term watershed or habitat degradation (except where FS 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.

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

2.6.2.4 Vegetation Management Effects, Including Restoration, Climate Change, Fire

While implementation of the BMFP is intended to produce commercial timber, the intent of the Vegetation 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 (*MA 1B DC (unnumbered)* see Proposed Action above). 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.

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). When fish, such as bull trout, are isolated above barriers or in streams with little connectivity to adjacent populations, they are more susceptible to extirpation by a large disturbance. The concern, therefore, is not so much regarding the effects of "natural" fires but with the larger, more severe fires than occurred historically, especially if the fires occur in subwatersheds with isolated populations.

Vegetation management through timber sales for timber production or unscheduled timber harvest (e.g. thinning, 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; and Day 2015). 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. Vegetation management and white bark pine DCs, standards and guidelines should result in BMFs managing for large trees and white bark pine habitat that will moderate the effects of fire and climate change. 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. While adverse effects such as decreases in large wood, shade, and increased erosion may continue to occur, implementation of the ARCS components should minimize these effects.

The potential for adverse effects is greatest on lands specifically allocated for timber production due to the emphasis on commodity production; potentially resulting in intense vegetation manipulation and more ground disturbance due to logging and roads than is expected where vegetation management emphasizes the restoration of forest vegetation. The RMA standards and guidelines that specifically constrain vegetation management activities, including fire, to prevent or minimize adverse effects of vegetation management activities include:

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

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.

OF-1G: Management activities should retain and generally emphasize recruitment of old[32] trees, large[33] trees and legacy[34] trees. Exceptions where individual old, large, or legacy trees may be removed or destroyed include situations where:

- 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.

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32 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).

33 "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.

34 “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 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.

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

TM-4G: Yarding activities shuld achieve full suspension over the active channel, unless other alternatives will have less damage to riparian areas and stream channels.

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-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.

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-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 iginition in RMAs should not be used unless site/project scale effects analysis demonstrates that it would not retard attaining aquatic and riparian desired conditons.

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

Vegetation management activities can cause adverse effects to bull trout; however, the Water Use and RMA DCs, standards and guidelines should greatly reduce the potential for long-term adverse effects. The baseline condition results show that the majority of subbasins are "functioning at risk" or "functioning at an unacceptable risk." Vegetation management to create a vegetation composition and structure that is more characteristic of the natural fire regime and to promote late-forest structure appropriate to the biophysical environment is 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.

2.6.2.5 Response to Climate Change

The Washington Department of Fish and Wildlife (WDFW) analyzed the effects of climate change on bull trout in the Mid-Columbia Recovery Unit in Washington, and determined they were moderately to highly vulnerable (WDFW 2015, Appx C p.C-60). They determined bull trout would be exposed to increased water temperatures, altered runoff timing, increased winter/spring flood events, and lower summer flows. The WDFW (2015, Appx C p.C-60) noted the following:

> "Sensitivity of Bull Trout is primarily driven by water temperature. Bull Trout are the southernmost species of Western North American char and have lower thermal tolerance than other salmonids they co-occur with. The upper incipient lethal temperature for Bull Trout was found to be 70˚F, whereas the optimal temperatures for growth were in the range of 50-59˚F. Thus bull trout have similar thermal optima to the salmonids they co-occur with, yet a lower thermal tolerance, indicating they have a narrower thermal niche and higher sensitivity to temperature. Indeed the geographic distribution of bull trout and the persistence of populations during contemporary warming has been most strongly related to maximum water temperature. The ability of bull trout to persist in sub-optimally warm temperatures likely depends on food abundance. As temperature increases metabolic costs, the extent to which bull trout can maintain positive energy balance depends on its ability to find food. Bull trout historically relied heavily on salmon as a food resource and may be less resilient to temperatures in areas where foraging opportunities of salmon eggs and juveniles have declined. Invasive chars (Brook and Lake trout) now reside in many headwater streams and lakes, and may exclude bull trout from these potential coldwater refuges, increasing their sensitivity to warming. Bull trout sensitivity to flows is likely to occur during two critical periods: 1) direct effects of altered runoff timing and magnitude on emerging fry in late winter/spring, and 2) indirect effects of low summer flows on all life phases of bull trout by mediating the duration and magnitude of thermal stress events."

Desired conditions place emphasis on managing RMAs so they are resilient to climate change and other disturbances. The BMFP will respond to climate change through the following DCs, standards and guidelines.

> *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 Desired Condition:* 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.
>
> *DC-4 Watershed Function:* Aquatic and riparian ecosystems are resilient to the effects of climate change and other major disturbances. Scale: subbasin for Forest planning and watershed scale for project planning.
>
> *WM-1S:* When watershed function[35] desired conditions are being achieved and watersheds are functioning properly[36], projects shall maintain[37] 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 restore[38] or not retard attainment[39] of desired conditions. Short-term[40] adverse effects from project activities may occur when

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35 Per Revised Land Management Plan Watershed Function desired conditions (watershed function, hydrologic, riparian, wetland, stream channel, groundwater dependent ecosystem, and aquatic habitat).
36 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 1998b), 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).
37 See glossary for definitions of "maintain" and "degrade".
38 See glossary for definitions of "restore".
39 See glossary for definitions of "retard attainment".
40 See glossary for definition of "short-term adverse effects."

they support or do not diminish long-term[41] 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 A of Assessment) to assist in determining compliance with this 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.

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.

Land management objectives for forests with mixed-severity fire regimes are increasingly designed to restore successionally diverse landscapes that are resistant and resilient to current and future stressors, such as climate change (Hessberg *et al.* 2016). Providing for resilient RMAs, forest, and road conditions is key for providing productive bull trout habitat over time.

As described above, there is management direction in the BMFP to implement these climate change adaptations through the emphasis on dynamic-landscape restoration, and the restoration of conditions that would enhance connectivity of habitats. These components, in combination with the other Forest-wide BMFP components, show clear intent to provide habitat necessary for the recovery of bull trout. Included in the BMFPs' intent is to minimize habitat degradation that may make conditions more suitable for non-native competitors.

2.6.2.6 National Forest Access System (Roads and Trails)

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.

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41 See glossary for definition of "long-term recovery."

The effects of roads on hydrologic processes include the interception of rainfall directly on the road surface and 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 where the roads are 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).

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 populations. 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. Following Lee *et al.* (1997), the USFWS (64 FR 17110) considers watersheds with road densities <1 mile/square mile and no valley bottom roads as one measure of properly functioning watersheds for bull trout recovery. The USFWS considers road densities of 1-2.4 miles/square mile to be "functioning at risk", and road densities greater the 2.4 miles/square mile to be "not properly functioning".

Off-highway Vehicle (OHV) 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 OHV activities include soil compaction, reduced water infiltration capacity, increased erosion, and damage to vegetation. Extensive networks of OHV routes 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 access system can also be a vector for AIS. 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 entrain juvenile fish, such as bull trout resulting in direct mortality. During road construction, reconstruction and maintenance both pumps and vehicles need to be refueled near the work site in order to prevent the potential for a fuel spill.

The effects of roads and trails on watershed function can be reduced by considering the location, 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.

Minimizing the threat of roads in key watersheds is further emphasized with standards *KW-1S Watershed Funtions and RF-5S Road Management*. In key watersheds with ESA listed fish critical habitat that are "functioning properly" with respect to roads, there will be no net increase is system roads that affect hydrologic function. In key watersheds with ESA critical habitat for aquatic species that are "functioning-at-risk" or have impaired function with respect to roads, there will be a net decrease (for every mile of road construction there would be greater than one mile of road-related risk reduction) in system roads that affect hydrologic function to move toward proper function. Treatment priority shall be given to roads that pose the greatest relative ecological risks to riparian and aquatic ecosystems. As with other site-specific actions, road-related treatment at the project-level may require individual consultation. Road-related risk reduction will occur prior to new road construction unless logistical restrictions require post-construction risk reduction.

One DC and ten standards and guidelines are designed to minimize effects from roads: The *Key Watershed DC-2* reflects the Forest's intent that roads will not be a substantial risk to soil or hydrologic function, and do not disrupt riparian and aquatic function. *RF-9S* reflects the Forest's intent that road construction or reconstruction of stream crossings will provide passage for all riparian-dependent species.

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

The standards and guidelines designed to specifically reduce the potential for adverse effects due to the access system include:

> *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 flow shall be avoided when construction or reconstruction 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-12G: Road drainage should be routed away from potentially unstable channels, fills, and hillslopes to the extent practicable.
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.

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 in necessary within RMAs, these operations will be conducted no closer than 100 feet from waterways.

The watershed condition assessment for all three BMFs found that the attributes associated with roads were "functioning at risk" or "impaired" for road densities (with the exception of Upper John Day Basin, Upper and Lower Grande Ronde, Lower Snake Asotin, and Umatilla Basin). While it is not possible to eliminate all the adverse effects of roads and to a lesser extent trails, the ARCS and RMA standards and guidelines and objectives will help reduce the current effects of the access system. The RMA standards and guidelines reduce the potential for future adverse effects due to new road construction and reconstruction, as well as minimize the potential for fuel spills, introducing AIS into waterbodies, and entraining juvenile bull trout during construction, reconstruction and maintenance activities. Standards for constructing new and reconstructing existing road stream crossings will prevent creating future fish passage barriers. The Key Watershed and Watershed Function objectives for improving passage will help connect currently disconnected habitat.

2.6.2.7 Livestock Grazing Effects

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 stabilizes stream banks; 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, especially where grazing occurred in watersheds with high road densities. Grazing can result in direct mortality to bull trout if livestock trample redds (Gregory and Gamett 2009).

The ARCS and plan components include a comprehensive strategy for conserving aquatic resources, particularly because of the ARCS' restoration objectives and focus on priority watersheds. As restored watersheds accumulate over time through implementation of focused aquatic restoration as directed by the BMFP, larger blocks of high-quality, well-connected habitat will be created, increasing the number of refugia.

The *GM-1S* says that the BMFs will manage livestock grazing to attain aquatic and riparian DCs. And activity-specific standards and guidelines should set program-level sideboards to avoid or keep small any adverse effects to bull trout and bull trout critical habitat from the collective implementation of activites under the plan.

The total active livestock grazing allotments within the action area is approximately 3,295,000 acres, or approximately 68 percent of the BMFs. Current status of many habitat metrics on the BMFs are still highly departed from reference conditions. Grazing is also still being identified as a major factor in decline for listed bull trout in the recovery plan (USFWS 2015c, pg C-9; USFWS 2015e, pg E-18). Specifically, improper grazing has reduced stream habitat complexity and floodplain connectivity and function, and degraded riparian conditions in tributary habitat.

The BMFP does not include any changes to grazing allotments, or reduction in acres grazed, but does include new DCs and standards and guidelines for managing the grazing program. The Livestock Grazing program DC includes managing grazing for native plant communities with few to no invasive plant species, having stable or improving ecological conditions, and conditions are resilient to disturbance events. The BMFP includes DCs, standards and guidelines specifically developed to prevent or minimize the potential adverse effects grazing can have on riparian and aquatic habitat:

> *Grazing DC (App K of Assessment):* Allotments provide sustainable forage for grazing livestock, while moving toward ecological, social, and economic desired conditions. Scale: Forest-wide.
>
> *Federally Listed Species DC-1:* Federally listed species (aquatic and terrestrial) are recovered or delisted. Management activities improve the conservation status of listed species and designated critical habitat. Habitats are managed in accordance with conservation planning documents, recovery plans, best available scientific information, and local knowledge. Critical habitat components (i.e., Physical and Biological Features) are protected and restored to achieve species recovery.

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

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

- For listed plant species, threats such as invasions by aggressive, nonnative plants, adverse livestock grazing management, and changes in fire frequency and seasonality are addressed. Populations achieve recovery through cooperation and coordination with tribes, state agencies, federal agencies, and other interested groups. Scale: A variety of spatial scales and hydrologic boundaries (ranging from individual projects to subwatersheds to areas as large as populations). Species recovery plans identify activities necessary for recovery at the project (reach), subwatershed and population scales. Species' recovery plans further describe high-priority restoration actions at these scales that address identified limiting factors and threats to listed species and designated critical habitats.

RMA 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 forestwide planning; subwatershed scale for project planning.
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.

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

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

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.[42] 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

42 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).

vegetative setting in which they are being applied[43]. Indicators and indicator values should be adapted over time based on long-term monitoring and evaluation of conditions and trends. Alternative use and disturbance indicators and values, including those in current ESA consultation documents or non-ESA allotment management plans or allotment 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 attained[44] and riparian vegetation is in late-seral conditions[45], protect or maintain those conditions by managing annual livestock grazing use and disturbance as follows[46]: maintain a minimum of 4-inch residual stubble height[47] of key herbaceous species on the greenline; utilize no more than 30-45 percent of deep-rooted herbaceous vegetation in the active floodplain[48] and, as needed, in other critical portions of the riparian management area; limit streambank alteration[49] 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 conditions, 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

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43 Indicator values for specific sites should be determined based on consideration of local conditions including, but not limited to, the degree of departure between existing and desired conditions, the current and desired rate of improvement, site sensitivity to grazing, grazing season, the presence of special status species (e.g., ESA-listed species, Regional Forester's sensitive species) that are sensitive to grazing, whether or not water quality standards and related requirements (e.g., 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.

44 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.

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

46 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.

47 Stubble height criteria apply at the end of the grazing period, when that period ends after the growing season.

48 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.

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

herbaceous species on the greenline; follow the criteria for utilization of deep-rooted herbaceous vegetation, streambank alteration, and use of woody species described in (1).

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

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.

Additional Standards and Guidelines apply to grazing within RMAs:

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. Short-term adverse effects from project activities may occur when they support long-term recovery of riparian management area desired conditions.

Exceptions to this standard include situations where Forest Service authorities are limited (Alaska National Interest Lands Conservation Act {ANILCA}, the General Mining Act of1872, valid State water rights, etc.). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of desired conditions to the extent possible within Forest Service authorities. Use ARCS Attachment B (Appendix A of Assessment) (diagnostic indicators and RMA ecological process and function descriptions) to assist in determining compliance with this standard.

WM-1S: When watershed function desired conditions are being achieved and watersheds are functioning properly, projects shall maintain those conditions. When watershed function desired conditions are not yet achieved or watersheds have impaired function or are functioning-at-risk, and to the degree that project activities would contribute to those conditions, projects shall restore or not retard attainment of desired conditions. Short-term adverse effects from project activities may occur when they support or do not diminish long-term recovery of watershed function desired conditions and federally listed species. 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 A of Assessment) to assist in determining compliance with this standard.

Management direction for grazing provided in the BMFP are expected to promote habitat improvement. *GM-3G* provides indicators similar to the 1995 land management direction found in PACFISH/INFISH to maintain conditions in "functioning properly" subwatersheds and the ability to improve conditions in "functioning at risk subwatersheds". Appendix H of the Opinion presents an updated assemblage of the best available science for livestock grazing management in areas overlapping with distribution of listed bull trout. Appendix H states "When desired conditions have not been attained and conditions are not improving, a minimum 6" stubble height is specified. As noted in Table 47 of the Assessment, the number of subwatersheds that are FAR, or impaired indicators, for the MNF, UNF, and WWNF is 98, 79, and 95 percent, respectively. The potential effects of livestock grazing on bull trout habitat include soil erosion and sediment delivery to streams; soil compaction; alteration or removal of riparian vegetation that provides shade, cover, and terrestrial food source, and stabilizes stream banks; altered channel morphology including channel widening, increased bank instability and loss of undercut banks. The percent of MNF, UNF, and WWNF in active allotments is 91, 59, and 54 percent, respectively. Future adverse effects from grazing are likely to occur; however, the BMFP includes three standards and three guidelines specifically developed to prevent or minimize the potential adverse effects grazing can have on riparian and aquatic habitat.

2.6.2.8 Mining Effects

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 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 FS has limited authorities, per the General Mining Act of 1872. In these situations, adverse effects to aquatic resources may not be avoided, but projects will minimize adverse effects to the greatest extent possible through mitigation measures (see *MM-1G* below).

> *Mineral, Energy, and Geological Resources DC:* Exploration, development, and production of mineral and energy resources contribute to the social and economic needs as well as local communities, and are conducted to minimize adverse environmental effects on national forest surface resources. Reasonable access is provided to valid existing mineral claims, as well as for exploration and production of leasable and locatable mineral resources. Congressionally designated wilderness, wild rivers, municipal watersheds, or other areas of important natural or cultural resource value are withdrawn from mineral entry, subject to valid existing rights. Scale: Forest-wide.

The BMFP does not authorize any new mining operations on the three BMFs. The BMFP does, however, address new mining operations with specific standards and guidelines for mining and through the identification of suitable uses within RMAs in order to avoid or minimize the effects of mining operations on bull trout. There are also five specific standards and guidelines developed to further minimize the potential impacts of mining operations:

> *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 discretional 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, construct new structures, support facilities, and roads outside riparian management areas. If new structures, support facilities and roads cannot be constructed outside riparian management areas becasuse of site limitations, then construct and manage them to minimize adverse effects to aquatic and riparian dependent resources. Existing roads and facilities should be maintained to minimize damage to aquatic and riparian dependent resources, and should be removed/relocated if roads and facilities are causing unacceptable implacts in riparian management areas. When sturctures, support facilities, and roads are no longer required for mineral activites, 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 resources[51] ." 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.

Not all impacts of mining on bull trout and critical habitat can be avoided but the standards and guidelines, combined with Forest-wide Water Resource plan components will help minimize potential impacts. Bull trout and critical habitat will benefit by the BMFP components that address existing mining activities, and protective measures that will be applied to new mining activities. The BMFPs provide additional protection to bull trout habitat in that saleable mineral development and surface occupancy for leasable mineral operations may not be authorized as identified in the suitable uses for RMAs (see MM-5S and MM-4G).

2.6.2.9 Recreation Effects

Recreation is a large program on all three BMFs with the potential to affect bull trout and bull trout critical habitat. The DCs 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,

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51 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.

backcountry skiing, boating, mushroom and berry picking, hunting, and fishing) venues. The FS has provided a DC for Recreation, Developed Recreation, Dispersed Recreation, and Backcountry Recreation, and these can be found in Appendix K of the Assessment.

The potential effects to bull trout and habitat due to recreation include effects from the access system maintained to support the recreation activities (discussed previously) and the human disturbance to the environment and/or individual bull trout at dispersed and developed sites. The potential effects of developed and dispersed camping are similar; the major difference being developed sites have been dedicated to recreation. The concentrated human use of developed and dispersed sites can lead to soil compaction and trampled vegetation, and exposing soils to erosion accelerating sediment delivery to streams. Riparian and streamside vegetation may be damaged or destroyed by removing shade, resulting in increased 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 contributing excess sediment to the stream system and 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 bull trout. Litter fall from streamside vegetation is an important food source for aquatic macroinvertebrates that provide food for juvenile bull trout 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 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 AIS into previously uninfected waters. In general the effects of recreation activities, other than the transportation to access a recreation site, are confined to the site; however, larger scale effects may result from additive impacts of multiple recreation sites. As in all activities, project-level consultation will be required for site-specific recreation actions.

To minimize recreation effects:

> *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 conditoion should be restored to improve riparian area function.

One RMA standard specific to recreation activities, other than those previously mentioned for the Access System (roads and trails) and Livestock grazing programs, that will help minimize the potential adverse effects of recreation to bull trout habitat is:

> *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.

Key watershed objectives include restoring riparian vegetation on 690 acres; and increasing effective stream shade on 1,050 acres (Table 2). Some of these sites will be associated with recreation. The recreation-specific guidelines combined with the overarching standards and guidelines for RMAs provide management direction to implement actions necessary to minimize the potential effects of the Recreation Program on riparian processes and bull trout.

2.6.2.10 Lands and Special Uses Effects

The Forest "Lands" program includes real estate type activities (including land exchanges and acquisitions, granting or accepting of easements). The Lands program can be beneficial to bull trout and its critical habitat 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 habitat including aspects of connectivity, foraging and reproduction for threatened and endangered and species of conservation concern. The Lands program activities will continue as they do in the current Forest Plan, with a more specific focus on taking actions benefical to listed species and their critical habitat.

Special uses include permitting activities other than those uses included in the regulations governing the disposal of timber, minerals, and the grazing of livestock. The Forest administers a variety of uses under special use permits, leases, or easements. 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 know what uses may be requested in the future. Examples of special use permits that may affect bull trout would be road use permits, right-of-ways or easements, water transmission lines, diversion dams, or water withdrawals for irrigation. Current special use permits may need to be modified in order to meet the new direction provided by the BMFP.

The potential effects of special uses within RMAs will be minimized as all special uses will not only need to meet the RMA standards and guidelines but will also be constrained by:

> *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, hydroeclectric, 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 conditons for fish, water, and other riparian dependent species

and resources. These processes include instream flow regimes, physical and biological connectivity, water quality, and integrity and complexity of riparian and aquatic habitat.

Hydropower special uses are further constrained by *LH-2S* that requires new support facilities to be located outside of RMAs.

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.

Additional hydroelectric constraints are included in the following:

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.

In addition to the standard regarding roads in key watersheds, the Forest-wide and RMA standards and guidelines, there is one additional guideline specific to key watersheds:

LH-3G: If existing support facilities are lcated 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.

2.6.2.11 Monitoring

In addition to the BMFP components described above, there are aquatic habitat monitoring questions that will be addressed. The monitoring questions specify the information that is essential for measuring BMFP accomplishments and effectiveness. The associated evaluation process determines whether the observed changes are consistent with the DCs and what adjustments may be needed, if any. The monitoring plan includes monitoring conducted in compliance with other laws, policies, and site-specific decisions.

The information gained through monitoring and evaluation may be the catalyst for plan revisions or amendments. The BMFP annual and five year monitoring reports will be shared with the USFWS, as will the BMFs' biennial evaluation summary.

2.6.2.12 Hells Canyon National Recreation Area Effects

The revised Wallowa-Whitman Forest Plan incorporates the 2003 HCNRA CMP, pertinent 1990 Wallowa-Whitman National Forest Plan guidance, and Plan amendments (e.g., PACFISH, INFISH, and Eastside Screens), within its 652,488 acre boundary. The CMP identifies 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 bull trout and its critical habitat from BMF management 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/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 and 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 will be managed to meet the intent of the HCNRA by enhancing recreational and ecological values.

Within the above MAs, active forest 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 will also be implemented. No new roads will 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.

The limited HCNRA management activities have some limited potential to adversely affect bull trout and their critical habitat PBFs, including impacts to water quality, water temperature, instream and riparian habitat, and food sources. Specifically, limited vegetation management activities can accelerate local erosion and increase local runoff by changing upslope hydrology and road-related disturbance, which can have limited, local impacts to water quality. Developed and dispersed camping can frequently result in local 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 critical habitat within tributaries due to habitat impacts and disturbance to rearing, spawning, and pre-spawning fish.

Existing HCNRA management direction (eg, PACFISH and INFISH) for riparian and aquatic resources has been established to maintain or improve watershed and aquatic conditions on HCNRA lands. PACFISH/INFISH standards and guidelines and 1990 Wallowa-Whitman Forest Plan guidance included in the CMP will avoid or minimize potential adverse effects to bull trout and critical habitat PBFs from management activities. Examples of this guidance include:

> *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.
>
> *Rip/Aqu-S1*: RHCAs will 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.
>
> *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 RHCAs which seriously and adversely affect water quality and riparian aquatic habitat.
>
> *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.
>
> *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 of the Assessment.

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 Columbia River bull trout. Critical habitat improvements will 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 bull trout and 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 bull trout and DCH.

2.6.3 Summary of Effects to Bull Trout

Forest management programs, especially vegetation management, the road/trail access system, livestock grazing, minerals, and lands and special uses, all can adversely affect bull trout. The Water Resource and RMA DCs, standards and guidelines are expected to limit adverse effects of management activities to short-term effects that do not degrade watershed and riparian desired conditions or slow progress towards achieving the DCs. The BMFP includes an integrated watershed and aquatic resource monitoring program designed to assess if management actions during BMFP implementation are meeting or moving towards the DCs. The BMFP includes specific objectives for improving watershed and aquatic habitat conditions, and population and habitat connectivity, particularly within the priority watersheds, which will lead to improved population and habitat connectivity within and between the key watershed. To date, the majority of aquatic habitat baseline conditions for 16 of the 22 subbasins within the action area are “Functioning at Risk” or “Funtioning at Unexceptable Risk” (Table 26 of Assessment). Only nine of the 112 pathway ratings were “Functioning Appropriately”. Of the 16 subbasins, only five contain bull trout strongholds (Appendix J of Assessment). In addition, to date repeat PIBO (PACFISH/INFISH Biological Opinion) monitoring indicates there has been recovery of riparian areas and wetlands, 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 DCs. Large differences remain in several variables between managed and referenced sites. Effects from implementation of the BMFP are summarized as follows:

- Future actions (including BMFP objectives for bull trout) implemented under the BMFP are likely to increase documentation of bull trout within those subbasins with a baseline condition that is functioning at risk (FR) and functioning at unacceptable risk (FUR). And, since the duration of the BMFP is 15 years, bull trout distribution may expand over time, changing the likelihood of bull trout exposure across the forest. Therefore, future effects could occur over a broader area as bull trout respond positively via range expansion to implementation of the BMFPs. WCF and potential WCF Priority Watersheds are expected to improve during the life of the BMFP as restoration objectives and actions are completed.

- The goal of the ARCS is to minimize long-term impacts to aquatic resources from management actions by the BMFP. The MAs and ARCS include several forest-wide aquatic and/or watershed DCs, standards, and guidelines that will conserve bull trout habitat and minimize adverse effects to the bull trout. The RMAs will allow for careful management to achieve riparian, aquatic and landscape scale DCs while protecting the important ecological processes in fish bearing streams, intermittent streams, and other aquatic systems. The RMA widths are expected to be protective of aquatic ecological functions. The protections are expected to provide benefits to bull trout not just through improved habitat, but also to forage species.

- The Key Watersheds include most subwatersheds with bull trout critical habitat within the three BMFs. While key watersheds will benefit from application of the ARCS and other protective guidance in the BMFPs, priority watersheds are used to target implementation of short-term, strategically designed restoration work that should benefit bull trout in the long-term within those subwatersheds. These actions should benefit all native species on the BMNF, as well as bull trout, through improved conditions for habitat and forage species.

- Vegetation management including timber harvest or prescribed fire can reduce large wood input to stream channels, remove shade resulting in increased summer stream temperatures, result in accelerated erosion and sediment delivery to stream channels. The DCs, standards and guidelines in the BMFPs, if implemented properly, will ensure these adverse impacts will not occur to bull trout, as significant restrictions will be placed on activities that might result in reducing woody imput to streams or removing streamside shade, or increasing sediment delivery to occupied bull trout streams. While adverse effects may continue to occur, implementation of the ARCS components should result in terrestrial and aquatic ecosystems that are more resilient to disturbance from vegetation management or prescribed fire.

- Vegetation management to create a vegetation composition and structure that is more characteristic of the natural fire regime and to promote late forest structure appropriate to the biophysical environment is a component of managing for natural watershed function and should result in terrestrial and aquatic ecosystems that are more resilient to disturbance from fires or insects and disease.

- There is management direction in the BMFP to respond to climate change, including an emphasis on dynamic-landscape restoration, and the restoration of conditions that would enhance connectivity of habitats. These components in combination with the other Forest-wide BMFP components should minimize the effects of climate change on bull trout.

- While it is not possible to eliminate all the adverse effects of the Access System, including roads and to a lesser extent trails, the Roads and Trails, Water Resource, and RMA standards and guidelines and DCs will help reduce the current effects of the access system. The RMA standards and guidelines reduce the potential for future adverse effects due to new road construction and reconstruction, as well as minimize the potential for fuel spills, introducing AIS, into waterbodies, and entraining juvenile bull trout during construction, reconstruction and maintenance activities. Standards for constructing new and reconstructing existing road stream crossings will prevent creating future fish passage barriers. The Key Watershed and Water Resource objectives for improving passage will help connect currently disconnected habitat.

- The potential effects of livestock grazing on bull trout habitat include soil erosion and sediment delivery to streams; soil compaction; alteration or removal of riparian vegetation that provides shade; instream and overhead cover; terrestrial food sources; and altered channel morphology including channel widening, increased bank instability and loss of undercut banks. Future adverse effects from grazing may still occur, however the BMFP includes extensive standards and guidelines and DCs that, if implemented properly, should prevent or minimize the potential adverse effects grazing can have on riparian and aquatic habitat.

- Mining activities may alter the way water and sediment are transported through a river system, impair water quality, effect the macroinvertebrate community, and damage streamside vegetation that shades streams and stabilizes streambanks. Not all impacts of mining can be avoided but the BMFP's standards and guidelines for mining will help minimize potential impacts. The BMFP provides additional protection to bull trout habitat in that saleable mineral development and surface occupancy for leasable mineral operations may not be authorized as identified in the suitable uses for riparian management areas.

- The potential effects of recreation, including developed and dispersed camping, include soil compaction and trampled vegetation causing sediment delivery to streams, removal of shade, decreasing large woody debris as hazard trees are felled in developed sites and by unauthorized firewood cutting in dispersed sites, loss of streamside vegetation causing accelerated bank erosion and resulting in channel widening. The recreation-specific DCs, standards and guidelines, combined with the overarching standards and guidelines for RMAs, provide management direction to implement actions necessary to minimize the potential effects of the Recreation Program on riparian and aquatic processes and bull trout.

- The potential effects of special uses within RMAs will be minimized as all special uses will not only need to meet the RMA standards and guides but will also be constrained by LH-2S and *LH-3S.* These standards state, new support facilities shall be located outside of riparian management areas, and if support facilities are located within the riparian management areas, they should be operated and maintained to restore or enhance aquatic and riparian dependent resources.

- The BMFP is consistent with the bull trout recovery plan as standards and guidelines should limit the potential for exacerbating the threats to bull trout recovery due to forest management practices, national forest system roads, and fish passage issues within the action area. Appendix B provides a matrix comparing the BMFP to the Bull Trout Recovery Plan expectations which should facilitate the direction of project level management activities towards protection and recovery of bull trout.

- HCNRA CMP's implementation of the PACFISH/INFISH standards and guidelines (*RM-1*, *RM-2*, and *RM-3*) should minimize impacts to bull trout habitat, riparian vegetation, water quality, and food sources for bull trout.

The BMFP in general, and particularly the Water Resource, RMA, and key watershed plan components, are intended to restore ecological resiliency and protect watershed and stream channel processes. Restoring resiliency, protecting ecological processes and improving habitat and population connectivity are likely the best strategy for helping bull trout survive in changing climate conditions. Additionally, HCNRA bull trout habitats will continue to be maintained and improved under the HCNRA CMP.

Because we do not know the project-specific details of future activities that will be conducted under the direction of the BMFP, we cannot predict or quantify the specific adverse effects from these future projects. However, based on the BMFP's protective suite of standards and guidelines, and on the ARCS's focus on stream and riparian habitat restoration in priority watersheds, we expect the BMFP should maintain or improve the viability of the populations of listed species on the BMFs.

2.7 Effects to Bull Trout Critical Habitat

The effects to bull trout critical habitat PBFs are discussed by major topics below. Much of the discussion summarizes what was already addressed under bull trout because the PBFs so closely mirror the habitat and life history needs of bull trout.

2.7.1 ARCS and MAs

BMF-wide and RMA plan components are expected to provide high quality water and protect the riparian and watershed ecological processes that can contribute to providing downstream habitat conditions for bull trout.

Plan objectives that have been identified for key watersheds with bull trout critical habitat include: 1) In cooperation with state wildlife agencies, expand bull trout occurrence within ten years into unoccupied suitable stream segments (one for each forest) within its natural range; and 2) 260-400 stream miles of restoring habitat quality and connectivity within and between stronghold watersheds for aquatic species, with emphasis on strongholds for ESA-listed aquatic species (Table 2 of ARCS). Objectives are expected to be accomplished during the first decade of the BMFP and are based on annual budgets.

The bull trout effects discussion (above) described the effects of the ARCS and MAs; the effects will be similar for critical habitat. The potential threats to bull trout critical habitat will be avoided or greatly reduced by the BMF-wide ARCS Water Resource and RMA plan components (DCs, standards and guidelines) that have been previously discussed for bull trout. The proposed action section of this Opinion describes the ARCS RMA size for fish-bearing streams; permanently flowing non-fish-bearing streams; constructed ponds and reservoirs, and wetlands greater than one acre; lakes and natural ponds; and discusses the approach for intermittent streams. Appendix B compares existing aquatic management under INFISH, to that expected under the BMFP. The ARCS Water Resources and RMA standards and guidelines for specific management activities further help either avoid or minimize the potential effects to bull trout critical habitat due to the specific activity. The BMFP's ARCS management direction supports all nine critical habitat PBFs, and ensures maintenance or improvement of the aquatic functions needed by bull trout.

2.7.2 Vegetation Management, Restoration, Fire, Climate Change
Effects to critical habitat from vegetation management are similar to those described above for bull trout. Vegetation management activities can cause adverse effects to critical habitat PBFs, however the Water Resource and RMA DCs, standards and guidelines will greatly reduce the potential for long-term adverse effects. Short-term adverse effects may occur as long as they support or do not diminish achievement or maintenance of watershed function DCs and the recovery purpose of bull trout DCH. Vegetation management to create a vegetation composition and structure that is more characteristic of the natural fire regime and to promote late forest structure appropriate to the biophysical environment is 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, thereby minimizing adverse effects on critical habitat PBFs.

DC-4 Watershed Function, expects management of aquatic and riparian ecosystems to be resilient to climate change. Land management objectives for forests with mixed-severity fire regimes are to restore successionally diverse landscapes that are resistant and resilient to current and future stressors, such as climate change (Hessberg *et al.* 2016). Providing for resilient RMA, Forest, and Road conditions is key for providing productive critical habitat over time. As described previously for bull trout, there is management direction in the BMFP to implement these climate change adaptations through the emphasis on dynamic-landscape restoration, and the restoration of conditions that would enhance connectivity of habitats. These components in combination with the other BMF-wide BMFP components, show clear intent to provide critical habitat PBFs necessary for the recovery of bull trout, including avoiding degradation of habitats.

2.7.3 National Forest Access System Effects
Minimizing the adverse effects of roads to DCH in key watersheds is emphasized with Key Watershed Standard *KW-1S*. In key watersheds with bull trout critical habitat that are "functioning properly" with respect to roads, there will be no net increase in system roads that affect hydrologic function. In key watersheds with bull trout critical habitat that is "functioning-at-risk" or has impaired function with respect to roads, there will be a net decrease (for every mile of road construction there would be greater than one mile of road-related risk reduction) in system roads that affect hydrologic function to move toward proper function. 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.

Roads and other access routes can have direct or indirect effects on all critical habitat PBFs. While it is not possible to eliminate all the adverse effects of roads and to a lesser extent trails as long as the access system is in place, the Water Resource and RMA standards and guidelines, as well as the key watershed and Water Resource objectives to improve roads that are hydrologically connected to streams will help reduce the current effects of the access system. The RMA standards and guidelines reduce the potential for future adverse effects due to new road construction and reconstruction, as well as minimize the potential for fuel spills, introducing AIS into waterbodies, and entraining juvenile bull trout during construction, reconstruction and maintenance activities. Standards for constructing new and reconstructing existing road stream crossings will prevent creating future fish passage barriers. The key watershed and Water Resource objectives for improving passage will help connect currently disconnected habitat.

2.7.4 Livestock Grazing Effects
The main critical habitat PBFs affected by livestock grazing are PBF 4 (complex aquatic environments), PBF 5 (temperature), PBF 6 (spawning substrates) and and PBF 8 (sufficient water quality and quantity). The BMFP components that have been developed to reduce the potential impacts of grazing to bull trout and bull trout habitat can be found in Appendix H. Appendix H identifies end-of-use indicators (based on best available science) that should

maintain conditions in "functioning properly" subwatersheds and improve conditions in "functioning at risk" subwatersheds.

2.7.5 Mining Effects
The main critical habitat PBFs affected by mining include PBF 4 (complex aquatic environments), PBF 6 (spawning substrates) and PBF 8 (sufficient waters quality and quantity). The mining standards are as stringent, if not more so, than the INFISH standards and guidelines, and when combined with BMF-wide Water resource plan components are an improvement over current direction. Not all impacts of mining can be avoided but the standards will help minimize potential impacts. *MM5-S* directly applies to suction dredging. The BMFP provides additional protection to bull trout habitat in that saleable mineral development and surface occupancy for leasable mineral operations may not be authorized if in conflict with achieving desired conditions for riparian management areas, or if determined such uses would be non-compliant with RMA-1S

2.7.6 Recreation Effects
Recreation can have direct and indirect impacts on most or all of the critical habitat PBFs. Recreation is likely to increase on forest service lands due to increasing demands from the public; many of those activities are focused near water and can result in disturbance of bull trout, channel morphology changes, sediment impacts, and other effects to bull trout and bull trout critical habitat. The recreation-specific guidelines combined with the overarching standards and guidelines for RMAs provide management direction to implement actions necessary to minimize the potential effects of the Recreation Program on riparian processes and bull trout. The objectives addressing recreation impacts provide specific direction to improve

riparian and aquatic habitat where recreation impacts have occurred and prevent AIS invasion that is not included in PACFISH/INFISH.

2.7.7 Lands and Special Uses Effects

Depending on the site specific details, Lands and Special Uses could have indirect effects on all critical habitat PBFs. The potential effects of special uses within RMAs will be minimized as all special uses will not only need to meet the RMA standards and guidelines but will also be constrained by *LH-2S* and *LH-3S Uses and Hydropower*. These standards state, new support facilities shall be located outside of riparian management areas, and if support facilities are located within the riparian management areas, they should be operated and maintained to restore or enhance aquatic and riparian dependent resources.

Additional Hydroelectric constraints are included in the standards for key watersheds. In addition to the standard regarding roads in key watersheds, the BMF-wide and RMA standards and guidelines there are two additional standards specific to key watersheds, *KW-2S Hydroelectric and Other Water Development Authorizations in Key Watersheds* and *KW-3S New Hydroelectric Facilities and Water Developments*, that provide extra protection to key watersheds from potential adverse effects of hydropower and other water developments.

2.7.8 Hells Canyon National Recreation Area Comprehensive Management Plan Effects

The BMFP carries forward the 2003 CMP for the HCNRA without modification. Future activities carried out under the CMP should have small impacts to water quality, water temperature, instream and riparian habitat, and food sources for bull trout. 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 flock fish habitat;
- Developed and dispersed camping can frequently result in streambank distrubances, soil compaction, and vegetation removal; and
- Grazing can lead to an increase in sedimentation through increased surface erosion, a decrease in effective vegetative ground cover and root binding strength, streambank instability, stream channel incision, and loss of primary shade in small streams.

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

PACFISH/INFISH standards and guidelines will continue to apply to timber harvest, grazing, mining, road management, recreation, and other activities in the HCNRA. PACFISH activity-specific standards and guidelines were designed to avoid or minimize potential adverse effects to listed bull trout and their critical habitat from management activities. PACFISH guideline GM-1 directs the Forests to modify grazing practices that retard or prevent attainment of riparian management objectives. The Service has previously concluded that PACFISH/INFISH direction of Federal land management is not likely to jeopardize the continued existence of listed bull trout or destroy or adversely modify their critical habitat (USFWS 1998). PIBO monitoring demonstrates that the standards and guidelines function to keep the adverse effects, to acceptable levels and to provide some benefits to bull trout and critical habitat (Appendices C through E of the Assessment). In addition, given the character and location of the HCNRA, only a limited type and number of activities are expected, i.e., recreational activities and small amounts of grazing. Because future activities conducted in the HCNRA will, per the CMP, continue to be developed to meet the direction of PACFISH/INFISH, and the activities are expected to be limited in type and amount, the BMFP as it applies to the HCNRA is likely to avoid or keep small the the aggregate adverse effects and provide some benefits to listed species or their ctitical habitat from the continuation of the CMP.

2.8 Cumulative Effects – Bull Trout and Critical Habitat

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Recreation is likely to increase on all land ownerships due to increasing demands from the public, many of those activities are focused near water and can result in disturbance of bull trout, channel morphology changes, sediment impacts, and other effects to bull trout and its critical habitat.

There are several entities in and near the action area that are working on improvement of aquatic habitat and water quality to benefit native salmonids, including bull trout and its critical habitat. Some of the major activities that are ongoing or have been recently completed are:

Tributary Habitat Restoration, Enhancement, and Passage:

- Floodplain restoration has occurred on 4.5 miles of Meacham Creek with 4 additional miles planned through 2019. Two additional miles planned in 2017-2018 for floodplain restoration.
- Bonneville Power Administration (BPA) and Confederated Tribes of the Umatilla Indian Reservation (CTUIR) stream restoration on Middle Fork John Day River.

Bull Trout Research and Monitoring:

- Bull trout working groups have been established in the Umatilla, Walla Walla, John Day, and Malheur river basins for the purpose of developing bull trout conservation strategies.
- ODFW reduced the stocking of hatchery reared rainbow trout and brook trout in areas where bull trout occur.
- ODFW completed genetic analysis for most bull trout poulations in 1997.

Umatilla River Water Quality:

- In 2004-2013, maximum stream temperature exceeded the US EPA criterion for bull trout rearing habitat at and downstream from a temperature recorder at river kilometer 3.2 on the North Fork Umatilla River (Bull Trout Working Group)
- The critierion for bull trout migratory habitat was exceeded at and downstream from a temperature recorder at river kilometer 144 on the Umatilla River (Bull Trout Working Group).

The ODFW manages fisheries in the action area and regulates private and public hatchery releases. The ODFW modifies and publishes recreational fishing regulations on an annual basis. Currently, recreational anglers may not target bull trout, but may incidentally catch and release bull trout. Changes in the regulations such as seasons, closed areas, and harvestable sizes and numbers of other trout species could also change the likelihood of the incidental catch of bull trout by altering angler effort.

2.9 Summary of Effects to Critical Habitat

Most actions that will be implemented under the direction of the BMFP, including the HCNRA CMP, have the potential to affect the PBFs of critical habitat indirectly. Future land management activities that disturb the soil surface and alter vegetation have the greatest potential for and risk of adverse effects. The management programs that have the greatest potential to affect bull trout critical habitat are Vegetation Management, the National Forest Access System, Livestock Grazing, Mining, Recreation, and Lands and Special Uses. The BMFP designates MAs where, depending upon the intent and BMFP components for the MA, management activities will be implemented to achieve DCs of the MA within the constraints provided by the BMFP components for the individual programs. Additionally, proper interpretation and implementation of the ARCS during design and implementation of future activities should minimize the effects where future actions occur, and improve on aquatic and riparian habitat restoration over the baseline condition in all other areas. Additionally, implementation of passive and active restoration in key and priority watersheds will have significant beneficial effects to individual PBFs of DCH. Therefore, implementation of the BMFP will ensure that critical habitat PBFs are maintained and improved at the local and forest-wide scales.

With the proper interpretation and implementation of the BMFP direction (e.g. ARCS, HCNRA CMP), riparian areas should improve, with a beneficial impact on bull trout populations. Proper implementation of BMFP guidance should help to reduce management effects that have contributed to limiting factors (eg., excessive sediment, elevated summer water temperatures, and degraded riparian conditions) in tributary habitat identified in the bull trout recovery plan.

Key components of the BMFP and ARCS are expected to enhance PBFs and the value of bull trout critical habitat across many miles of the action area, including HCNRA. These components include focusing the BMFs habitat restoration efforts in priority watersheds and providing objectives for the amount of habitat restoration (subject to the qualifiers outlined above). The proposed action, therefore will not reduce and may improve the conservation value for bull trout critical habitat at the designation scale for any of the two recovery units.

2.10 Conclusion – Bull Trout and Critical Habitat

The Service concludes that the implementation of the BMFP, including the implementation of the HCNRA CMP, will not jeopardize the continued existence of bull trout. Impacts to reproduction, numbers, and distribution are not expected to appreciably reduce the likelihood of survival and recovery of the bull trout in the action area, recovery units, and rangewide for the following reasons:

- Under the ARCS and other plan direction in the BMFP, riparian and aquatic ecosystems managed by BMFP are expected to improve, particularly in areas where they are currently degraded.

- Although there will be adverse effects from actions under the BMFP in the future, the management direction in the BMFP is expected to result in conserving and expanding bull trout habitat, including critical habitat, in the long term. Water Resource and RMA DCs, standards and guidelines are expected to limit short-term adverse effects and not degrade watershed and riparian desired conditions or slow progress towards achieving the DCs.
- One BMFP objective for bull trout is to expand bull trout occurrence within ten years into unoccupied suitable stream segments within its natural range (Table 2).
- The BMFP is consistent with the bull trout recovery plan as standards and guidelines should reduce the potential for threats to bull trout recovery due to forest management practices, forest roads and fish passage issues on the BMFs. Overall, the Service expects FS management to provide for improved habitat conditions and PBFs. The key watershed objectives are also consistent with and will complement recovery actions identified in the recovery plan and restoration plans of other entities.
- Appendix B compares the expectations of the bull trout recovery plan, and the Recovery Unit Implementation Plan with components of the BMFP and ARCS. The result is a comprehensive strategy for conserving aquatic resources, particularly because of the ARCS' restoration objectives and focus on priority watersheds.

Based on the analysis of effects from implementation of the programs described within the BMFP to bull trout critical habitat, the Service believes that implementation of the BMFP, including the implementation of the HCNRA CMP, will not result in the destruction or adverse modification of bull trout critical habitat. Overall, implementation of future actions may have adverse effects to bull trout critical habitat, depending on the site-specific effects, but are expected to result in beneficial effects to critical habitat in the long term. The Service concludes that the implementation of the BMFP will not result in adverse modification of bull trout critical habitat because:

- Most of the bull trout critical habitat on the BMFP is included within the key watershed network. Key watersheds are a network of watersheds that serve as strongholds for important aquatic resources and are crucial to threatened and endangered aquatic species and provide high quality water important for maintenance of downstream populations. Management in key watersheds emphasizes minimizing risk and maximizing passive and active restoration or preservation of watershed function and aquatic and riparian habitat.
- Although there will be adverse effects to critical habitat PBFs from actions under the BMFP in the future, most of the adverse effects are anticipated to be short-term and the management direction in the BMFP will result in conserving and expanding DCH PBFs in the long term (see *GM-1S, GM-3G, RMA-1S, RMA-2G, RF-7S, RF-9S, RF-1G, FM-8G, MM-5S, TM-1S, RE-4S, RE-5S, RE-1G, RE-2G, KW-1S, WM-2S, WM-1S*) .
- Under the ARCS and BMFP, riparian and aquatic ecosystems managed by the BMFs are expected to improve, including PBFs of DCH (see *GM-1S, GM-3G, RMA-1S, RMA-2G, RF-7S, RF-9S, RF-1G,FM-8G,MM-5S, TM-1S, RE-4S, RE-5S, RE-1G, RE-2G, KW-1S, WM-2S, WM-1S).*

- Management direction from the HCNRA CMP will continue to minimize adverse effects to listed species and their critical habitat from activities conducted in the HCNRA.
- Future activities conducted in the HCNRA CMP will continue to be developed to meet the direction of PACFISH

SPALDING'S CATCHFLY CHAPTER

2.11 Status of the Species – Spalding's Catchfly

2.11.1 Listing Status

Spalding's catchfly (*Silene spaldingii*) was listed as a threatened species on October 10, 2001 (66 FR 51598, USFWS 2001) under the authority of the Act. Designation of critical habitat was determined to be prudent; however, it will not be designated until available resources and priorities allow (66 FR 51598, USFWS 2001). The recovery plan was finalized on September 6, 2007 (USFWS 2007).

Spalding's catchfly (*Silene spaldingii*) is an herbaceous perennial plant. It is a regional endemic found predominantly in bunchgrass grasslands and sagebrush-steppe, and occasionally in open pine communities, in eastern Washington, northeastern Oregon, west-central Idaho, western Montana, and barely extending into British Columbia, Canada. This species is affected by a variety of factors including competition with invasive nonnative plants; habitat destruction and fragmentation resulting from agricultural and urban development; habitat degradation; adverse grazing and trampling by domestic livestock and native herbivores; herbicide treatments; annual climatic conditions (i.e., drought cycles); climate change; alterations in fire frequency, intensity, and seasonality; off-highway vehicles; and a loss of genetic variation associated with small, fragmented populations (USFWS 2007).

2.11.2 Description and Taxonomy

Spalding's catchfly is a member of the pink or carnation family, the Caryophyllaceae. It was first collected by Henry Spalding around 1846 near the Clearwater River in Idaho and later described by Sereno Watson in 1875, based on the Spalding material (USFWS 2007). The species has no other scientific synonyms nor has its taxonomy been questioned. Common names for Spalding's catchfly include Spalding's catchfly, Spalding's silene, and Spalding's campion. Spalding's catchfly overlaps in range and is somewhat similar in appearance with *S. scouleri*, *S. douglasii*, *S. cserei*, *S. oregana*, and *S. scaposa var. scaposa* (USFWS 2007). One closely related species, bladder campion (*S. latifolia ssp. alba*), is an invasive nonnative plant. It may be separated from Spalding's catchfly by bladder campion's much larger, inflated looking flowers.

Spalding's catchfly is an herbaceous perennial, a plant that withers to the ground every fall and emerges again in spring. Plants range from 20 to 61 centimeters (8 to 24 inches) in height, occasionally up to 76 centimeters (30 inches). There is generally one light-green stem per plant, but sometimes there may be multiple stems. Each stem bears four to seven pairs of leaves that are 5 to 8 centimeters (2 to 3 inches) in length, and has swollen nodes where the leaves are attached to the stem. All green portions of the plant (leaves, stems, calyx [defined below]) are covered in dense sticky hairs that frequently trap dust and insects, hence the common name "catchfly." The plant has a persistent root crown atop a long taproot (1 meter [3 feet]) in length.

Typically, Spalding's catchfly blooms from mid-July through August, but it can bloom into September.

Three to 20 (up to 60) flowers are horizontally positioned near the top of the plant in a branched arrangement (inflorescence). Flowers are approximately 1 centimeter (0.5 inch) long; however, the majority of the flower petal is enclosed within a leaf like tube, the calyx, that resembles green material elsewhere on the plant and has 10 veins running from the flower mouth to the base of the flower. The visible portion of the five flower petals is small (2 millimeters [0.08 inch]), cream-colored, and extends only slightly beyond the calyx. Below the visible flower petals (blades) are four to six very small (0.5 millimeter [0.02 inch]) appendages, the same color as the blades. Seeds are small (2 millimeters [0.08 inch]), wrinkled, flattened, winged, and light brown when mature (USFWS 2007).

2.11.3 Environment and Habitat

This species occurs on the Umatilla and Wallowa-Whitman National Forests within the action area. Spalding's catchfly occurs at elevations between 365 to 1,615 meters (1,200 to 5,300 feet) (summarized in USFWS 2007). In general, summers are hot and dry, while winters are cool to cold and moist across the range of Spalding's catchfly. A drought period occurs in mid and late summer when precipitation is minimal and temperatures are high (USFWS 2007). Consequently, most of the vegetation does not grow in summer, but can remain active during the winter months when moisture is more readily available. The majority of growth, however, occurs in spring (USFWS 2007). Spalding's catchfly is different in that it grows during the summer drought when the majority of the surrounding vegetation is dormant.

Spalding's catchfly is generally found in deep loamy soils (fertile soils comprised of organic material, clay, sand, and silt) and in more mesic, moist sites such as northern slopes, swales, or other small landscape features (USFWS 2007). Soils in the tri-state (Idaho, Oregon and Washington) area are loess (wind-dispersed) and ash (from volcanic eruptions) influenced while soils in Montana are more glacially influenced (USFWS 2007). Spalding's catchfly is found on a wide range of slopes, from flat areas to slopes as great as 70 percent. Most occurrences are found on grades ranging from 20 to 40 percent slope, although this may be an artifact of where intact habitat has not been converted to other uses (USFWS 2007).

Spalding's catchfly is found primarily within the plant association known as the Pacific Northwest Bunchgrass Grasslands, extending from Washington and Oregon into parts of Montana and into adjacent British Columbia and Alberta, Canada (USFWS 2007). Pacific Northwest bunchgrasses are characterized by one or both of two main bunchgrass species, *Agropyron spicatum* (bluebunch wheatgrass) and *Fesctuca idahoensis* (Idaho fescue), with *Festuca idahoensis* sometimes co- or subdominant with *Festuca scabrella* (rough fescue) in Montana (USFWS 2007).

Primary grassland habitat types within the Pacific Northwest bunchgrass grasslands include: 1) *Festuca idahoensis – Symphoricarpos albus* (snowberry); 2) *Festuca idahoensis – Rosa* spp. (rose); 3) *Festuca idahoensis – Koeleria cristata* (prairie junegrass); 4) *Agropyron spicatum – Festuca idahoensis* or *Festuca idahoensis – Agropyron spicatum*; and 5) *Festuca scabrella*

(USFWS 2007). Primary shrub habitats include: 1) *Artemesia tridentata* (big sagebrush) – *Festuca idahoensis*; and 2) *Artemesia tripartite* (three-tip sagebrush) – *Festuca idahoensis*. Primary forest habitat types include: 1) *Pinus ponderosa* (ponderosa pine) – *Festuca idahoensis*; and 2) *Pinus ponderosa* – *Symphoricarpos albus*. In 2004, seventy-three percent of known Spalding's catchfly occurrences were within grassland habitat types, 20 percent within shrub habitat types, and seven percent within forest habitat types (summarized in USFWS 2007). Although the recent discovery of several new sites in the shrub-steppe of the Canyon Grasslands significantly increases the number of plants and sites in this habitat type. Some of the most difficult nonnative invasive plants to control in Spalding's catchfly habitat include *Centaurea solstitialis* (yellow star thistle), *Cardaria draba* (whitetop), *Centaurea maculosa* (spotted knapweed), *Euphorbia esula* (leafy spurge), *Hypericum perforatum* (St. Johnswort), and *Potentilla recta* (sulfur cinquefoil).

The recovery plan has split the occupied habitat of Spalding's catchfly into five physiographic regions that are characterized by distinctive physical features. These regions are distinctive from one another in climate, plant composition, historical fire frequencies, and soil characteristics. These differences are significant in that they may translate into differences in life histories, habitat trends, consequences of fire suppression, and types of weed control as they apply to conservation of Spalding's catchfly. The five physiographic regions utilized in the recovery plan are:

(1) the Blue Mountain Basins in northeastern Oregon;
(2) the Canyon Grasslands along the Snake, Salmon, Clearwater, Grande Ronde, and Imnaha Rivers in Idaho, Oregon, and Washington;
(3) the Channeled Scablands of east-central Washington;
(4) the Intermontane Valleys of northwestern Montana; and
(5) the Palouse Grasslands in southeastern Washington and adjacent west-central Idaho.

2.11.3.1 Blue Mountain Basins

The Blue Mountain Basins were once contiguous Pacific Northwest Bunchgrass Grasslands. Today, much of the Wallowa Valley has been converted into residential or urban areas surrounded by agricultural and grazing lands. Soils are composed of deep loess similar to the Palouse Grasslands or glacial till soils such as those at the head of Wallowa Lake.

Spalding's catchfly occurs at its highest elevation (1,555 meters [5,100 feet]) within the Blue Mountain Basins, specifically the Wallowa Valley. The basin abuts habitat characterized as Canyon Grasslands, with no clear demarcation between the two regions. In the Blue Mountain Basins, Spalding's catchfly is often found along slopes of low broad ridges and ridgebrows, some with biscuit and swale topography (USFWS 2007). Within the Wallowa Valley, habitat is highly dissected by urban and agricultural lands. A Spalding's catchfly population with at least 1341 plants as of 2014 data occurs at Wallowa Lake Key Conservation Area (and approximately 95 percent documented are located on private lands) (Moholt *in lit.* 2015). This population is the largest occurring on private land, other than land owned by The Nature Conservancy (TNC).

Rangewide suitable habitat for Spalding's catchfly includes all flat, east facing, northern facing, and even southern facing (at higher elevations) slopes between 365 to 1,615 meters (1,2000 to 5,300 feet) in elevation within *Festuca idahoensis* and *Festuca scabrella* communities that are associated with Pacific Northwest bunchgrasses, sagebrush-steppe, and open pine forests. However, even within what is presently understood to be suitable habitat, Spalding's catchfly is quite infrequent (rare). If another habitat parameter was identified that would help to narrow the definition of suitable habitat for this species, field searches could become more focused. At present it appears that there are vast tracts of suitable habitat for Spalding's catchfly on private and public lands within the Canyon Grasslands, Channeled Scablands, and the Blue Mountain Basins. Identifying a mechanism to help facilitate searches on these lands may identify other large populations where conservation efforts could occur.

2.11.3.2 Canyon Grasslands

Of the five physiographic regions where Spalding's catchfly is found, the habitat of the Canyon Grasslands is the most intact, largely because the canyon walls are steep and do not lend themselves to agricultural or urban developments. The Canyon Grasslands range widely in elevation, as evidenced by the presence of Hells Canyon, the deepest canyon in the United States at a depth of 7,900 feet; (USFWS 2007). The lowest elevation population of Spalding's catchfly occurs within the Canyon Grasslands. The dramatic range in elevation within the Canyon Grasslands results in marked variations in the climate and vegetation. Soils within the Canyon Grasslands range from solid bedrock cliffs to deep loess and ash deposits (USFWS 2007).

Within the Canyon Grasslands, Spalding's catchfly is found at elevations from 365 to 1,615 meters (1,200 to 5,300 feet) generally on northerly slopes that support more mesic *Festuca idahoensis* communities. Because of their steep nature, the Canyon Grasslands are the most under-surveyed area for Spalding's catchfly, and also represent the area where large populations of Spalding's catchfly may be most easily conserved because they are more removed from human influence.

2.11.3.3 Channeled Scablands

Spalding's catchfly is reported to be primarily associated with relict flood channels within the Channeled Scablands. More specifically, Spalding's catchfly is generally found on northern facing slopes below talus or rock outcroppings, gentle northern slopes just above valley floors, or on the northern sides of biscuits (USFWS 2007). The species is found at elevations from 472 to 747 meters (1,550 to 2,450 feet) within the Channeled Scablands. Since we lack earlier botanical surveys, we do not know how much Spalding's catchfly may have formerly occurred within the loess islands between channels. However, its affinity for deep soils elsewhere indicates that habitat conversion has most likely reduced the number of plants found on these loess islands.

2.11.3.4 Intermontane Valleys

Spalding's catchfly populations within Montana are disjunct (separated by well over 160 kilometers [100 miles]) from Spalding's catchfly sites elsewhere. Plants have only been found near Eureka on the Tobacco Plains, in the Niarada and Flathead Lake area, and, most recently, on the Lost Trail National Wildlife Refuge. The species is found at elevations from 820 to 1,150 meters (2,700 to 3,800 feet) within the Intermontane Valleys. Spalding's catchfly is found in small isolated grasslands outside the larger valleys delineated in Figure 4 of the recovery plan, demonstrated by the recent discoveries at the Lost Trail National Wildlife Refuge. Within Montana, *Festuca idahoensis* is codominant or subdominant with *Festuca scabrella,* sometimes near the forest's edge.

2.11.3.5 Palouse Grasslands

The Palouse Grasslands are extremely fertile and may comprise the world's best wheat land. An underlying basalt layer is covered with deep deposits of loess and ash, forming long undulating dune-like plains of rich soils. These soil deposits can reach depths of 105 to 140 meters (350 to 450 feet), although generally less, and have high moisture-holding capacity and water infiltration rates. Beginning in 1880, the Palouse Grasslands have undergone a dramatic conversion to farm lands. So much so, it is estimated that today only 0.1 percent of the grasslands remain in a natural state (USFWS 2007). The remains of the Palouse Grasslands include small remnants in rocky areas or at field corners (USFWS 2007). The Camas Prairie in Idaho between the Clearwater and Salmon Rivers is included with the Palouse Grasslands here because soil properties and land conversions are similar; however, the Camas Prairie is generally higher in elevation and cooler and moister than other portions of the Palouse Grasslands (USFWS 2007).

Spalding's catchfly within the Palouse Grasslands is restricted to small, fragmented populations ("eyebrows," field corners, cemeteries, rocky areas, and steptoes) on private lands, and in larger remnant habitats such as research lands owned by Washington State University or patches within the lower foothills of the Blue Mountains managed by the UNF. Elevations occupied by Spalding's catchfly within the Palouse Grasslands range from 700 to 1,340 meters (2,300 to 4,400 feet). Of all the places where Spalding's catchfly resides, the Palouse Grasslands are the most threatened, and care is needed to maintain occupied sites and representative genetic material from these sites.

2.11.4 Distribution, Life History and Populations

Within the United States, Spalding's catchfly is known from four counties in Idaho (Idaho, Latah, Lewis, and Nez Perce), four counties in Montana (Flathead, Lake, Lincoln, and Sanders), one county in Oregon (Wallowa), and five counties in Washington (Adams, Asotin, Lincoln, Spokane, and Whitman) (summarized in USFWS 2007). Two occurrence records of Spalding's catchfly are known in British Columbia, Canada, and both sites are located within one mile (1.6 kilometers) of plants in Montana (USFWS 2007); therefore, we consider these plants to be within one single population.

It is expected that more populations of Spalding's catchfly will be found in the future as survey efforts increase. To date, survey effort has been lower on privately-owned lands than on publicly-managed lands. Yet even with this lower survey effort, over half the known sites and estimated plant numbers occur on privately-owned lands. Thirty-two of the known populations of Spalding's catchfly (32 percent) occur on lands that are entirely in private ownership, with an additional 18 populations (18 percent) in partial private ownership (summarized in USFWS

2007). The participation of private landowners, including organizations such as TNC, will therefore be vital in the recovery of this species.

In Oregon, there are approximately 21 populations; these populations vary from a few (22 plants on BLM land, Grande Ronde River canyon grasslands) to over 40,000 documented on the Zumwalt preserve (Ferriel, R. BLM pers. comm 2011; Taylor *et al.* 2012). There are two known occurrences of silene on the Nez Perce Tribe's Precious Lands Wildlife Area, one in the Joseph Creek drainage and one near Buford Creek. On federal lands in Oregon, this species occurs on the WWNF, BLM lands, and National Park Service Lands (Old Chief Joseph Gravesite and Cemetery). Of these 21 populations in Oregon, as of 2015, there are approximately 16 populations in the Blue Mountains Physiographic Region and approximately five populations in the Canyon Grasslands Physiographic Region. Spalding's catchfly monitoring data collected from 2008-2012 by The Nature Conservancy for the WWNF, documented approximately 4,500 individuals at Crow Creek in Wallowa County, Oregon (Taylor and Finnerty 2013).

The total number of mature Spalding's catchfly plants now known within the Lower Imnaha Range Analysis (LIRA) canyon grasslands is at least 1,780 individual plants. This current population or population estimate is significant because the Service's Spalding's catchfly Recovery Plan lists one of the objectives of its recovery program to documentation of at least "twenty-seven populations, with at least 500 reproducing *Silene spaldingii* individuals" (USFWS 2007). At the time the recovery plan was written, only ten populations with more than 500 individuals were known.

It is not known how many Spalding's catchfly individuals and how much habitat may have been lost to human-related activities during the last 150 years since European settlement of this region. Historic documentation indicates the species has always been relatively rare (USFWS 2007), but because most land conversions within the plant's historical range took place before botanical surveys had been done, we may never know how extensive or numerous Spalding's catchfly once was. Instead, we assume that the loss and alteration of large portions of suitable habitat have translated to a decline in population numbers.
Four population extirpations have been documented since tracking of Spalding's catchfly began in the early 1980's (summarized in USFWS 2007). At least three other sites that formerly supported the species have been documented as having no plants present at the last visit (USFWS 2007). Populations are not necessarily considered extirpated, however, if sites are revisited and Spalding's catchfly is not found, because plants at these sites may be exhibiting prolonged dormancy. Subsequent visits are needed to confirm extirpations at such sites.

At the end of the first five years of a demography study, 72 percent of Spalding's catchfly plants remained alive, suggesting the plant regularly reaches an age of 15 to 20 years (USFWS 2007). However, it is hypothesized some individuals may live up to 30 years of age or longer. Seedlings generally sprout in spring, form rosettes the first year, and occasionally flower the second year, but generally flowering does not occur until during or after the third season (USFWS 2007). Adult plants emerge in spring, usually May, as either a stemmed plant, a rosette, or occasionally as a plant with both rosette(s) and stem(s) (USFWS 2007). Stemmed plants may remain vegetative or may become reproductive in July or August. Plants senesce or wither in fall (September or October), reappearing the next spring (USFWS 2007).

Spalding's catchfly exhibits prolonged or summer dormancy; that is, plants can remain below the ground, without leaves, for up to three years when conditions are unfavorable (USFWS 2007). A preliminary analysis suggests prolonged dormancy tends to be higher in summers preceded by a wet summer and dry fall (USFWS 2007). This prolonged dormancy can make population estimates and monitoring difficult. Long-term monitoring is necessary to accurately assess population trends of Spalding's catchfly. Due to this ability to go dormant, population estimates of Spalding's catchfly, if based on visible plants, will always be lower than the actual population size (USFWS 2007).

Seed dispersal studies have not yet been conducted on Spalding's catchfly. However, the capsules of Spalding's catchfly serve as an open cup from which seeds are likely carried by the wind, jostled out by passing wildlife, or tossed when plants are knocked over. Plants are generally just taller than surrounding vegetation and the seeds are small, flat, and somewhat winged. The plant height and seed characteristics suggest that short-distance wind dispersal may be common. In addition, the sticky nature of the plant makes it possible for portions of the plant to break off and stick to the fur of passing animals. This method of seed dispersal is probably infrequent but may provide an opportunity for more long distance dispersal.
Measuring new recruits (seedlings) of Spalding's catchfly within native habitats can be problematic. Adult plants can produce rosettes that are similar to those of seedlings. Various characteristics have been used to distinguish adult rosettes from seedling rosettes, including: seedling rosettes with a conspicuous lack of stem material between leaves, adult rosettes with a conspicuous lack of stem material between the leaves, seedling rosettes with hairless leaves, seedling leaves with hairs only along the edges, and leaf size (USFWS 2007).

Spalding's catchfly reproduces only by seed, with no means of vegetative reproduction (spread by vegetative growth) (USFWS 2007). The species is partially self-compatible, meaning the pollen is capable of fertilizing the female reproductive structures on the same plant. Flowers of Spalding's catchfly contain both male (stamen) and female (pistil) parts. However, the male parts mature, shed pollen, and wither prior to the female parts becoming receptive (USFWS 2007). This reduces the chances of self-pollination within an individual flower, but still allows for pollination between different flowers on the same plant.

Collectively, studies suggest that Spalding's catchfly reproduces best when outcrossing occurs, pollinators are essential in maintaining the fitness of Spalding's catchfly, adjacent invasive nonnative plants may negatively impact reproduction, and pollinators must consistently visit Spalding's catchfly.

Spalding's catchfly's primary pollinator, the bumblebee *Bombus fervidus*, is known from southern Canada and most of the United States, except the extreme south (USFWS 2007). The species is common within grasslands but rare in wooded foothills, and tends to build its nests either on or just below the surface of the ground, generally within the first foot (0.3 meter) of soil (USFWS 2007). The queen emerges from hibernation in spring and establishes a seasonal colony that can contain over 200 individuals by fall (USFWS 2007). In California, the queen flies from early April to late October, workers from early May to late October, and males from early July to early October (USFWS 2007). *Bombus* species are generally less faithful to a particular plant species than honey bees (*Apis* spp.) within a foraging trip and do not specialize on pollination of any one species or group of plant species; in other words, they utilize a wide range of plant species for nourishment (USFWS 2007).

The distance that pollinators can travel is significant to plants because pollen transfer and seed dispersal are the only mechanisms for genetic exchange. In general pollinators will focus on small areas where floral resources are abundant; however, occasional longer distance pollination will occur, albeit infrequently. Studies suggest that genetic exchange via pollen transfer may be extremely rare for distances over one mile (1.6 kilometers, or 1,600 meters). This is one of the rationales used when grouping Spalding’s catchfly sites within one mile (1.6 kilometers) of one another as populations.

2.11.5 Reasons for Listing/Threats

The Recovery Plan for Spalding’s catchfly (USFWS 2007) discusses the reasons for federal listing, and the threats to this species. A summary of the threats from the Recovery Plan include, the effects of invasive nonnative plants; problems associated with small, geographically isolated populations; changes in the fire regime and fire effects; land conversion associated with urban and agricultural development; adverse livestock grazing and trampling; herbicide and insecticide spraying; adverse grazing (herbivory) and trampling by wildlife species; off-road vehicle use; insect damage and disease; impacts from prolonged drought and climate change; and inadequacy of existing regulatory mechanisms have been implicated as current threats and reasons for the decline of Spalding’s catchfly.

2.11.6 Conservation Needs and Biological Constraints

The long-lived nature of Spalding’s catchfly, in conjunction with sporadic and rare recruitment, delayed maturity, cryptic rosettes that may disappear before monitoring, prolonged dormancy, and difficulties identifying seedlings, make it challenging to measure changes in numbers of individuals of this species. For plants exhibiting prolonged dormancy, population trend monitoring needs to occur for three or more consecutive years every five to twenty years to adequately assess trends at a given site (USFWS 2007). Although population trend and demographic monitoring is occurring at a number of sites, long-term monitoring of this kind has occurred at only one Spalding’s catchfly site, the Dancing Prairie Preserve in Montana. Monitoring efforts to date have not used consistent methodologies so comparisons of key life history parameters across the range of the species are difficult. The Spalding’s catchfly technical team is currently utilizing Rangewide Spalding’s Catchfly Monitoring Guidelines developed by Peter Lesica and Nathan Rudd (Lesica and Rudd 2011).

Ground disturbing activities including fires, adverse livestock grazing and trampling, and off-road vehicle use impact Spalding’s catchfly the most during the flowering and seeding period (late July to September) and during seedling and shoot emergence in early spring. Small, isolated populations relegated to remnant fragments of native habitat pose a problem as their viability into the future is questionable. Spalding’s catchfly requires grasslands dominated by native vegetation, with adequate numbers of pollinators available and other Spalding's catchfly populations close enough (within 1.6 kilometers [1 mile]) to provide for pollen exchange and enhance gene flow and genetic variability.

2.11.7 Conservation Actions

State conservation efforts, including inventory, monitoring and demographic studies, additional sources of scientific information on this species, invasive non-native plant control efforts, and additional conservation actions have been completed or are ongoing at several Spalding's catchfly populations within each state where the species occurs. Refer to the Recovery Plan for more information on state conservation efforts (USFWS 2007).

2.12 Environmental Baseline – Spalding's Catchfly

The analyses presented in this section supplement the above *Status of the Species* evaluation by focusing on the current condition of Spalding's catchfly in the action area, the factors responsible for that condition (inclusive of the factors cited above in the regulatory definition of environmental baseline), and the role that action area plays in the survival and recovery of the Spalding's catchfly. Relevant factors on lands surrounding the action area that are influencing the condition of the Spalding's catchfly were also considered in completing the baseline evaluations herein.

2.12.1 Umatilla National Forest Baseline

As of 2016, the FS has mapped 111 acres of occupied habitat on the UNF. These mapped areas are all within the Canyon Grassland physiographic province in the Blue Mountains Foothill key conservation area. Within this key conservation area (KCA), 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*.

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. For example, in 2017 livestock were scheduled to be present June 18-28 (150 pairs) and August 23 through October 3 (333 pairs). There are also some Spaulding's catchfly in the Cottonwood pasture, which is normally grazed early in the season; in 2017 grazing by 150 cow/calf pairs was scheduled to 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 KCA 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 UNF 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.

2.12.2 Wallowa-Whitman National Forest Baseline

Within the WWNF, 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 NFS lands on the WWNF (outside of the HCNRA) amounts to approximately 100 acres (all within the KCA).

The populations on Wallowa-Whitman NF are within grazing allotments, and plant 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).

Of the 27 key conservation areas idenitified for Spalding's catchfly, National Forest System lands that make up the plan area contribute three key conservation areas (Crow Creek, Clear Lake Ridge, and Blue Mountain Foothills). As the third largest population range-wide, the Crow Creek key conservation area plays a leading role in the conservation of Spalding's catchfly. Spalding's catchfly populations also occur in the adjacent Hells Canyon National Recreation Area (HCNRA) but have not been identified as key conservation areas because they contain fewer than 500 plants.

2.13 Effects of the Action – Spalding's Catchfly

Spalding's catchfly populations, including populations that may be discovered during the life of the BMFP, will be managed according to several DCs, standards and guidelines. The main risk factors potentially effecting *Silene spaldingii* are livestock grazing, invasive species, and fire. Within the UNF, nearly all known sites of Spalding's catchfly are within management area 3B backcountry motorized, where livestock grazing is a suitable (allowed) activity. Two Spalding's catchfly patches that have about 200 plants (roughly 3 percent of the Spalding's catchfly plants within the UNF) occupy an area 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 BMFP, will be managed according to standards *FLS-15S* and *FLS-3S* and guideline *FLS-5G* (presented below) as well as other DCs, standards and guidelines as described for the WWNF.

The Spalding's catchfly recovery plan (USFWS 2007) outlines steps to recover the plant by protecting and maintaining reproducing, self-sustaining populations so that protection under the ESA is no longer necessary. As projects are planned or revised (including ongoing actions that will be brought into compliance with the BMFP upon implementation), all known and new populations that may be discovered during the life of the BMFP have protection measures (including DCs, standards and guidelines) that will be followed to ensure protection and conservation of Spalding's catchfly populations.

2.13.1 Effects 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 Umatilla and Wallowa Whitman NFs only:* Livestock grazing of occupied *Silene spaldingii* habitat shall not be authorized between July 1 and September 30 (flowering-fruiting period).

- *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-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.

To simplify management and ensure viability and recovery of Spalding's catchfly, the BMF has restricted grazing from occurring during the catchfly's flowering-fruiting period from July 1 to September 30 in occupied habitat. This timeframe allows catchfly flowers to be pollinated and its seed to ripen and disperse. The timing of grazing in pastures occupied by the catchfly will not be predicated on the ecological condition of the pasture.

The 30 percent utilization is an extra measure of protection to the catchfly while still maintaining good ecological condition of other key forage species. The Recovery Plan for Spalding's catchfly does not recommend specific use levels and no other plans or agreements are currently in place.

During implementation of BMF grazing program, *FLS-15S* allows for the Spalding's catchfly to complete its reproductive cycle: flowering, pollination-fertilization, fruit-seed maturation and seed dispersal. Spalding's catchfly begins 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 a 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 FS 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 will 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 because, as stated above, in the early season catchfly plants are too small to browse and the grazing closure period allows the plants to develop and disperse seeds. Utilization of key forage species will be measured with the same methodology as other portions of a pasture or allotment.

2.13.2 Effects from Invasive Plants

Forest Plan objective 1.5 (Table 2), "Reduce current infestations of invasive plant species," is designed to 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 through the use of herbicides to treat invasive plants. If applied indiscriminately, it may cause mortality or damage to Spalding's catchfly.

The following additional protection measures will insure that as invasive plant treatment projects are planned and implemented, adverse effects to Spalding's catchfly will be minimized and recovery should not be retarded. Any invasive plant treatments will be designed to not adversely affect *S. spaldingii* (pg 281 in Assessment).

- *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 recovery 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 desigated and proposed critical haibtats shall be managed in accordance with their recovery or other conservation plans, in accordance with Forest Service authorities.
- *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.

2.13.3 Effects from Prescribed Fire

BMFP guideline *FLS-7G* requires 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* will require federally listed, proposed, or candidate plants be avoided during the construction fire suppression lines for both planned (prescribed) and unplanned fires (wildfire).

- *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-8*G: 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 speices, except where needed to provide for the protection of human life and public safety.

These standards and guidelines will 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 should benefit *S. spaldingii*, though some individual plants may be adversely affected in the short-term.

2.13.4 Effects of Plan Components for Other Forest Management Programs That Contribute to Spalding's Catchfly Conservation

Additional standards and guidelines *FLS-9S* and *FLS-13G* specify that other potential management activities will avoid adverse effects to Spalding's catchfly and other listed plant species. To do so, road and trail construction and maintenance and timber harvest and associated vegetation management will be designed and carried out in a manner to avoid adverse effects to Spalding's catchfly. An exception will be granted for situations where the silvicultural prescription would benefit the species in the long or short term. Few, if any, of the catchfly populations on NFS 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 will 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 plant species and critical habitat). The goal of this guideline is to minimize to the extent feasible adverse environmental effects to threatened and endangered species. Currently, Spalding's catchfly habitat does not overlap with areas under permitted mineral activity.

Additionally, a guideline (*LH-4G*) 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.

2.13.5 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 BMFP, will promote resilience and conservation of known populations of *Silene spaldingii*,even in the face of climate change.

2.14 Cumulative Effects – Spalding's Catchfly

The action area includes lands within the proclaimed boundaries of the Umatilla and Wallowa-Whitman National forests and adjacent lands. Tribal lands exist adjacent to 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 NFS 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 will be managed as they are today (eg. farming, ranching, timber management, land and water restoration, railroad maintenance and use, etc).

The nonfederal action most likely to affect catchfly plants on adjacent NFS 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, will likely benefit catchfly habitat on federal lands because fewer weed propagules will 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 NFS lands.

2.15 Conclusion – Spalding's Catchfly

After reviewing the current status of Spalding's catchfly, the environmental baseline for the action area, the effects of the proposed BMFP, and anticipated cumulative effects, it is the Service's biological opinion that the action as proposed is not likely to jeopardize the continued existence of the Spalding's catchfly for the following reasons:

- Standards and guidelines provided above provide adequate protection to ameliorate the identified risks to this species and its habitat from BMFP activities proposed.
- Though many management actions, such as nonnative invasive species abatement or prescribed fire, may have short-term adverse effects that may impact individual plants or their habitat, they would assist in the long-term recovery of Spalding's catchfly.
- The Service has developed a recovery plan that provides a strategy to protect and recover this species that the FS is implementing in part through the BMFP.
- Appendix E provides a list of Recovery and Conservation Strategies for Spalding's catchfly that are addressed by BMFP. This comprehensive strategy should result in conserving Spalding's, particularly because of the BMF objective to develop and implement habitat management plans for key conservation areas (discussed above)

CONFERENCE OPINION

The Description of the Proposed Action, Action Area, and Analytical Framework from the preceding biological opinion are incorporated into this conference opinion by reference. Note that the wolverine is a Proposed species and Whitebark Pine is a Candidate species.

WOLVERINE CHAPTER

2.16 Status of the Species – Wolverine

2.16.1 Taxonomy and Species Description

Wolverines (*Gulo gulo*) are the largest terrestrial member of the mustelid family. Adult males typically weigh 12-18 kilograms (26-40 pounds) and adult females weigh 8-12 kilograms (17-26 pounds)(Banci 1994). Wolverines are distinguished from other members of the mustelid family by their relatively large size. Their pelage is dark brown with a pale stripe along its side, from head to tail, and a light-colored facemask. They are highly adapted to deep snow and cold conditions with their wide body, short powerful legs, and relatively large feet.

The wolverine has a Holarctic (habitats found in the northern continents) distribution, including northern portions of Europe, Asia, and North America. The currently accepted taxonomy classifies wolverines worldwide as a single species, *Gulo gulo*, with two subspecies. Old World wolverines are found in the Nordic countries of Europe, Russia, and Siberia and are part of the subspecies *Gulo gulo gulo*. New World wolverines occur in North America and are known as *Gulo gulo luscus*, the North American wolverine (Kurten and Rausch 1959, Pasitschniak-Arts and Lariviere 1995).

The historical distribution of wolverine in the contiguous United States has been difficult to reconstruct. However, Aubry *et al.* (2007) conducted a recent assessment of historical wolverine records (1801-1960) to determine factors that influenced wolverine distribution in the contiguous United States. They found that the historical range was discontinuous in the Pacific states (Aubry *et al.* 2007). A similar pattern was found in the Rocky Mountains, with a relatively continuous distribution in Idaho, Montana, and Wyoming, but with substantial gaps in southwestern Wyoming and northwestern Colorado (Aubry *et al.* 2007). Schwartz *et al.* (2007) found that the wolverine in California were isolated from other populations in North America for >2000 years. Wolverine populations in Colorado and Utah may also have been isolated to some degree (Aubry *et al.* 2007). The Great Lakes region probably represented the southern extent of wolverine distribution in eastern North America prior to European settlement (de Vos 1964, Aubry *et al.* 2007).

The current distribution of wolverine in the contiguous United States has contracted substantially compared to the 1900s (Aubry *et al.* 2007). Currently, wolverines appear to be distributed as functioning populations in two regions in the contiguous United States: the North Cascades in Washington, and the northern Rocky Mountains in Idaho, Montana, and Wyoming. Wolverines were likely extirpated, or nearly so, from the entire contiguous United States in the first half of the 20th Century (Aubry *et al.* 2007; USFWS 2011). The available evidence suggests that, in the second half of the 20th Century and continuing into the present time, wolverine populations have expanded in the North Cascades and the northern Rocky Mountains, but that populations have not been reestablished in the Sierra Nevada Range or the southern Rocky Mountains.

2.16.2 Listing Status

The North American wolverine is proposed as a threatened species under the Endangered Species Act of 1973, as amended (81 FR 71670-71671). The proposed listing applies to the distinct population segment of wolverine (*Gulo gulo luscus*) in the contiguous United States. On February 4, 2013, the USFWS published a proposed rule to list the DPS of wolverine occurring in the contiguous United States as threatened (78 FR 7864). The USFWS also published a February 4, 2013, proposed rule to establish a nonessential experimental population (NEP) area for the North American wolverine in the Southern Rocky Mountains of Colorado, northern New Mexico, and southern Wyoming (78 FR 7864). On October 31, 2013, the USFWS reopened the comment period on the proposed listing rule for an additional 30 days (78 FR 65248). On August 13, 2014, the USFWS withdrew the proposed rule to list the DPS of the North American wolverine and the proposed NEP designation (79 FR 47552) based on their conclusion that the factors affecting the DPS as identified in the proposed rule were not as significant as believed at the time of the proposed rule's publication in 2013. In October 2014 three complaints were filed in the District Court challenging the withdrawal of the proposal to list the North American wolverine DPS. As a result of a court order, the August 13, 2014, withdrawal was vacated and remanded to the USFWS for further consideration consistent with the order. In effect, the court's action returned the process to the proposed rule stage, and the status of the wolverine under the Act was effectively reverted to that of a proposed species. Therefore, on October 18, 2016 the USFWS notified the public that they reopened the comment period on the February 4, 2013, proposed rule to list the DPS of wolverine occurring in the contiguous United States as threatened (81 FR 71670-71671). The USFWS also announced they were initiating an entirely new status review (81 FR 71670-71671).

2.16.3 Life History

In North America, wolverines occur in a wide variety of alpine, boreal, and arctic habitats, including boreal forests, tundra, and western mountains throughout Alaska and Canada. In the contiguous United States, habitats used by wolverines include high-elevation alpine portions of Washington, Idaho, Montana, Wyoming, California, and Colorado (Wilson 1982, Hash 1987, Banci 1994, Pasitschniak-Arts and Lariviere 1995, Aubry *et al.* 2007, Moriarity *et al.* 2009, Inman *et al.* 2009). Wolverines do not appear to specialize on specific vegetation types, but rather select areas that are cold and receive enough winter precipitation to reliably maintain deep persistent snow late into the spring season (Copeland *et al.* 2010). The requirement of cold, snowy conditions means that in the southern portion of the wolverine's range they are restricted to high elevations while at more northerly latitudes, wolverines are present at lower elevations (Copeland *et al.* 2010).

Wolverines require large home ranges and the availability of food is likely a primary factor that determines female wolverine movements and home range size (Hornocker and Hash 1981, Banci 1994). Male wolverine movements and home ranges are likely linked to the presence of active female home ranges and breeding opportunities (Copeland 1996). Wolverines travel long distances over rough terrain and deep snow, with adult males generally traveling longer distances than adult females (Hornocker and Hash 1981, Banci 1994, Copeland and Yates 2006, Moriarity *et al.* 2009, Inman *et al.* 2009, Inman *et al.* 2012). Home ranges of wolverines are large and vary greatly in size depending on geographic location, food availability, and the gender and age of the animal. Average home sizes for adult male wolverines in the contiguous United States range from 496 km^2 (193 mi^2) to 1522 km^2 (588mi^2), and females from 141 km^2 (55 mi^2) to 384 km^2 (148 mi^2) (Copeland 1996, Copeland and Yates 2006, Inman *et al.* 2012). The home ranges sizes of wolverines are large relative to their body size compared to other mammals. This may indicate that wolverines need to range considerable distances to consume the amount of calories need to meet their life-history requirements (Inman *et al.* 2012).

Female wolverines are generally 2-4 years old before they have their first litter, and produce average litter sizes of 1-2 kits (Persson *et al.* 2006). While wolverines are capable of producing litters every year, pregnant females commonly resorb or abort litters prior to giving birth if they are not in adequate condition to support their kits (Magoun 1985, Copeland 1996, Inman 2012). It is likely that in many places within the wolverine's range, it takes two years of foraging for a female to store enough energy to successfully reproduce (Persson 2005). The actual rates of reproduction in wolverines are among the lowest known for mammals (Persson 2005).

Breeding generally occurs from late spring to early fall (Magoun and Valkenburg 1983). Females undergo delayed implantation until the following winter or spring when active gestation lasts from 30-40 days (Rausch and Pearson 1972). Kits are born from mid-February to late March in a natural den. Natal dens are excavated in snow, generally >1.5 meters (5 feet) deep because this provides security for the kits and buffers cold temperatures (Pulliainen 1968, Copeland 1996, Magoun and Copeland 1998, Copeland *et al.* 2010, Inman *et al.* 2012). Natal dens are generally located by female wolverines to reduce exposure to predation and disturbance from humans (Banci 1994). Natal dens in the contiguous United States are generally associated with alpine or subalpine cirques with large rocks or downed logs (Copeland 1996, Inman *et al.* 2012). Natal dens are typically used until late April or early May (Magoun and Copeland 1998, Inman *et al.* 2012), after which, females may move kits to multiple secondary (maternal) dens during the month of May. After natal and maternal dens, wolverines may use rendezvous sites through early July. These sites are generally associated with natural cavities formed by large boulders, downed logs, and snow (Inman *et al.* 2012).

2.16.4 Habitat

Wolverine year-round habitat use takes place almost entirely within areas with deep persistent spring snow (Aubry *et al.* 2007, Copeland *et al.* 2010). In the western United States, these areas are characterized by high elevations alpine areas, and in cirque basins and avalanches chutes that have food sources such as marmots, voles, and carrion (Hornocker and Hash 1981, Copeland 1996, Magoun and Copeland 1998, Copeland *et al.* 2007, Inman *et al.* 2012).

Mean seasonal elevations used by wolverines in the northern Rocky Mountains and the North Cascades vary between 1400 and 2600 meters (4,592 and 8528 feet) depending on location, but are always relatively high on mountain slopes (Hornocker and Hash 1981, Copeland *et al.* 2007, Aubry *et al.* 2007, Inman *et al.* 2012). In the contiguous US, valley bottom habitats seem to be only used during dispersal movements and not for foraging or reproduction (Inman *et al.* 2009). Wolverine dens are generally located in alpine or subalpine habitats and rarely, or never, den in lower elevation forested habitats (Magoun and Copeland 1998).

2.16.5 Populations, Distribution, Trend

Wolverines naturally occur in low densities with reported ranges from one animal per 65 km^2 (25 mi^2) to one animal per 337 km^2 (130 mi^2) (Hornocker and Hash 1981, Hash 1987, Copeland 1996, Copeland and Yates 2006, Squires *et al.* 2007). No systematic population census exists over the range of wolverines in the contiguous United States, so current population level and trends are not known with certainty. Based on current knowledge of habitat and wolverine densities from several study areas, the USFWS estimated 250-300 individual wolverines in the contiguous United States (78 FR 7868). The majority of the wolverine population occurs in the Rocky Mountains and North Cascades (Aubry *et al.* 2007), and one known individual each in the Sierra Nevada (McKelvey *et al.* 2008, Moriarty *et al.* 2009) and southern Rocky Mountains (Inman *et al.* 2009). Spatial patterns in historical records from Montana indicate that wolverines had been extirpated from the state by the early 1900s (Newby and Wright 1955), but began to recolonize the area from the north in the early 1930s (Newby and McDougal 1964). During the last several decades, wolverines have recolonized the Cascade Range in northern Washington and southern British Columbia, and are continuing to expand their range southward (Aubry et *al.* 2014, McKelvey *et al.* 2014).

Until Aubry and others (2014) began their trapping studies in 2005, wolverines had never been studied in the northern Cascades, due partly to their low densities and extremely limited access into the unroaded wilderness areas where they occur during all periods of the year. Their findings indicate that the wolverines in the northern Cascades appear to be part of a larger population that includes portions of British Columbia, and possibly Alberta. Trapping studies from 2011-2014 have captured up to a high of eight total wolverine in a single season from the North Cascades near the Cascade Crest on the Methow Valley Ranger District of the Okanogan-Wenatchee National Forest (Aubry *et al.* 2014). Nine winter field seasons have resulted in 13 different wolverines captured in Washington on 33 occasions and yielded valuable information including the location of the first reproductive dens documented in the region. Telemetry information from the studies show an overlap in adult male and female activity areas, likely indicating reproductive pairs in the northern Cascades. Telemetry information has also shown that activity areas for multiple animals were located primarily in Washington, demonstrating there is a resident population of wolverines in the state. Aubry and others also found that most of the telemetry locations in their study fell within areas having snow cover that persisted into late spring, indicating that a bioclimate model is effective for delineating potential wolverine habitat in the northern Cascades.

2.16.6 Threats

2.16.6.1 Dispersed Recreation

The types of dispersed recreation that occurs in wolverine habitat include snowmobiling, heli-skiing, hiking, biking, off- and on-road motorized use, hunting, fishing, and other uses. In some locations, there is extensive overlap between winter recreational activities and modeled wolverine denning habitat (Heinemeyer and Copeland 1999, Heinemeyer *et al.* 2001, Heinemeyer 2012). Krebs *et al.* (2007) conducted a study of wolverine habitat use in an area used extensively for recreation during the winter. They found male wolverine habitat use to be negatively associated with helicopter skiing and female wolverine habitat use to be negatively associated with helicopter and backcountry skiing. More extensive research on the effects of dispersed recreation on denning, foraging, or survival have not been completed (Banci 1994).

Most roads in wolverine habitat are low-traffic volume dirt or gravel roads used for local access or for land management activities. Krebs *et al.* (2007) found that female wolverine habitat use was negatively associated with roaded areas. May *et al.* (2006) found that wolverine natal dens were located away from roads and that this had a positive influence on successful reproduction.

2.16.6.2 Infrastructure Development

Infrastructure includes all residential, industrial, and governmental developments such as building, houses, oil and gas wells, and ski areas. Wolverines are capable of long-distance movements through variable and anthropogenically altered terrain, crossing numerous transportation corridors (Moriarty *et al.* 2009, Inman *et al.* 2009). Wolverines are able to successfully disperse between habitats, despite the level of development that is currently taking place in the current range in the western United States (Copeland 1996, Copeland and Yates 2006, Pakila *et al.* 2007, Schwartz *et al.* 2009, Inman *et al.* 2012). Dispersal between populations is needed to avoid further reduction in genetic diversity; however, there is no evidence that human development and associated activities are preventing wolverine movements between suitable habitat patches (78 FR 7879).

2.16.6.3 Transportation Corridors

Transportation corridors are places where transportation infrastructure (roads, railways, etc.) is concentrated together. Transportation corridors may affect wolverines if located within habitat or between habitat patches. Transportation corridors can result in direct loss of habitat and direct mortality due to collisions with vehicles (Pakila *et al.* 2007). Major highways have been shown to disrupt wolverine movements and may be avoided or partially avoided (Austin 1998). Wolverines have been documented crossing major highways while making exploratory or dispersal movements (Landa *et al.* 1998, Pakila *et al.* 2007, Inman *et al.* 2009). Development of transportation corridors in linkage areas may inhibit wolverine movements between habitat patches, potentially reducing connectivity among habitat islands. However, the extent to which avoidance of highways may affect wolverine vital rates or life history has not been well studied.

2.16.6.4 Land Management

Wolverines are not thought to be dependent on specific vegetation or habitat features that might be manipulated by land management activities, nor is there evidence to suggest that land management activities are a threat to the conservation of the species (78 FR 7879). Krebs *et al.* (2007) found that female wolverine habitat use was negatively associated with recently logged areas. However, much of the high elevation habitats typically used by wolverines are not generally suitable for timber production, are in roadless condition, or protected in wilderness areas (78 FR 7879).

2.16.6.5 Trapping

Trapping has been the primary cause of wolverine mortality (Banci 1994, Krebs *et al.* 2004, Lofroth and Ott 2007, Squires *et al.* 2007). Wolverines are especially vulnerable to trapping and predator reduction due to their habit of ranging widely in search of carrion, low densities, and low reproductive rates (Copeland 1996, Krebs *et al.* 2004, Lofroth and Ott 2007, Squires *et al.* 2007).

Despite the impacts of trapping on wolverine in the past, trapping is no longer a threat within most of the wolverine range in the contiguous United States. Montana is the only state where wolverine trapping is still legal. Before 2004, average wolverine harvest in Montana was 10.5 wolverines/year. Due to the results reported in Squires *et al.* (2007), the Montana Department of

Fish, Wildlife and Park adopted new regulations to reduce impacts to subpopulations of wolverines.

Another potential source of mortality may come from incidental trapping where wolverines are caught in traps targeted for other species. While the number of wolverine mortalities from incidental trapping per year may be low (78 FR 7882), when considered cumulatively with other threat factors, it may contribute to population declines, but there is little supporting information (USFWS 2011).

2.16.6.6 Disease or Predation

Limited information is currently available on potential effects of disease on wild wolverine populations. Wolverines are sometimes killed by wolves (*Canis lupus*), black bears (*Ursus americanus*), and mountain lion (*Felis concolor*) (Burkholder 1962, Hornocker and Hash 1981, Copeland 1996, Inman *et al.* 2009). Wolverines are also likely vulnerable to predation while at reproductive dens though so few dens are known in North America that is it uncertain what the impact of this is on their population.

2.16.6.7 Inadequate Regulatory Mechanisms

Approximately 94 percent of the estimated wolverine habitat (based on Copeland *et al.* 2010, Inman *et al.* 2012) currently occupied by wolverine populations in the contiguous United States is federally owned and managed, mostly by the United States Forest Service (78 FR 7882). Several existing Federal or State regulatory mechanisms protect wolverine from disturbance and from overutilization from timber harvesting, such as: The Wilderness Act, National Environmental Policy Act, National Forest Management Act, National Park Service Organic Act, and State Laws and Regulations. The state of Oregon has also included wolverine in their Conservation Strategy. The primary threat with the greatest severity and magnitude of impact to the species is loss of habitat due to continuing climate warming. The existing regulatory mechanisms currently in place at the national level were not designed to address the threat to wolverine habitat from climate change (78 FR 7883).

2.16.6.8 Climate Change

Wolverine habitat is projected to decrease in area and become more fragmented in the future as a result of climate changes that result in increasing temperatures, earlier spring snowmelt, and loss of deep, persistent, spring snowpack (McKelvey *et al.* 2011). These climate change impacts are expected to have direct and indirect effects to wolverine populations in the contiguous United States, including reducing the number of wolverines that can be supported by available habitat, and reducing the ability of wolverines to travel between habitat patches (McKelvey *et al.* 2011). This will likely make it more difficult for subpopulations to recolonize areas were wolverines have been extirpated or to supplement the genetics or demographics of adjacent subpopulations (78 FR 7877).

It may appear contradictory that wolverine populations are expanding their distribution southward in the contiguous United States and reclaiming portions of their former range at a time when global warming is reducing the amount and connectivity of wolverine habitat (McKelvey *et al.* 2011). However, recolonization of the western United States by wolverines is occurring at much larger spatial scales and more rapidly than habitat losses from global warming (McKelvey *et al.* 2014). Predictive modeling indicates that relatively large (>1000 km2) islands of spring snow cover may persist in British Columbia, northern Washington, northwestern Montana, the Greater Yellowstone area, and portions of Colorado (McKelvey *et al.* 2011).

2.16.6.9 Synergistic Interactions Between Threat Factors

The wolverine in the western contiguous United States faces one primary threat that is likely to drive its conservation status in the future: habitat change and loss due to climate change (78 FR 7885). Other factors, though not as severe or geographically extensive as potential effects of climate change, when considered in the context of climate change, become threats due to the cumulative effects they are likely to have on wolverine populations (78 FR 7885). While wolverines may not be sensitive to habitat changes from fire, black carbon depositions on snow could accelerate melting.

2.16.7 Recovery Needs/Conservation Strategies

To date there is no recovery plan, designated critical habitat, or federal conservation strategy for the wolverine in the western contiguous United States. The state of Washington included the wolverine in its 2015 State Wildlife Action Plan (WDFW 2015), and according to the report, there are three stressors that need action in order to conserve wolverine in the state (numbers do not reflect priority) (Table 9).

The USFWS Candidate Species Assessment listed several threats to the wolverine: Habitat and range loss due to climate change, high intensity human use and disturbance, habitat loss or displacement from infrastructure development or transportation corridors, and barriers to connectivity from transportation corridors or human disturbance. Appendix F lists the key conservation concerns for wolverine, and compares them to the contributions of the BMFP.

Table 9. Actions to Conserve Wolverine in Washington (WDFW 2015).

Stressor	Description	Action Needed	Level of Investment
Resource information collection needs	Information on abundance, distribution, movements, and reproduction is lacking for the central and southern Cascades, and northeastern Washington.	Initiate or extend current monitoring activities into the central Cascades (especially north and south of the I-90 corridor) and the southern Cascades. Surveys in northeastern Washington would also be valuable.	Current insufficient
Habitat loss or fragmentation	Barriers or impediments to movement across	Continue surveys specifically to detect wolverine passage, and	Current insufficient

	Interstate 90 in the central Washington Cascades may impede demographic support from north to south and may have prevented the establishment of a breeding population in the south Cascades.	continue development of passage structures and habitat corridors to facilitate successful crossings.	
Climate change and severe weather	Loss of denning habitat and foraging habitat due to climate change.	Improve or maintain access to unoccupied denning and foraging habitat in the south Cascades (as identified in item 2 above).	Current insufficient

2.17 Environmental Baseline – 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 WWNF (Magoun *et al.* 2013), an area with no prior documentation of wolverines.

2.17.1 Malheur National Forest

The wolverine is listed as "suspected" on the MNF (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). Winter helicopter surveys conducted by ODFW 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 MNF 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 1,400 acres). This would suggest that it would be highly unlikely that the MNF 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).

2.17.2 Umatilla National Forest

The wolverine is listed as suspected on the UNF (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 UNF. Similar to the MNF, 96 percent of the watersheds on the UNF 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 1,400 acres). Similar to the MNF, 87 percent of the watersheds on the UNF have little to no denning habitat. This would suggest that it would be highly unlikely that the UNF 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).

2.17.3 Wallowa-Whitman National Forest and Hells Canyon National Recreation Area
Prior to 2011, there had been several unconfirmed sightings reported periodically in numerous areas on the WWNF. 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 WWNF 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 WWNF. 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 ten percent had high amounts (greater than 1,400 acres). Less than 58 percent of the watersheds had no denning habitat. As suggested by Magoun *et al.* (2011), it is possible that the WWNF 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 WWNF (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 that are used both winter and summer.

However, the BMFP is managing habitats towards historic range of variability (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 will likely contribute to habitat conditions for viability and persistence of the wolverine.

2.17.5 Conservation Role of the Action Area

The action area is on the periphery of the range of wolverine, with little reproductive habitat and without important migration corridors. The wolverine is a habitat generalist in regards to foraging and movement, but it requires a late spring snowpack for denning. Therefore, high elevation cold habitats are key for its conservation, along with limited human disturbance. The BMFP supports high elevation cold habitats, and has a history of wolverine sightings, therefore they should manage those areas to support wolverine use.

Out of a total of over 27 million acres of modeled wolverine habitat rangewide (within the lower 48 states), approxoimately 136,000 acres occur on Forest Service ownership on the BMF. Therefore, the BMF has a relatively small contribution to wolverine conservation, given the size of the range of the species.

2.18 Effects of the Action – Wolverine

Since wolverine is a proposed species, we are conferencing on the species as if it was listed, as requested by the BMFP. For more detail on the process if the wolverine is listed, see the Reinitiation Notice at the end of the Opinion.

Appendix F provides a matrix comparing conservation needs of the wolverine, and how the BMFP is anticipated to address those needs. Below, we discuss the general effects of the BMFP on the wolverine.

2.18.1 Effects of the MAs

The wolverine requires space for its large home range, and high elevation habitats with late spring snow packs. Most wolverine sightings on the action area have been in the Wallowa Mountains. Wolverines may use habitats throughout both the Wallowa-Whitman and Malheur National forests. The wolverine is suspected on the UNF but currently there is no evidence to indicate that the UNF contains occupied habitat. While the wolverine is a habitat generalist for foraging, it is a specialist in that it needs high elevation cold habitats.

The MAs that provide high elevation habitats with limited human use include: Congressionally Designated Wilderness, Recommended Wilderness, Backcountry, Wilderness Study Area and Research Natural Areas. In the BMFP those four MAs account for 22 percent of the WWNF, 7 percent of the MNF, and 25 percent of the UNF (Table 6 of Assessment). Wolverine may also use other MAs in the forest for dispersal or foraging, and the BMFPs will better support habitats suitable for wolverine dispersal, but the more isolated and/or higher elevation habitats are most important to conservation of the few potential wolverine in the action area.

Wolverines are expected to be most sensitive to human use in high elevation areas with late spring snow. Changes to winter recreation or other activities in likely or known wolverine denning habitat during their season of use may result in future adverse effects.

2.18.2 Vegetation Management Effects, including Restoration, Climate Change, Fire, and Insects and Disease

Few effects to wolverines from land management actions such as timber harvest and prescribed fire have been documented (78 FR 7879). Wolverines in British Columbia used recently logged areas in the summer and moose winter ranges for foraging (Krebs *et al.* 2007, pp. 2189– 2190). Males did not appear to be influenced strongly by the presence of roadless areas (Krebs *et al.* 2007, pp. 2189–2190). In Idaho, wolverines used recently burned areas despite the loss of canopy cover (Copeland 1996, p. 124). Intensive management activities such as timber harvest and prescribed fire do occur in wolverine habitat; however, for the most part, wolverine habitat tends to be located at high elevations and in rugged topography that is unsuitable for intensive timber management. Wolverines are not thought to be dependent on specific vegetation or habitat features that might be manipulated by land management activities, nor is there evidence to suggest that land management activities are a threat to the conservation of the species. While insects, disease, and large fires may increase in the future, the resultant effects on vegetation are not expected to adversely affect the wolverine.

Although there are no specific minimization measures for wolverine related to vegetation management, restoration, insects, and disease, the following DCs should maintain wolverine habitat:

> *FLS-1G:* Management activities should avoid adverse impacts to wolverine and its habitat to maintain population viability and avoid a trend towards federal listing.
>
> *Terrestrial Wildlife DC:* 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.
>
> *MA 1A Congressionally Designated Wilderness Areas DC:* Designated wilderness areas exhibit primitive qualities…. Buildings are rare within this management area; . 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. Predominantly diverse, native vegetation results from natural succession and disturbance processes, while nonnative vegetation is rare. The recreation opportunity spectrum is primitive.

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.

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.

Wolverine are expected to be most sensitive to human use in high elevation areas with late spring snow. Wolverines depend on deep snow that persists into late spring both for successful reproduction and for year-round habitat, and deep snow must be maintained through the denning period for wolverines to successfully live and reproduce (78 FR 7874-7875). Reduction of this habitat feature will reduce wolverine habitat, particularly if habitat reduction involves increasing fragmentation. As stated above however, the BMFs have already been managing high elevation habitat that is currently close to historical conditions, and in all likelihood, the results are showing wolverine mobility is not being restricted (Wales et al. 2011). Climate change affects wolverines through three primary mechanisms (78 FR 7875): (1) Reduced snowpack and earlier spring runoff, which would reduce suitable habitat for wolverine denning; (2) increase in summer temperatures beyond the physiological tolerance of wolverines; and (3) ecosystem changes due to increased temperatures, which would move lower elevation ecosystems to higher elevations, thereby eliminating high-elevation ecosystems on which wolverines depend and increasing competitive interactions with species that currently inhabit lower elevations. These mechanisms could tend to push the narrow elevation band that wolverines use into higher elevation. Due to the conical structure of mountains and elevation limits which preclude habitat connectivity to other high-elevation areas, this upward shift will result in reduced overall suitable habitat for wolverines.

Wolverine habitat is projected to decrease in area and become more fragmented in the future as a result of climate change that results in increasing temperatures, earlier spring snowmelt, and loss of deep, persistent, spring snowpack (McKelvey *et al.* 2011). These climate change impacts are expected to have direct and indirect effects to wolverine populations, including reducing the number of wolverines that can be supported by available habitat, and reducing the ability of wolverines to travel between habitat patches (McKelvey *et al.* 2011). This will likely make it more difficult or impossible for subpopulations to recolonize areas were wolverines have been extirpated or to supplement the genetics or demographics of adjacent subpopulations. As high elevation late spring snow areas decrease, the wolverine may become more vulnerable to disturbance or displacement from human activities.

The WDFW analyzed the effects of climate change on wolverines in Washington, and determined they were moderately to highly vulnerable (WDFW 2015, App C, p. C-32). They determined wolverines would be exposed to increased temperatures and reduced snowpack. The WDFW (2015, App C p. C-32) noted the following: "Wolverines exhibit sensitivity to temperature and declines in snowpack. Wolverines are obligatorily associated with persistent spring snow cover, which provides critical thermal advantages such as predator refugia for denning females and young, preventing competition with other scavengers, and important prey caching/refrigeration areas."

The BMFP will respond to climate change through the following DCs, Guidelines, and Monitoring expectations:

> *Species Diversity DC-1:* The nautral range of habitats for native and desired nonnative fish, wildlife, and plant species, including threatened and endangered species, species identified as regional forester's sensitive species, and surrogate species, is of adequate quality, distribution and abundance to contribute to maintaining native and desired nonnative species diversity. This includes the ability of species and individuals to interact, disperse, and find security within habitats in the planning area. These habitat conditions are resilient and sustainable considering the range of possible climat change scenarios.

Although the wolverine is a wide ranging species that utilizes a broad array of habitats, their denning is closely associated with deep snow that persists late into spring and early summer. These snow conditions coincide with the range of whitebark pine (Penninger pers. comm. May 2018). Therefore the management of whitebark pine may also contribute to the recovery of the wolverine:

> *Whitebark Pine DC (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 pine 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.
>
> *Federally Listed 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., primary constituent elements and primary biological features) are protected and restored to achieve species recovery.

> *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.
>
> *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 recovery[52] of listed, and proposed 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.

While the BMFP cannot, by itself, address the snowmelt and loss of deep persistent spring snowpack, the BMFs will manage for a diversity of vegetation that may help maintain connectivity between remaining patches of preferred habitat. As described above, there is management direction in the BMFP to respond to climate change through the emphasis on dynamic-landscape restoration, and the restoration of conditions that wiill enhance connectivity of habitats. Therefore, to the extent possible, future climate change-related challenges to wolverine and its high elevation habitats will be adequately managed via implementation of the revised BMFPs.

2.18.3 National Forest Access System Effects, including Roads, OHV Trails

Motorized recreation and the use of forest 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.

The sensitivity of wolverine to the effects of climate change are considered to be high (CCSD 2013). 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

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

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 BMFP includes management direction to make substantial improvement to habitat effectiveness for wolverines by reducing road impacts and densities. Overall, the BMFP will provide greater habitat effectiveness for wolverines than the current forest plans. The BMFP will improve habitat conditions for wolverines, whose habitats are influenced by roads and motorized trails.

The percent change in area suitable for over the snow vehicle use from current is estimated at -2 percent on the MNF, -7 percent on the UNF, and -5 percent on the WWNF. Disturbance caused by the use of roads will likely be reduced in the identified elk priority areas where RME-3G will increase elk security when management activities are proposed in those areas. There is little indication from the BMFP that extensive road building will occur. *KW-1S* stresses no net increasese in road densities, especially in key watersheds. And most (greater than 80 percent) of the modeled suitable habitat across the planning area is in wilderness or other MAs with limited management activities (Table 48 of Assessment).

Therefore, although adverse effects to wolverine may occur from future changes to road use, or development of roads or OHV trails in high elevation habitats, plan components provide adequate protection to ameliorate the identified risks to this species and its habitat from proposed activities.

2.18.4 Recreation, including Dispersed Recreation and Winter Recreation

Sources of human disturbance to wolverines have been speculated to include winter and summer recreation (78 FR 7877). These activities sometimes occur within or immediately adjacent to wolverine home ranges, such as in alpine or boreal forest environments at high elevations on mountain slopes. They can also occur in a broader range of habitats that are occasionally used by wolverines during dispersal or exploratory movements; habitats that are not suitable for the establishment of home ranges and reproduction but may be used nonetheless.

Little is known about the behavioral responses of individual wolverines to human presence, or about the species' ability to tolerate and adapt to repeated human disturbance. Some speculate that disturbance may reduce the wolverine's ability to complete essential life-history activities, such as foraging, breeding, maternal care, routine travel, and dispersal (Packila *et al.* 2007, pp. 105–110). However, wolverines have been documented to persist and reproduce in areas with high levels of human use and disturbance including developed alpine ski areas and areas with motorized use of snowmobiles (Heinenmeyer 2012, entire). This suggests that wolverines can survive and reproduce in areas that experience human use and disturbance. How, or whether, effects of disturbance extend from individuals to subpopulations and populations, through affecting vital rates (*e.g.,* reproduction, survival, emigration, and immigration) and gene flow remains unknown at this time.

The BMFP will address human recreation and disturbance through the DCs, Standards, and Guidelines already listed above (*ie. FLS-1G, RE-5S, MA 1A Congressionally Designated*

Wilderness Areas DC , Species Diversity DC-1, Species Diversity DC-5, Terrestrial Wildlife DC, Federally Listed DC (unnumbered, Whitebark Pine DC and RE-5S).

Wolverine are expected to be most sensitive to human use in high elevation areas with late spring snow. Changes to winter recreation or other management activities in likely or known wolverine denning habitat during their season of use may result in future adverse effects, including disturbance or displacement, but this is speculative. If snowpack declines during the 15-year duration of the BMFP, snow-dependent recreation and potential wolverine denning habitat may become more concentrated in a smaller area, making the adverse effects of disturbance and displacement more likely.

2.18.5 Lands and Special Uses, including Livestock Grazing and Mining

Few effects to wolverines from land management actions such as grazing have been documented (78 FR 7879). Because wolverine habitat is generally inhospitable to dense human use and development, and most wolverine habitat is also federally managed in ways that must consider environmental impacts, wolverines are somewhat insulated from impacts of human disturbances from industry, agriculture, or infrastructure development (78 FR 7877). In addition to recreation discussed previously, sources of human disturbance to wolverines may include housing and industrial development, road corridors, and extractive industries, such as logging or mining. These human activities and developments sometimes occur within or immediately adjacent to wolverine home ranges, such as in alpine or boreal forest environments at high elevations on mountain slopes. Specific reactions of wolverine to these types of disturbance are likely similar to those described above under recreation.

Wolverine habitat is characterized primarily by spring snowpack, but also by the absence of human presence and development (Hornocker and Hash 1981, p. 1299; Banci 1994, p. 114; Landa *et al.* 1998, p. 448; Rowland *et al.* 2003 p. 101; Copeland 1996, pp. 124–127; Krebs *et al.* 2007, pp. 2187–2190). This negative association with human presence is sometimes interpreted as active avoidance of human disturbance, but it may simply reflect the wolverine's preference for cold, snowy, and high elevation habitat that humans avoid. In the contiguous United States, wolverine habitat is typically associated with high elevation (e.g., 2,100 m to 2,600 m (6,888 ft to 8,528 ft)) subalpine forests that comprise the Hudsonian Life Zone (weather similar to that found in northern Canada), environments not typically used by people for housing, industry, agriculture, or transportation. However, a variety of activities associated with extractive industry, such as logging and mining, as well as recreational activities in both summer and winter are located in a small amount of occupied wolverine habitat.

The BMFP addresses lands and special uses through the following BMFP components:

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

Federally listed 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., primary constituent elements and primary biological features) are protected and restored to achieve species recovery.

Most lands and special uses and infrastructure development consistent with the BMFP will not be of the scale to result in increased mortality or impaired movements. Transportation corridors are places where transportation infrastructure (roads, railways, etc.) is concentrated together. Transportation corridors may affect wolverines if located within habitat or between habitat patches. Transportation corridors can result in direct loss of habitat and direct mortality due to collisions with vehicles (Pakila *et al.* 2007). However, due to the majority of potential wolverine habitat that occurs in MAs that are not suitable for infrastructure development, these impacts should largely be avoided.

Wolverine are expected to be most sensitive to human presence in high elevation areas with late spring snow. Changes to winter recreation or other habitat management activities in likely or known wolverine denning habitat during their season of use may result in future adverse effects, including disturbance or displacement.

Adverse effects may occur from large scale actions, or from actions that increase human use densities or increase likelihood of collisions with wolverine. The primary threat to the DPS is from habitat and range loss due to climate change. Wolverine denning is closely associated with deep snow that persists late into spring and early summer. *FLS-1G* prohibits management activities near denning sites; however, it is unlikely that management actions will occur in the area and during the time of denning due to lack of access. The BMFP will have more area allocated to MAs that will have more restrictive management actions, primarily wilderness and backcountry motorized. These management areas provide few potential human disturbance, especially during the time of denning (winter/early spring) due to snow.

2.18.6 Monitoring

In addition to the BMFP components described above, there are species and habitat monitoring questions to be addressed, but none specific to wolverine. The monitoring questions specify the information that is essential for measuring BMFP accomplishments and effectiveness. The associated evaluation process determines whether the observed changes are consistent with the DCs and what adjustments may be needed, if any. The monitoring plan include monitoring conducted in compliance with other laws, policies, and site-specific decisions.

The information gained through monitoring and evaluation may be the catalyst for plan revisions or amendments. The BMFP annual and five year monitoring reports will be shared with the USFWS.

2.18.7 Effects Within the HCNRA

The CMP retains greater than 85 percent of the total forest acres within the HCNRA are without timber harvest. Excluding large stand-replacing fires, the forested acres will provide large reserves of habitat where little habitat alterations and low human disturbance occur. In these areas, large secluded open spaces will 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 will 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 in the HCNRA are believed to be located in the Seven Devils area of Idaho. No recreation occurs in these areas during winter or spring (due to lack of access), therefore, no impact from recreationists is expected for natal dens in the HCNRA CMP.

The HCNRA provide for a year-round prey base of ungulates. Populations of deer and elk continue to be managed at their current management objectives. Bighorn sheep reintroductions into HCNRA will add to the numbers of ungulates available to wolverine. The reduction of domestic sheep in most of the HCNRA has probably reduced the amount of carrion available; however, because big game populations will continue to be managed at their current management objectives, the CMP is expected to have a low impact on reducing the amounts of large, wild ungulates available to wolverine.

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 gi

The CMP will provide similar levels of alternative prey base, such as rabbits and squirrels. Prescribed burning will enhance most small mammal populations by increasing the quality and quantity of forage. The 100 percent snag level will 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 will 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 will reduce human disturbance to ungulates, therefore retaining big game use in more areas. This will 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.

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 showed a preference by wolverines for big game winter ranges during the winter months. The CMP will continue to limit general use of snowmobiles in HCNRA by restricting 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 and will provide for large expanses of winter/denning habitat where motorized vehicles should not overlap with reproducing wolverine.
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.

2.19 Summary of Effects
The implementation of the BMFP and continued implementation of the CMP is expected to contribute to the maintenance and restoration of habitat for wolverines within the BMFs and the HCNRA. Implementation of the BMFP and HCNRA/CMP will affect the wolverine in the following ways:

- The BMFP MAs that emphasize providing habitats with limited human use include: Congressionally Designated Wilderness, Recommended Wilderness, Wilderness Study Area, Research Natural Areas, and Backcountry (nonmotorized). These MAs provide the majority of potential habitats on the BMFs, and all these MAs restrict motorized use (especially winter motorized use), thereby greatly reducing the effect of the BMFPs on wolverine. The HCNRA CMP provides similar MAs that contain the majority of potential wolverine habitat on the HCNRA and have limited human use. Wolverine may also use other MAs in the forests for dispersal or foraging, but the more isolated and/or higher elevation habitats are most important.
- The implementation of the BMFP 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.
- *KW-1S* stresses no net increasese in road densities, especially in key watersheds.
- *FLS-1G* and RE-5S of the proposed BMFP call for protections of important habitats for wolverines, and wolverines themselves.
- Several other plan components (such as suitability of high elevation MAs for winter

motorized recreation and infrastructure) also provide important wolverine protections.

- Climate change effects to wolverines include reduced snowpack and reduced suitable habitat for wolverine denning, increase in summer temperatures beyond the physiological tolerance of wolverines, and eliminating or reducing high-elevation ecosystems on which wolverines depend. The BMFP responds to climate change through managing for resilience and historic range of variability.
- Adverse effects to wolverine may occur from future changes to road use, or development of roads or OHV trails in high elevation habitats. These effects will be ameliorated by the BMFP's determination that development of roads and OHVs is not a suitable use in the majority of MAs with potential wolverine habitat. Additionally, management commitments for other species, including elk and whitebark pine, will further reduce impacts of forest activities on wolverine.
- Most lands and special uses and infrastructure development consistent with the BMFP will not be of the scale to result in increased wolverine mortality or impaired movements. Adverse effects may occur from large scale actions, or from actions that increase human use densities or increase likelihood of collisions with wolverine.
- BMFP direction addresses the main applicable threats to the wolverine and Appendix F provides a complete list of plan components that will contribute to the conservation and possible recovey of the wolverine. Also see *Wld-G6* above for HCRNA.
- CMP plan components provide adequate protection to ameliorate the identified risks to this species and its habitat from activities proposed.

2.20 Cumulative Effects

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. However, these lands generally do not contain the important high elevation lands, such as those provided by the Forests, for wolverine.

Grazing is reasonably certain to continue on off-forest lands, potentially impacting deciduous or riparian habitats for wolverine prey species. 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, potentially improving the forage base for wolverine. Recreation is likely to increase on non-federal lands due to increasing demands from the public. This will increase human disturbance and result in areas with relatively low human disturbance on FS lands becoming more important to wolverine. Development on non-federal lands may negatively impact connectivity for wolverine between high elevation habitat patches.

Transportation corridors can result in direct loss of habitat and direct mortality due to collisions with vehicles (Pakila *et al.* 2007). Major highways have been shown to disrupt wolverine movements and may be avoided or partially avoided (Austin 1998). Wolverines have been documented crossing major highways while making exploratory or dispersal movements (Landa *et al.* 1998, Pakila *et al.* 2007, Inman *et al.* 2009). The extent to which avoidance of highways may affect wolverine vital rates or life history has not been well studied.

2.21 Integration and Synthesis of Effects

Wolverines have likely always occurred in low densities on the BMFs. Wolverines are tied to high elevation and late spring snow packs for denning and reproduction. The most imminent threats to the wolverine are likely low densities, changing snow pack due to climate change, human use and disturbance, infrastructure development, and access and transportation corridors. The BMFP addresses those threats as displayed in Appendix F of this Opinion.

The implementation of the BMFP, including the HCNRA CMP, will contribute to the maintenance and restoration of habitat for wolverines. The BMFP and HCNRA CMP include MAs that support maintenance of high elevation habitats with minimal human use. The BMFP addresses climate change through development of resilient habitats. The BMFP and HCNRA CMP include management direction to reduce the impact of roads, and recreation impacts on habitat effectiveness for wolverines. Management direction for elk and Whitebark pine could also result in management benefits to the wolverine, particularly where high elevation habitat exists, *ie.* Wallowa, Seven Devils in HCNRA, Elk Horn and Strawberry mountains.

There is no recovery plan for the wolverine at this point. However, Appendix F (Opinion) displays the primary stressors and threats to the wolverine, compared to the contributions of the BMFP. While there may be future effects to the wolverine from management actions, the standards and guidelines in the BMFP should prevent any significant long-term adverse effects so that management activities will not appreciably reduce the likelihood of survival and recovery of the wolverine.

2.22 Conclusion – Wolverine

After reviewing the current status of the wolverine, the environmental baseline for the action area, the effects of the proposed BMFP, including the implementation of the HCNRA CMP, and the cumulative effects, it is the Service's Opinion that the action, as proposed, is not likely to jeopardize the continued existence of the wolverine. No critical habitat has been designated for this species; therefore none will be affected.

The wolverine is a proposed species. See the Reinitiation Notice regarding future confirmation of this conference opinion as a biological opinion.

WHITEBARK PINE CHAPTER

2.23 Status of the Species – Whitebark Pine

2.23.1 Taxonomy and Species description

Whitebark pine *(Pinus albicaulis* Engelm.) is a 5-needled conifer species placed in the subgenus *Strobus*, which also includes other 5-needled white pines. This subgenus is further divided into two sections (*Strobus* and *Parrya*), and under section *Strobus*, into two subsections (*Cembrae* and *Strobi*). The traditional taxonomic classifications placed whitebark pine in the subsection *Cembrae* with four other Eurasian stone pines (Critchfield and Little 1966, p. 5; Lanner 1990, p. 19, all as referenced in 76 FR 42631). However, recent phylogenetic studies (Liston *et al.* 1999, 2007; Syring *et al.* 2005, 2007, as cited in Committee on the Status of Endangered Wildlife in Canada (COSEWIC) 2010, p. 4, all as referenced in 76 FR 42631) resulted in merging subsection *Cembrae* and subsection *Strobi* into one subsection *Strobus*. No taxonomic subspecies or varieties of whitebark pine are recognized (COSEWIC 2010, p. 6, as referenced in 76 FR 42631).

Whitebark pine is typically 5 to 20 meters (m) (16 to 66 feet (ft)) tall with a rounded or irregularly spreading crown shape. On higher density conifer sites, whitebark pine tends to grow as tall, single-stemmed trees, whereas on open, more exposed sites, it tends to have multiple stems (McCaughey and Tomback 2001, pp. 113–114, as referenced in 76 FR 42631). Above tree line, it grows in a krummholz form (stunted, shrub-like growth) (Arno and Hoff 1989, p. 6, all as referenced in 76 FR 42631). This pine is monoecious, (both male pollen and female seed cones are on the same tree). Its characteristic dark brown to purple seed cones are 5 to 8 centimeters (cm) (2 to 3 inches (in.)) long and grow at the outer ends of upper branches (Hosie 1969, p. 42, as referenced in 76 FR 42631).

2.23.2 Listing Status

Whitebark pine is currently a federal candidate for listing (76 FR 42631) which means listing as a threatened or endangered species is warranted, but precluded by higher priority actions.

On January 13, 2017, the USFWS started an in-depth review of the best available scientific and commercial information called a Species Status Assessment. This process is ongoing.

2.23.3 Life History

Stone pines (so-called for their stone-like seeds) include five species worldwide, and whitebark pine is the only stone pine that occurs in North America (McCaughey and Schmidt 2001 p. 30, as referenced in 76 FR 42631). Characteristics of stone pines include five needles per cluster, indehiscent seed cones (scales remain essentially closed at maturity) 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) (Lanner 1996 p. 7; Schwandt 2006 p. 2, all as referenced in 76 FR 42631). Consequently, Clark's nutcrackers facilitate whitebark pine regeneration and influence its distribution and population structure through their seed caching activities (Tomback *et al.* 1990 p. 118, all as referenced in 76 FR 42631).

Whitebark pine trees are capable of producing seed cones at 20–30 years of age, although large cone crops usually are not produced until 60–80 years (Krugman and Jenkinson 1974, as cited in McCaughey and Tomback 2001, p. 109, all as referenced in 76 FR 42631). Therefore, the generation time of whitebark pine is approximately 60 years (COSEWIC 2010, p. v, as referenced in 76 FR 42631). Like many other species of pines, whitebark pine exhibits masting, in which populations synchronize their seed production and provide varying amounts from year to year. During years with high seed production, typically once every 3-5 years in whitebark pine (McCaughey and Tomback 2001 p. 110), seed consumers are satiated, resulting in excess seeds that escape predation (Lorenz *et al.* 2008 pp. 3-4, all as referenced in 76 FR 42631). Whitebark pine seed predators are numerous and include more than 20 species of vertebrates including Clark's nutcracker (*Nucifraga columbiana*), pine squirrels (*Tamiasciurus spp*.), grizzly bears (*Ursus arctos*), black bears (*Ursus americanus*), Steller's Jay (*Cyanocitta stelleri*), and Pine Grosbeak (*Pinicola enucleator*) (Lorenz *et al.* 2008 p. 3, as referenced in 76 FR 42631). Seed predation plays a major role in whitebark pine population dynamics, as seed predators largely determine the fate of seeds. However, whitebark pine has co-evolved with

seed predators and has several adaptations, like masting, that has allowed the species to persist despite heavy seed predation (Lorenz *et al.* 2008 p. 3-4, as referenced in 76 FR 42631).

Seeds not retrieved by seed predators are subsequently available for germination when conditions are favorable (McCaughey and Tomback 2001 p. 111, as referenced in 76 FR 42631). In years with low seed production, most seeds are predated and, therefore, unavailable for germination (Lorenz *et al.* 2008 p. 4, as referenced in 76 FR 42631). A single nutcracker can cache up to an estimated 98,000 whitebark pine seeds during good seed crop years (Hutchins and Lanner 1982 p. 196, as referenced in 76 FR 42631). They may bury seeds near parent trees or travel up to 22 kilometers (km) (14 miles (mi)) away at varying elevations. Cache sites have been found to occur on forest floors, above treeline, in rocky outcrops, meadow edges, clearcuts, and burned areas (Tomback *et al.* 1990 p. 120, as referenced in 76 FR 42631). Whitebark pine seedlings have highly variable survival rates; seedlings originating from nutcracker caches ranged from 56 percent survival over the first year to 25 percent survival by the fourth year (Tomback 1982 p. 451, as referenced in 76 FR 42631).

While whitebark pine is almost exclusively dependent upon Clark's nutcracker for seed dispersal, the reverse is not true as Clark's nutcracker forage on seeds from numerous species of pine. The frequency of nutcracker occurrence and probability of seed dispersal from a whitebark pine forest is strongly associated with the number of available cones. A threshold of 1,000 cones per hectare (ha) (2.47 acres (ac)) is needed for a high likelihood of seed dispersal by nutcrackers, and this level of cone production occurs in forests with a live basal area (the volume of wood occurring in a given area) greater than 5 square meters (m) per ha (McKinney *et al.* 2009 p. 603, as referenced in 76 FR 42631). For an adult Clark's nutcracker to survive a subalpine winter (accounting for those seeds consumed by rodents and those fed to juvenile nutcrackers), it would need to cache seeds from 767 to 2,130 cones (McKinney *et al.* 2009 p. 605, as referenced in 76 FR 42631). Clark's nutcrackers are able to assess cone crops, and if there are insufficient seeds to cache, they will emigrate in order to survive (McKinney *et al.* 2009 p. 599, as referenced in 76 FR 42631).

2.23.4 Habitat
Whitebark pine grows at the highest elevations of any western tree species (Kral 1993, Arno and Hoff 1990, all as referenced in USDA 2008). In Oregon and Washington, it occurs mainly at elevations of 1,600 m to 2,800 m (5,249 ft to 9,186 ft). Whitebark pine is a hardy conifer that tolerates poor soils, steep slopes, and windy exposures and is found at alpine tree line and subalpine elevations throughout its range (Tomback *et al.* 2001, pp. 6, 27, as referenced in USDA 2008). It grows under a wide range of precipitation amounts, from about 51 to over 254 cm (20 to 100 in.) per year (Farnes 1990, p. 303 as referenced in USDA 2008). Whitebark pine may occur as a climax species, early successional species, or seral (mid-successional stage) co-dominant associated with other tree species. Although it occurs in pure or nearly pure stands at

high elevations, it typically occurs in stands of mixed species in a variety of forest community types.

Whitebark pine is a slow-growing, long-lived tree with a life span of up to 500 years and sometimes more than 1,000 years (Arno and Hoff 1989, pp. 5–6, as referenced in USDA 2008). It is considered a keystone, or foundation species in western North America where it increases biodiversity and contributes to critical ecosystem functions (Tomback *et al.* 2001, pp. 7-8 as referenced in USDA 2008). As a pioneer or early successional species, it may be the first conifer to become established after disturbance, subsequently stabilizing soils and regulating runoff (Tomback *et al.* 2001, pp. 10-11, as referenced in USDA 2008). At higher elevations, snow drifts around whitebark pine trees, thereby increasing soil moisture, modifying soil temperatures, and holding soil moisture later into the season (Farnes 1990 p. 303 as referenced in USDA 2008). These higher elevation trees also shade, protect, and slow the progression of snowmelt, essentially reducing spring flooding at lower elevations.

2.23.5 Populations, Distribution, Trend

Whitebark pine occurs in the mountainous regions of western North America (Kral 1993 as referenced in USDA 2008). Outside the Pacific Northwest states, it is distributed in the British Columbia Coast Range Mountains and Cascades, the Rocky Mountains from British Columbia and Alberta to Wyoming, the Sierra Nevada and Klamath Mountains of California, and in some of the high Great Basin ranges of Nevada.

In Washington and Oregon, whitebark pine grows in the Cascade Range and in the Olympic, Kettle River, Selkirk, Blue, Wallowa, Paulina, Yamsey, North Warner, and Siskiyou Mountains (Ward *et al.* 2006 as referenced in USDA 2008). Whitebark pine populations tend to be scattered and spotty because of the often discontinuous distribution of favorable habitat on high mountain peaks and ridges. Individual populations are of widely varying sizes, with some being quite small. Some Pacific Northwest whitebark pine populations, notably those in the Olympic and Blue Mountains, are widely separated from any other populations, and the populations in northeastern Washington are closer to the Rocky Mountain portion of the species' range than they are to the Cascades.

Most whitebark pine habitat in Washington and Oregon occurs on federally administered land, and 81 percent is on lands administered by the FS, Region 6, in Washington and Oregon (USDA 2008). Sixty percent of the known occupied whitebark pine habitat and 72 percent of the potential whitebark pine habitat on NFS land in the Pacific Northwest occurs in congressionally designated wilderness areas.

Unfortunately, information on long-term whitebark pine population trends in individual stands in the Pacific Northwest is lacking. Re-measured permanent forest inventory plots containing whitebark pine are few and flawed because only trees greater than 12.5 cm (4.9 in.) are recorded. Comprehensive surveys of whitebark pine stands done at different points in time are currently nonexistent. Virtually all stand data available that evaluate pines of all sizes are from single, one-time examinations. The contention that whitebark pine is seriously declining in the region is based on high observed amounts of recent and current mortality due to fire, white pine blister rust infection, and mountain pine beetle infestation; documentation of very high levels of white pine blister rust on still living trees involving a large number of presumably lethal main stem infections; high proportions of trees with topkill caused by white pine blister rust that affects cone and seed production; and stand structures in which small white pine blister rust-affected trees represent by far the most numerous size class.

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 population trend within the majority of the whitebark pine range, across the range of the species (USFWS 2016). Determinations of serious whitebark pine declines are based on high observed amounts of recent and current mortality due to fire, white pine blister rust infection, and mountain pine beetle infestation; documentation of very high levels of white pine blister rust on still living trees involving a large number of presumably lethal main stem infections; high proportions of trees with topkill caused by white pine blister rust that affects cone and seed production; and stand structures in which small white pine blister rust-affected trees represent by far the most numerous size class (USDA 2008 p.21-22).

2.23.6 Threats

Threats to the whitebark pine include, mortality from white pine blister rust, mortality from mountain pine beetle, habitat loss from catastrophic fire and/fire suppression, and habitat loss from environmental effects resulting from climate change. These threats and stressors interact, with one building upon the other to increase effects.

Since many white pine blister rust infections on smaller whitebark pines (20 cm diameter at breast height or smaller) are main-stem infections, a high proportion of these trees are very likely to die or suffer top mortality in the next few years. Larger infected trees may survive for some time with greatly reduced vigor; large trees with substantial amounts of blister rust generally are poor cone producers.

Much of the following discussion of threats comes directly from the threats summaries in the 2011 warranted-but-precluded finding for whitebark pine (76 FR 42631). More detail can be found in that document.

2.23.6.1 Fire

Fire suppression results in conditions that favor the dominance of shade tolerant species such as *Abies lasiocarpa, Picengelmannii,* and *Tsuga mertensiana,* which form dense stands that eventually exclude Whitebark pine (Agee 1993, p. 252; Arno 2001, p. 83). We assume that fire suppression efforts that create these impacts will continue to occur into the future. Where whitebark pine persists, dense forest structure crowds and stresses individual trees, making them more susceptible to white pine blister rust, infestation by mountain pine beetle, and mortality. Succession to more shade-tolerant species also results in less whitebark pine regeneration because whitebark pine is shade-intolerant, and seeds will not survive if cached in heavily shaded forest stands. The interaction between fire suppression and environmental effects from climate change exacerbates the impacts to whitebark pine, and in the future will be particularly devastating to whitebark pine populations as whitebark pine seed sources are expected to become increasingly limited by continued impacts from white pine blister rust and mountain pine beetle.

The balance of a natural fire regime with related vegetative successive processes has been disrupted across the whitebark pine ecosystem. As a result, whitebark pine has lost its competitive advantage and trends indicate its presence has been reduced on the landscape. Because there is seldom a historic baseline for comparison and the degree of succession is very locally specific, we are not able to quantify what portion of the species decline can be attributed to fire management and changes in fire regimes. However, we consider the current fire regime and fire management practices to be threats that limit the abundance of the species and weaken whitebark pine communities, such that other factors create additional negative impacts to the species. The effects of changing fire regimes and fire suppression on whitebark pine, combined with the interaction of white pine blister rust and mountain pine beetles, have created more homogenous forest stands with reduced numbers of whitebark pine compared to historic subalpine landscapes. These effects are becoming more pronounced with climate change (Morgan and Murray 2001, p. 300), creating a trajectory toward forest stands without whitebark pine. The species appears likely to be in danger of extinction, or likely to become so within the foreseeable future, because of habitat losses due to changes to the fire regime, particularly when viewed in combination with climate change, disease, and predation.

2.23.6.2 Climate Change
Given projected increases in temperature, a significant loss of the cool high-elevation habitats of whitebark pine is expected. Rapid warming is likely to outpace the ability of whitebark pine to migrate to suitable habitats. Additionally, adaptation to warming conditions for this long-lived species seems unlikely. Synergistic interactions between environmental changes resulting from climate change, wildfire, disease, and mountain pine beetle also are negatively impacting whitebark pine rangewide. In particular, mountain pine beetle epidemics brought about by increasing temperatures are currently having significant negative impacts on whitebark pine rangewide.

2.23.6.3 White Pine Blister Rust
Despite white pine blister rust’s complex life cycle and the exacting environmental conditions required for reproduction and transmission, it has successfully spread across almost the entire range of whitebark pine, and its frequency of occurrence and intensity of infection are increasing. Although some whitebark pine regeneration has been documented in portions of its range, the change in overall whitebark pine population structure will reduce the number of large trees, expose surviving trees to higher white pine blister rust infection levels, and reduce the number of mature, cone-producing trees. The likelihood of sustaining whitebark pine in suitable habitats is further diminished in locations where populations are small (Schwandt *et al.* 2010, p. 235).

While whitebark pine trees will continue to persist on the landscape, whitebark pine forests may become functionally extinct (USFWS 2016; 76 FR 42631). Where additional threats occur, the pattern of forest renewal may be disrupted, leading to severe declines and potential extirpation of whitebark pine (Larson 2009, pp. 45–46).

2.23.6.4 Predation

Mountain pine beetle outbreaks are becoming more common throughout the range of the whitebark pine and are having increasingly significant impacts on whitebark pine. In some locations, mortality rates are as high as 96 percent. There are no known ways to stop a mountain pine beetle epidemic once it has started (Raffa *et al.* 2008, p. 514). Mountain pine beetle epidemics typically subside when the availability of suitable hosts is exhausted. In a worst-case scenario, there could be 95 percent mortality of mostly cone-bearing (*i.e.,* reproductive) adults by the time the current epidemic collapses (Keane *et al.* 2010, p. 35). Therefore, we expect the ongoing epidemic to continue to intensify and expand in the future. Additionally, we expect ongoing and predicted environmental effects from climate change to create more favorable conditions for mountain pine beetle outbreaks to persist in whitebark pine habitats into the foreseeable future.

2.23.6.5 Summary

Disease in the form of white pine blister rust and predation from mountain pine beetle are contributing, individually and in combination, to the decline of Whitebark pine rangewide. White pine blister rust is now ubiquitous on the landscape; millions of acres of whitebark pine have been infected, and that number is increasing yearly. Due to the warmer temperatures and drier conditions brought on by climate change within the range of whitebark pine, mountain pine beetle epidemics now occur at unprecedented levels, causing mortality in millions of acres of whitebark pine, much of which was previously thought to be mostly climatically immune from large-scale mountain pine beetle attacks. Additionally, the interaction between white pine blister rust and the mountain pine beetle further intensifies the impact of both threats. White pine blister rust and mountain pine beetle are impacting whitebark pine equally in both Canada and the United States portion of the range. In other words, there is currently no refuge from these threats (COSEWIC 2010, p. viii). There is no known way to control or reduce or eliminate either threat at this time, particularly at the landscape scale needed to effectively conserve this species. Thus, we expect both disease and predation to continue to heavily impact whitebark pine.

2.23.6.7 Recovery Needs/Conservation Strategies

There is a National Whitebark Pine Strategy (Keane *et al.* 2012). The strategy expects creation of a range-wide genetic resistance program to promote the conservation of rust resistance in whitebark pine (Keane *et al.* 2012 p.46), and development of a prioritization process for conservation efforts. Out of a total 5,770,013 hectares of whitebark pine range (Keane *et al.* 2012 p.49), there is 5,769,542 ha of FS ownership, and of that the Pacific Northwest region has 668,967 ha of whitebark pine range. The National Plan refers to the regional plan for the Pacific Northwest Region of the Forest Service (described below).

The Pacific Northwest Region of the Forest Service published a Whitebark Pine Restoration Strategy in September, 2008 (USDA 2008). This document lays out a strategy for whitebark pine assessment and restoration. The overriding goal of the strategy is to restore and conserve a network of viable populations of whitebark pine and associated species across the Pacific Northwest (Oregon and Washington). There are five objectives listed to complete this goal:

1. Restore degraded habitat.
2. Protect genetic resources through gene conservation.
3. Increase blister rust resistance in whitebark pine populations.
4. Evaluate the health and status of whitebark pine stands.
5. Increase our understanding of the threats to whitebark pine and develop practical and effective restoration techniques.

The components of this process include an ecosystem based analysis (USDA 2008):

1. Conduct an ecoregion-based assessment.
2. Identify overarching threats.
3. Select a portfolio of sites for conservation and restoration.
4. Create a biodiversity vision.
5. Set long- and short-term conservation goals.
6. Prioritize actions to meet conservation goals.

The region was divided into nine subregions. These were originally developed as seed zones for the genetic restoration program but also worked well as the first scale for analysis. Seed zones were then divided into 30 smaller conservation areas. Each conservation area was divided into one to eight management units based on geographic features, whether the unit is in a designated wilderness area or not, and fire history. The BMF is in Seed Zone 6. There are four conservation areas as follows: The MNF has conservation area 604 and part of 603, UNF has 603, and WWNF has 601 and 602. The Eagle Cap Wilderness on the WWNF (conservation area 601), provides the largest continuous whitebark pine habitat in this seed zone. Post-fire surveys are needed to determine planting needs in conservation area 604 on the MNF. Planting and tree thinning are proposed in conservation area 602 on the WWNF and in conservation area 603 on the Umatilla and Malheur National forests. Mountain pine beetle activity is high in all areas except in 604, and has caused mortality that requires replacement planting. Blister rust infection is moderate to high and was recorded at 49 percent at Vinegar Hill in conservation area 603 (UNF).

One or more of the following proposed actions were assigned to each management unit (USDA 2008):

1. Safeguard habitat - Conserve/safeguard from fire (both wild and prescribed). These units will be included in fire and land management plan maps. This action was only assigned to designated wilderness areas, which do not require restoration.
2. Collect cones - Collect cones from mature whitebark pine stands with high potential for cone production.
3. Restore - Plant seed or seedlings, thin for conifer release, and/or prune. Included in this category are units that have burned or have high mortality due to mountain pine beetle infestation. If a stand represents a unique ecological or aesthetic resource (say, at a popular ski area or campground), then pruning branches with blister rust cankers might be a good tool to retain live trees on the landscape, increase the stand’s conebearing and regenerative potential, and provide ongoing recruitment of young trees as material for natural selection for blister rust resistance. Pruning may also be beneficial to

protect individual high-value trees, such as blister rust resistant candidate trees and trees that are important local seed sources.

4. Survey condition - Survey to determine if whitebark pine is present, to record the general stand condition, and to determine what actions, if any, are needed.
5. Survey seed trees - Survey to determine if conebearing trees are present.

   The proposed action incorporates specific management direction (*OF-1G*) to accommodate situations where encroaching conifers larger than 21 inches diameter at breast height (dbh) can be cut, while also placing restrictions on the harvesting of older trees. This guideline will not be anticipated to substantially restrict whitebark restoration activities because conifers that are generally targeted for removal will 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 will be allocated to MA 1B (*i.e.*, recommended wilderness) from the existing condition. Until final decisions are made by Congress, these area will 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 BMFs have all implemented some levels of active restoration efforts for whitebark pine over the previous planning period. Restoration activities for this species will likely continue or intensify, contingent upon funding.

2.24 Environmental Baseline – Whitebark Pine

Out of a total 5,770,013 hectares (ha) of whitebark pine range (Deane et al. 2012 p. 49), there is 5,769,542 ha of FS ownership, and of that the Pacific Northwest region (Oregon and Washington) has 668,967 ha of whitebark pine range. Within the Pacific Northwest Region, the BMFP has four conservation areas, and 57,000 acres (23,067 ha) of occupied habitat. Therefore, the BMF provide a relatively small contribution to whitebark pine conservation, given the size of the range.

Whitebark pine has a limited distribution within the BMFs and is strongly associated with higher elevation areas within the cold forest potential vegetation group and within wilderness areas. The WWNF contains the largest acreage of whitebark pine in the action area, with an estimated 49,000 acres. The MNF contains an estimated 7,000 acres and the UNF, an estimated 1,000 acres of whitebark pine. Whitebark pine was encountered during the installation of Current Vegetation Survey (CVS) plots on NFS lands, and was found on approximately 140 of the 10,000 plots in the BMFs. 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 BMFs are white pine blister rust, mountain pine beetle, wildfire, and climate change (Aubry *et al.* 2008). Monitoring transects within the BMFS 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 WWNF (conservation area 601), provides the largest continuous whitebark pine habitat in its seed zone (Aubry *et al.* 200). Post-fire surveys are needed to determine planting needs in several areas. This also applies to conservation area 604 on the MNF. Planting and tree thinning are proposed in conservation area 602 (also on the WWNF) 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 BMFs, and was recorded at 49 percent at Vinegar Hill in conservation area 603.

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 of Assessment. 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.

The Colville National Forest (CNF) has already had stand replacing fires in whitebark pine stands (*e.g.*, the Kettle Crest, Mankato Mountain, North and South Baldy) (Honeycutt 2017, *in litt*.). Some of the trees lost in these fires had offspring that showed resistance to blister rust in tests conducted at the FS, Dorena Genetic Resources Center and the Coeur d'Alene Nursery test center. These trees' rust resistant genotypes need to be preserved through collection of scion material which is grafted onto rootstock and planted in areas which will be protected from fire. The existing whitebark pine stands need to have the highest priority for protection from fires, for, when these stands are lost, their individual rust resistant tree genotypes are lost.

2.24.1 Conservation Role of the Action Area

The action area is on the periphery of the range of whitebark pine, with only isolated stands of whitebark pine known to occur (Arno and Hoff 1990, p. 268). The BMFP is in seed zone 6 for the whitebark pine (USDA 2008). Region 6 of the Forest Service's whitebark pine goal is to restore and conserve a network of viable populations of whitebark pine and associated species across the Pacific Northwest by restoring degraded habitat, protecting genetic resources through gene conservation, increasing blister rust resistance in whitebark pine populations, evaluating the health and status of whitebark pine stands where lacking, increasing our understanding of the threats to whitebark pine, and developing practical and effective restoration techniques (USDA 2008 p.2).

Out of a total 5,770,013 hectares (ha) of whitebark pine range (Keane et al. 2012 p.49), there is 5,769,542 ha of Forest Service ownership, and of that the Pacific Northwest region (Oregon and Washington) has 668,967 ha of whitebark pine range. Within the Pacific Northwest Region, the BMFP has four conservation areas, and 57,000 acres (23,067 ha) of occupied habitat. Therefore, the BMF has a relatively small contribution to whitebark pine conservation, given the size of the range of the species.

2.25 Effects of the Action – Whitebark Pine

As stated earlier in the Opinion, the BMFP is a Federal action that provides a framework for the development of future BMF actions that will be authorized, funded, or carried out at a later time within the next 15 years. The overall goal of this section 7 consultation and conferencing process is to evaluate the BMFP for its consistency with the conservation of listed (and proposed and candidate) species. Since whitebark pine is a candidate species, we are conferencing on the species as if it was listed, as requested by the BMF. For more detail on the consultation expectations if the whitebark pine is listed, see the Reinitiation Notice at the end of the Opinion.

Appendix G provides a matrix comparing conservation needs of the whitebark pine and how the BMFP addresses the applicable expectations in that plan. The BMFP specifies maintenance, conservation, and promotion of whitebark pine populations and plan components will provide significant protection measures that should result in the conservation of the whitebark pine on the BMFs. Below, we discuss the general effects of the BMFP on the whitebark pine.

2.25.1 Effects of the MAs and Management Direction

Whitebark pine sites on the BMF total 57,000 acres and occur in the following MAs: Congressionally Designated Wilderness, Recommended Wilderness, Backcountry, and Research Natural Area. These high elevation Mas have very few suitable uses, and are therefore protective of current HRV, thus these designations and their suitable uses help conserve whitebark pine.

BMFP Management Direction that is relevant to whitebark pine is as follows:

> *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.

> *Whitebark Pine DC (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.

Special Plant Habitats DC (unnumbered): Special plant habitats include mountain mahogany, aspen, cottonwood, sagebrush steppe, and whitebark pine. They provide high quality habitat for associated species. The distribution and abundance of structural stages and vegetation density classes within these special plant habitats are consistent with their natural range of variability and create conditions that are ecologically resilient, sustainable, and compatible with maintaining disturbance processes within the desired conditions. Variations in the mix of structural stages and vegetation density combinations across the landscape allow special plant habitats to respond to potential changes in climate.

Federally listed Plants DC: 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.

Federally listed species DC (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., primary constituent elements and primary biological features) are protected and restored to achieve species recovery.

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.

Alpine and subalpine meadows, fellfields, and parklands habitats where whitebark pine occurs 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, as referenced in BA p.234). Whitebark pine is exposed to threats from insect and disease, as well as environmental changes (Devine *et al.* 2012). Additionally, whitebark pine, along with other high alpine and subalpine species has exposure to livestock grazing, recreational activity, hydrologic regime alteration, and plant collecting. Together this creates high to medium levels of risk for desired conservation outcomes.

The BMFP promotes landscape scale restoration of sustainable vegetation types within historic and future ranges of variation and would continue to provide capable habitat. The proposed desired future conditions to maintain or enhance existing populations are expected to be achieved through the application of protective standards and guidelines as well as implementation of plant monitoring that targets population and habitat conditions and trends.

2.25.2 Vegetation Management Effects, including Restoration, Climate Change, Fire, and Insects and Disease

Whitebark pine is not at risk to timber harvest because most of the sites occur in Designated Wilderness, Recommended Wilderness, Research Natural Areas or Back Country. The sites that do not occur in those MAs are addressed through the following management direction, making timber harvest of whitebark pine unlikely.

> *Structural Stages DC:* The distribution and abundance of forested structural stages creates conditions that are ecologically resilient, sustainable, and compatible with natural levels of disturbance.
>
> *OF-1G:* Management activities should retain and generally emphasize recruitment of old trees, large trees and legacy trees. Exceptions where individual old, large, or legacy trees may be removed or destroyed include situations where:
>
> - 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.

Future restoration activities, including controlled fire, could have short-term adverse effects (such as a controlled fire that burns hotter or further than planned), with long term benefits.

> *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-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.

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

Vegetation management for conservation or restoration activities, such as thinning of other trees species in and around whitebark pine is likely to occur, consistent with BMFP management direction as follows:

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.

MA 1A Congressionally Designated Wilderness Areas DC: Designated wilderness areas exhibit primitive qualities. … 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 1B Preliminary Administratively Recommended Wilderness Areas DC: 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.

Appendix G in the BMFP lists possible actions that may take place on the BMF at the project or activity-level to help maintain existing conditions or move toward the DCs. These include: 1) Planting white pine blister rust resistant western white pine or whitebark pine; 2) Maintenance or restoration of rare plant habitat and special and unique natural communities; and 3) Management or treatment of insects and diseases using integrated pest management techniques. While the actions in this appendix are simply projections of what may occur in the future, they indicate intent by the BMF to conserve whitebark pine.

The BMFP will respond to climate change through the following DCs, Guidelines, and Monitoring expectations:

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.

Wildland (Unplanned) Fire DC: Fire adapted and fire resilient landscapes are restored and maintained. Wildland fire (planned and unplanned ignitions) plays a characteristic ecological role in creating forest and rangeland conditions that are resilient to disturbances and climate changes. Wildland fire may be suitable on all acres, depending on expected fire effects and resource objectives.

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.

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.

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. Climate change, coupled with the other threats, may result in loss of individuals or complete sites and continued declines in populations. The BMFP responds to climate change by working towards resilient landscapes and historic range of variability.

2.25.3 Fire

Specific fire related management direction is as follows:

Wildland (Unplanned) Fire DC: Fire adapted and fire resilient landscapes are restored and maintained. Wildland fire (planned and unplanned ignitions) plays a characteristic ecological role in creating forest and rangeland conditions that are resilient to disturbances and climate changes. Wildland fire may be suitable on all acres, depending on expected fire effects and resource objectives.

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-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.
DP-2G: Manage unplanned ignitions as appropriate to achieve desired conditions.

FM-8G (in MA 4B): Minimum impact suppression tactics (MIST) should be utilized in sensitive areas, such as designated wilderness areas, designated wild and scenic river corridors, research natural areas, botanical areas, riparian management areas, cultural and historic sites, developed recreation areas, special use permit areas that have structures, and historic and recreational trails. MIST techniques should also be used for post fire restoration activities.

FM-6G (in MA 4B): 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.

When used under controlled conditions, prescribed fire can be used to reduce fire hazards, reduce competition to whitebark pine from other plant species, and prepare areas where Clark's Nutcrackers can cache seeds. Unretrieved seed from these seed caches results in whitebark pine regeneration.

Large, high-severity fires have the potential to severely reduce or even eliminate cone-bearing whitebark pine across an extensive landscape. The MNF has experienced stand replacing fires in whitebark pine stands (*e.g.* Bald Sisters Fire of 2014 and Canyon Creek Complex of 2015). However, the extent of whitebark pine mortality is unknown due to lack of MNF funds to assess these fires after the initial post-fire assessment. More recent fires on the WWNF have not likely impacted Whitebark pine stands.

Future actions under the BMFP and USDA 2008 may have beneficial effects to whitebark pine. Fire suppression efforts may have beneficial effects on the species. However, large high severity fires may cause mortality and result in loss of individuals or complete sites. An additional guideline, DP-2G, encourages management of unplanned iginitions as appropriate to achieve DCs. In some cases, managed fire can be used to encourage whitebark pine regeneration.

2.25.4 Insects and Disease

Assessments describe the existing threats for the whitebark pine ecosystem from both western white pine blister rust and mountain pine beetle (76 FR 42631, Spies *et al.* 2010). Across the range of whitebark pine, these agents have contributed significantly to recent tree mortality.

This species is a candidate for federal listing with a "warranted but precluded" finding issued in 2011. Continued implementation of the Pacific Northwest whitebark pine restoration strategy, as implemented through the BMFP, will be a critical management action to accomplish conservation goals. In the Pacific Northwest, whitebark pine is highly vulnerable to insects and diseases (Devine *et al.* 2012).

The BMFP includes the following management direction for insects and disease:

> *Invasive Species DC:* 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 significantly diminish the ability of the Forests to provide the goods and services communities expect or the habitat that plant and animal community diversity depends upon. New invasive species resulting from changes in plant and animal habitats due to changes in climate occur only at low levels.
>
> *Insects and Disease DC:* Characteristic levels of insect and disease activity contribute to diverse landscape conditions and provide important wildlife habitat components, such as hollow trees, dead wood, and mistletoe brooms. The desired conditions for vegetation structure, stand density, and species composition (displayed in Sections 1.6, 1.7, and

1.8) create stand conditions with low to moderate vulnerability to insects and diseases across the majority of the upland forest potential vegetation groups. These stand conditions result in ecologically resilient forests with composition, structure, and density characteristics that are fully compatible with periodic disturbance occurring at characteristic levels of severity, intensity, size, and spatial distribution.

IS-2S: An integrated pest management (IPM) approach, including Early Detection and Rapid Response, shall be used to manage pests, such insects, diseases, and invasive or unwanted plants and animals.

IS-3G: Determine appropriate range of treatments necessary to meet objectives for invasive species and native pests, while minimizing adverse effects of treatments. All methods including prevention, manual, cultural, mechanical, regionally approved.

IS-4G: All activities should be planned and conducted to minimize or prevent the potential spread of establishment of invasive species.

Mountain pine beetles are endemic to forest ecosystems and western white pine blister rust, although an introduced disease, is now endemic. It will not be possible to eliminate the disease or the pest, but through proper management of stands, impacts from mountain pine beetles to whitebark pine stands can be reduced, and blister rust resistance genotypes can be introduced into stands through planting of rust resistant seedlings which would be expected to survive on the landscape longer than non-resistant individuals.

Addressing insects and disease may result in beneficial effects to whitebark pine and assist in conservation efforts.

2.25.5 National Forest Access System Effects, including roads, OHV Trails, Recreation, including Dispersed Recreation and Winter Recreation

Access systems including roads and trails are not listed in the literature as a specific stressor or threat to whitebark pine. Road and trail access, however, is a significant responsibility of the FS. Impacts to Whitebark pine from roads and trail access will be managed in the following ways:

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.

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-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.

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

The Access System may result in loss of individuals or habitat if roads or trails are built through occupied or potential whitebark pine habitat. There may be indirect effects of increased human access resulting in accidental fire starts, or gathering of wood including whitebark pine. However, overall the trails and roads program will have minimal impacts on whitebark pine, and plan direction is provided to avoid impacts to individual trees during access management activities.

2.25.6 Lands and Special Uses, including Livestock Grazing and Mining.

Most of the lands and special uses actions occur in lower elevations and in MAs where the whitebark pine is unlikely to exist, therefore impacts from these programs will be minimal. Where these lands and special uses occur in higher elevation MAs that contain whitebark pine, the BMFP will address lands and special uses through the following DCs:

MA 1A Congressionally Designated Wilderness Areas DC: Designated wilderness areas exhibit primitive qualities. … 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 1B Preliminary Administratively Recommended Wilderness Areas DC: Recommended wilderness areas exhibit primitive qualities….. 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.

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.

Because areas occupied by whitebark pine are primarily either in congressionally designated wilderness, proposed wilderness, research natural areas, and backcountry, most Lands and Special Uses actions are unlikely to affect whitebark pine.

Approximately one third of active grazing allotments on the BMFs have some probability of white bark occurrence (*Barb Wales pers. Comm. March 2018*). Therefore, there is a slight vulnerability to trampling from livestock grazing. Grazing on the trees themselves is unlikely, since cattle do not prefer conifer species. Future actions in or near occupied or potential whitebark pine habitat may result in direct or indirect loss of whitebark pine habitat but the DC listed below will minimize any adverse effects.

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 approve conservation strategy, conservation agreement, or recovery plan recommends an alternate use level.

2.25.7 Monitoring

BMFs implementation of whitebark pine monitoring targets population and habitat conditions and trends. Condition and trend monitoring and conservation of genetic material in seed banks have been identified as strategies to deal with the climate change components (ie. temperature increases, changes in precipitation, precipitation patterns, snow pack accumulations, snowmelt, etc). In addition, these climate change components will interact with insect ecology, plant phenology, invasive plant infestations, habitat connectivity, and fire regime shifts to indirectly impact existing populaitons and their habitats (Miller-Struttmann et al. 2015).

The information gained through monitoring and evaluation may be the catalyst for plan revisions or amendments. The BMFP annual and five year monitoring reports will be shared with the USFWS.

2.25.8 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 HCNRA and the allocations of management areas are displayed in the Assessment. Known locations are generally within wilderness land allocations. Excluding large stand-replacing fires or insects and disease, the forested acres 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 BMFP, restoration activities will likely continue or intensify, contingent upon funding.

Existing CMP plan components include components to protect and restore federally listed and sensitive species:

> *TES-02:* 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-04:* 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)

These CMP components are augmented by the 1990 Wallowa-Whitman Forest Plan, which states that in the absence of conservation agreements or strategies, manage sensitive plant species to ensure their continued viability in the planning area. 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.

2.26 Summary of Effects

Beneficial, insignificant, and/or adverse effects may occur to whitebark pine from future actions implemented under the BMFP. Future vegetation management actions could result in insignificant or adverse effects to whitebark pine, depending on the site specific details. Effects are summarized as follows:

- The majority of whitebark pine stands on the BMFs are in the following management areas: Designated Wilderness, Recommended Wilderness, Research Natural Area, and Backcountry. These MAs allow actions that are generally protective of whitebark pine habitat. Future actions under the BMFP and USDA 2008 may have beneficial effects to whitebark pine.
- In HCNRA, whitebark pine also occur mainly in protected wilderness management areas.
- Whitebark pine is not at risk from timber harvest because most of the sites occur in Designated Wilderness, Proposed Wilderness, Research Natural Areas or Back Country. The sites that do not occur in those MAs are addressed through management direction that makes timber harvest of whitebark pine unlikely. Future vegetation management actions could result in insignificant or adverse effects to whitebark pine, depending on the site specific details.
- Climate change will continue and will exacerbate the main threats to whitebark pine (intense fires, pests, and disease). Climate change coupled with the other threats may result in loss of individuals or complete sites, and continued declines in populations. The BMFP responds to climate change through working towards resilient landscapes and historic range of variability.
- Restoration activities will be implemented consistent with the Region 6 Whitebark Pine Restoration Strategy to maintain and enhance whitebark pine. Future restoration activities, including controlled fire, may have short-term adverse effects (for instance, a prescribed fire may burn hotter or further than predicted), but long term benefits may result from the restoration actions. Large, high-severity fires may cause mortality and result in loss of individuals or complete sites across an extensive landscape. Fire suppression efforts may have beneficial effects on the species. Mountain pine beetles are endemic to forest ecosystems, and western white pine blister rust, although an introduced disease, is now endemic. It will not be possible to eliminate the disease or the pest, but through proper management of stands, impacts from mountain pine beetles to whitebark pine stands can be reduced, and blister rust resistance genotypes can be introduced into stands through planting of rust resistant seedlings.

- The BMFs have done some resistance screening and developed a working strategy to collect more seeds from these elite trees, to protect them, and to survey for more potentially resistant trees. The BMFs are planning an outplanting trial with resistant seedlings but no time frame was given. These priority actions were conveyed to the regional WBP coordinator and will be included in a regional conservation strategy.
- Addressing insects and disease may result in beneficial effects to whitebark pine and assist in conservation efforts. The BMFP includes management direction to address insects and disease.

- There may be indirect effects of increased human access resulting in accidental fire starts, or gathering of wood including whitebark pine. However, the management direction will minimize these impacts.
- Because the majority of whitebark pine sites are within congressionally designated wilderness, recommended wilderness, research natural areas, and backcountry, most lands and special uses actions are unlikely to affect whitebark pine. Depending on the size of the allotment, density of cattle grazed, and terrain, trampling of seedling whitebark pine could impact whitebark pine, but trampling is not expected to impact the majority of whitebark pines within an allotment. Grazing on the trees themselves is unlikely, since cattle do not prefer conifer species.
- BMFP direction addresses the main applicable threats to whitebark pine and Appendix G provides a complete list of plan components that should contribute to the conservation and possible recovey of the pine.
- 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.
- The CMP states: Though many management actions such as thinning competitors or prescribed fire will 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. However, the long-term effects of CMP management actions will support conservation of this species.

2.27 Cumulative Effects – Whitebark Pine

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. However, there is no state or private land in whitebark pine habitat. Therefore cumulative effects are unlikely to occur.

2.28 Integration and Synthesis of Effects

Whitebark pine is affected by white pine blister rust and predation from mountain pine beetle. That, coupled with climate change and more frequent and higher intensity fires, has resulted in the decline of whitebark pine range wide. Most whitebark pine habitat in Washington and Oregon occurs on federally administered land, and 81 percent is on lands administered by the Forest Service, Region 6 (USDA 2008). Sixty percent of the known occupied whitebark pine habitat and 72 percent of the potential whitebark pine habitat on NFS land in the Pacific Northwest occurs in congressionally designated wilderness areas.

The BMFs will protect the habitat, manage for white pine blister rust resistant genetic lines, and implement restoration activities. The BMFP provides management direction that is consistent with National (Keane *et al.* 2012) and regional level (USDA 2008) whitebark pine strategies (Appendix G). The CMP provides similarly protective management direction.

Out of a total 5,770,013 hectares (ha) of whitebark pine range (Keane *et al.* 2012 p.49), there is 5,769,542 ha of Forest Service ownership, and of that the Pacific Northwest region (Oregon and Washington) has 668,967 ha of whitebark pine range. Within the Pacific Northwest Region, the

BMFP has four conservation areas, and 57,000 acres (23,067 ha) of occupied habitat. Therefore, the BMF has a relatively small contribution to whitebark pine conservation, given the size of the range of the species.

Despite BMFs efforts, the occupied whitebark pine habitat may continue to decline because of disease, habitat loss from catastrophic fire, and habitat loss from environmental effects resulting from climate change. BMFP and CMP management direction will minimize effects from individual activities, and contribute to the conservation of the species. Although the BMFP and CMP provide management direction to address this species and its habitat, we expect occupied whitebark pine habitat in the action area to shrink, but not be eliminated. Coupled with other efforts in other regions, the decline may be slowed and allow conservation efforts to better protect this species.

2.29 Conclusion – Whitebark Pine
After reviewing the current status of the whitebark pine, the environmental baseline for the action area, the effects of the proposed BMFP, including the implementation of the HCNRA CMP, and the cumulative effects, it is the Service's Opinion that the action, as proposed, is not likely to jeopardize the continued existence of the whitebark pine. Occupied whitebark pine habitat in the action area may shrink, but is not expected to be eliminated.

No critical habitat has been designated for this species.

The whitebark pine is a candidate species. See the Reinitiation Notice regarding future confirming of this conference opinion as a biological opinion.

3.0 INCIDENTAL TAKE STATEMENT (For All Species)
Although the BMFP, including the HCNRA CMP, provides descriptions of program activities and overall goals for a variety of resource programs (e.g., timber harvest, recreational use, etc.), it does not provide a detailed list of proposed actions that will occur within these programs during the next 15 years. The proposed action that is the subject of this consultation is a "framework programmatic action" as defined in 50 C.F.R. 402.02. In accordance with 50 C.F.R. 402.14(i)(6), an incidental take statement is not required for this action. Any incidental take resulting from any action subsequently authorized, funded, or carried out under this framework programmatic action will be addressed in subsequent section 7 consultations, as appropriate.

Sections 7(b)(4) and 7(o)(2) of the ESA generally do not apply to listed plant species (for example, whitebark pine). However, limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law. It is expected that the BMFs will comply with these limited protections for whitebark pine, should this species become listed during the life of the BMFP and the HCNRA CMP.

4.0 CONSERVATION RECOMMENDATIONS FOR ALL SPECIES

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

4.1 Bull Trout

1. Standardize monitoring and evaluation of bull trout populations across these recovery units in order to develop sufficient demographic information to assess status and trend, and response to recovery actions.
2. Coordinate with Service, La Grande Field Office, on annual bull trout surveys. Work together to determine highest priority areas and efforts.
3. For future site-specific actions and step-down consultations, consider the best available scientific information and current bull trout distribution to determine the likely exposure of bull trout.
4. Work with the Service to implement recovery and conservation actions identified in the recovery plan including but not limited to, identifying suitable spawning habitats, genetic surveys, and developing distribution records.

4.2 Wolverine

1. Cooperate with efforts to better understand the distribution and life history of wolverine in Oregon and the Northwest.
2. If the wolverine is listed, cooperate with recovery efforts for the wolverine.

4.3 Whitebark Pine

1. Collect whitebark pine seed to contribute to developing white pine blister rust resistant trees. Mark each collected tree with small aluminum tags at the base to ensure that the data and locations can be tracked.
2. Explore methods and encourage research to reduce pine beetle activity in vulnerable whitebark pine sites.
3. Continue to implement the Whitebark Pine Restoration Strategy for the Pacific Northwest Region (USDA 2008).
4. Explore replanting blister-rust resistant seedlings in previously occupied habitats as evidenced by whitebark pine snags.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

5.0 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following conservation recommendations:

1. Often, new roads produce more sediment than existing roads. Thus, we recommend the BMF mitigate the sediment resulting from new roads by reducing sediment production on more than a 1:1 ratio.
2. A review, every five years, of the climate change vulnerability assessment implementation (e.g. Duncan 2015 and Isaak et al. 2015 for bull trout; Halofsky and Peterson 2017 for other vulnerable species, such as wolverine and whitebark pine http://adaptationpartners.org/bmap/docs/HalofskyPeterson2017_PNW-GTR-939.pdf) to validate and/or add to the BMFP conditions, standards, and guidelines and to develop new objectives, as needed, to address vulnerable ecosystems and processes.
3. BMF regularly review and update the Watershed Condition Framework Indicators in order to accurately evaluate the status and trend of watersheds, water quality, and aquatic and riparian resources on all three Forests.

6.0 REINIATION NOTICE FOR LISTED SPECIES

This concludes formal framework programmatic consultation on the action(s) outlined in the request for formal consultation. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) New information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; 2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or 3) a new species is listed or critical habitat designated that may be affected by the action. As described previously, this is a framework Opinion, and therefore no incidental take is anticipated or exempted for the action.

7.0 REINITIATION NOTICE FOR PROPOSED AND CANDIDATE SPECIES

This concludes formal framework programmatic conference for wolverine and whitebark pine, on the BMFP. You may ask the La Grande Field Office (LGFO) in writing to confirm the conference opinion as a biological opinion issued through formal consultation if the wolverine or whitebark pine get listed. If the LGFO reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the conference, the LGFO will confirm the conference opinion as the biological opinion and no further section 7 framework programmatic consultation on the BMFP or CMP for these species will be necessary. After listing of the species as endangered or threatened and after any subsequent adoption of this conference opinion, the Federal Agency shall request reinitiation of consultation if: (1) New information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (3) a new species is listed or critical habitat designated that may be affected by the action.

LITERATURE CITED - GENERAL

(followed by sections for each species chapter)

Beechie, T.J., D.A. Sear, J.D. Olden, G.R. Pess, J.M. Buffington, H. Moir, P. Roni, and M.M. Pollock. 2010. Process-based principles for restoring river ecosystems. BioScience, 60(3), pp.209-222.

Benda, L., D. Miller, P. Bigelow, and K. Andras. 2003. Effects of post-wildfire on channel environments, Boise River, Idaho. Forest Ecology and Management 178: 105-119.

Crowe, E.A. and R.R. Clausnitzer. 1997. Mid-montane wetlands classification of the Malheur, Umatilla, and Wallowa-Whitman national forests. USDA Forest Service, Pacific Northwest Region, Wallowa-Whitman National Forest. Baker City, Oregon. 299 pp.

FEMAT (Forest Ecosystem Management Assessment Team). 1993. Forest ecosystem management: an ecological, economic, and social assessment. Report of the Forest Ecosystem Management Assessment Team. U.S. Government Printing Office 1993-793-071. U.S. Government Printing Office for the U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Land Management, and National Park Service; U.S. Department of Commerce, National Oceanic and Atmospheric Administration and National Marine Fisheries Service; and the U.S. Environmental Protection Agency.

Hessberg, P.F., T.A. Spies, D.A. Perry, et al. 2016. Tamm Review: Management of mixed-severity fire regime forests in Oregon, Washington, and Northern California. Forest Ecology and Management 366 (2016) 221-250.

Johnson, C.G. and S. Simon. 1987. Plant associations of the Wallowa-Snake Provicne. R6-ECOL-TP-255B-86, U.S. Department of Agriculture, Pacific Northwest Region, Wallowa-Whitman National Forest, Baker City, Oregon Toweill D.E., Thomas J.E. (2002) North American elk: ecology and management. Smithsonian Institution Press, Washington, DC.

Karr, J.R. 1991. Biological integrity: a long-neglected aspect of water resource management. Ecological Applications, 1, 66-84.

Karr, J.R., K.D. Fausch, P.L. Angermeier, P.R. Yant, and I.J. Schlosser. 1986. Assessing biological integrity in running waters: a method and its rationale, Illinois Natural History Survey Special Publication 5, 27 pp.

Potyondy, J.P and T.W. Geier 2010. Forest Service watershed condition classification technical guide. Available at: http://www.fs.fed.us/biology/resources/pubs/watershed/maps/watershed_classification_guide2011FS978.pdf. Accessed October 4, 2016

Regional Ecosystem Office. 1995. Ecosystem analysis at the watershed scale. Federal Guide for Watershed Analysis.

Reiss, K.Y., K. Gallo, P. Dawson, D. Konnoff, and L. Croft. 2008. Process for evaluating the contribution of national forest system lands to aquatic ecological sustainability. A regional pilot process conducted on the Okanogan-Wenatchee and Colville National Forests. USDA Forest Service, Pacific Northwest Region, Region 6. Portland, Oregon. June 5, 2008.

Roni, P., T.J. Beechie, R.E. Bilby, F.E. Leonetti, M.M. Pollock, and G.R. Pess. 2002. A review of stream restoration techniques and a hierarchical strategy for prioritizing restoration in

Pacific Northwest watersheds. North American Journal of Fisheries Management, 22(1), pp.1-20..
U.S. Department of Agriculture, Forest Service [USDA Forest Service]. 1989. Land and resource
management plan, Malheur National Forest. Portland, OR, U.S. Department of Agriculture, Forest Service, Pacific Northwest Region.
U.S. Department of Agriculture, Forest Service. 1989. Land and resource management plan, Ochoco National Forest. Portland, OR, U.S. Department of Agriculture, Forest Service, Pacific Northwest Region.
U.S. Department of Agriculture, Forest Service. 1989. Land and resource management plan, Umatilla National Forest. Portland, OR, U.S. Department of Agriculture, Forest Service, Pacific Northwest Region.
U.S. Department of Agriculture, Forest Service. 1990. Land and resource management plan, Wallowa-Whitman National Forest. Portland, OR, U.S. Department of Agriculture, Forest Service, Pacific Northwest Region.
USDA Forest Service. 2003. Biological assessment for endangered threatened, and candidate species. Hells Canyon National Recreation Area final environmental impact statement comprehensive management plan. Wallow-Whitman National Forest. Baker City, OR.
USDA Forest Service. 2005a. Pacific Northwest Region Aquatic Restoration Strategy. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. Portland, Oregon. 28 pp.
U.S. Department of Agriculture, Forest Service. 2012 BMPs (General water quality Best Management Practices). Pacific Northwest Region.
USDA Forest Service. 2016. Draft Aquatic and riparian conservation strategy version 2016.1. USDA Forest Service, Pacific Northwest and Pacific Southwest Regions. USDA Forest Service Pacific Northwest Region, Portland, Oregon. 125 pp. August 10, 2016.
Wondzell, S.M. and J.G. King. 2003. Post fire erosional processes in the Pacific Northwest and Rocky Mountain regions. Forest ecology and Management 178: 75-87.

LITERATURE CITED - GRAY WOLF

Boyd, D.K. and D.H. Pletscher. 1999. Characteristics of dispersal in a colonizing wolf population in the central Rocky Mountains. Journal of Wildlife Management. 63:1094-1108.
Fuller, T. K. 1989. Population dynamics of wolves in north-central Minnesota. Wildlife Monographs 105:1-41.
Fuller, T.K., W.E. Berg, G.L. Radde, M.S. Lenarz, and G.B. Joselyn. 1992. A history and current estimate of wolf distribution and numbers in Minnesota. Wildlife Society Bulletin. 20:42-55.
Larsen, T. and Ripple, W.J., 2006. Modeling gray wolf (Canis lupus) habitat in the Pacific Northwest. USA Journal of Conservation Planning, 2(1), pp.30-61.
Mech, L.D. 1970. The Wolf: The ecology and behavior of an endangered species. Natural History Press. 389 pp.
Mech, L. D. and L. Boitani. 2003. Wolf Social Ecology. pp. 1-34 in L. D. Mech and L. Boitani (eds.), Wolves: Behavior, Ecology, and Conservation. University of Chicago Press.

Mladenoff, D. J., T. A. Sickley, R. G. Haight, and A. P. Wydeven. 1995. A regional landscape analysis and prediction of favorable gray wolf habitat in the northern Great Lakes region. Conservation Biology 9:279-294.

Oakleaf, J.K., D.L. Murray, J.R. Oakleaf, E.E. Bangs, C.M. Mack, D.W. Smith, J.A. Fontaine,

M.D. Jimenez, T.J. Meier, and C.C. Niemeyer. 2006. Habitat selection by recolonizing wolves in the Northern Rocky Mountains of the United States. Journal of Wildlife Management, 70(2):554-563.

ODFW (Oregon Department of Fish and Wildlife). 2015. Updated biological status review for the Gray Wolf (Canis lupus) in Oregon and evaluation of criteria to remove the Gray Wolf from the List of Endangered Species under the Oregon Endangered Species Act. Salem, OR. http://www.dfw.state.or.us/agency/commission/minutes/15/11_november/Exhibit%20B_Attachment%203_Updated%20Biological %20Status%20Review.pdf

ODFW. 2016. Oregon Wolf Conservation and Management 2015 Annual Report. Oregon Department of Fish and Wildlife, 4034 Fairview Industrial Drive SE. Salem, OR, 97302.

Paquet, P. C., L. Wierzchowski, and C. Callaghan. 1996. Effects of Human Activity on Gray Wolves in the Bow River Valley, Banff National Park, Alberta. Chapter 7 in: Green, J., Pacas, C., Cornwell, L., and S. Bayley (Eds.). Ecological Outlooks Project. A Cumulative Effects Assessment and Futures Outlook of the Banff Bow Valley. Prepared for the Banff Bow Valley Study. Department of Canadian Heritage, Ottawa, Ontario

LITERATURE CITED - BULL TROUT

Al-Chokhachy, R., B.B. Roper, and E. Archer. 2010. Evaluating the status and trends of physical stream habitat in headwater streams within the interior Columbia River and upper Missouri River basins using an index approach. Transactions of the American Fisheries Society 139:1041–1059.

Ardren, W.R., P.W. DeHaan, C.T. Smith, E.B. Taylor, R. Leary, C.C. Kozfkay, L. Godfrey, M. Diggs, W. Fredenberg, and J. Chan. 2011. Genetic structure, evolutionary history, and conservation units of bull trout in the coterminous United States. Transactions of the American Fisheries Society 140:506-525. 22 pp.

Battin, J., M.W. Wiley, M.H. Ruckelshaus, R.N. Palmer, E. Korb, K.K. Bartz, and H. Imaki. 2007. Projected impacts of climate change on salmon habitat restoration. Proceedings of the National Academy of Sciences of the United States of America 104(16):6720-6725. 6 pp.

Baxter, C.V. 2002. Fish movement and assemblage dynamics in a Pacific Northwest riverscape. Doctoral dissertation. Oregon State University, Corvallis, OR. 174 pp.

Baxter, J. S. 1997. Aspects of the reproductive ecology of bull trout in the Chowade River, British Columbia. Master's thesis. University of British Columbia, Vancouver. 110 pp.

Beauchamp, D.A., and J.J. VanTassell. 2001. Modeling seasonal trophic interactions of adfluvial bull trout in Lake Billy Chinook, Oregon. Transactions of the American Fisheries Society 130:204-216. 13 pp.

Behnke, R.J. 2002. Trout and Salmon of North America; Chapter: Bull Trout. Free Press, Simon and Shuster, Inc. N.Y., N.Y. Pp. 293-299.

Benda, L., D. Miller, P. Bigelow, and K. Andras. 2003. Effects of post-wildfire on channel environments, Boise River, Idaho. Forest Ecology and Mangement 178: 105-119.

Bisson, P.A., B.E. Rieman, C. Luce, P.F. Hessburg, D.C. Lee, J.L. Kershner, G.H. Reeves, and R.E. Gresswell. 2003. Fire and aquatic ecosystems of the western USA: Current knowledge and key questions. Forest Ecology and Management. 178 (2003) 213-229. 17 pp.

Boag, T.D. 1987. Food habits of bull char, Salvelinus confluentus, and rainbow trout, Salmo gairdneri, coexisting in a foothills stream in northern Alberta. Canadian Field-Naturalist 101(1): 56-62. 6 pp.

Bond, C.E. 1992. Notes on the nomenclature and distribution of the bull trout and the effects of human activity on the species. Pages 1-4 in Howell, P.J. and D.V. 4 pp.

Brenkman, S.J. and S.C. Corbett. 2005. Extent of Anadromy in Bull Trout and Implications for Conservation of a Threatened Species. North American Journal of Fisheries Management. 25:1073–1081. 9 pp.

Brewin, P.A. and M. K. Brewin. 1997. Distribution Maps for Bull Trout in Alberta. Pages 206-216 in Mackay, W.C., M.K. Brewin and M. Monita. Friends of the bull Trout Conference Proceedings. 10 pp.

Buchanan, D.V., and S.V. Gregory. 1997. Development of water temperature standards to protect and restore habitat for bull trout and other cold water species in Oregon. Mackay, W.C., Pp. 119-126

Buchanan, D.V., M.L. Hanson, and R.M. Hooton. 1997. Status of Oregon's bull trout. Oregon Department of Fish and Wildlife. 168 pp.

Bureau of Land Management, U.S. Environmental Protection Agency, National Marine Fisheries Service, U.S. Forest Service, and U.S. Fish and Wildlife Service. 2014. Updated Interior Columbia Basin Strategy: A strategy for applying the knowledge gained by the interior Columbia Basin ecosystem management project to the revision of land use plans and project implementation. 28 p.

Burkey, T.V. 1989. Extinction in nature reserves: the effect of fragmentation and the importance of migration between reserve fragments. Oikos 55:75-81. 7 pp.

Burkey, T.V. 1995. Extinction rates in archipelagoes: Implications for populations in fragmented habitats. Conservation Biology 9: 527-541. 16 pp.

Burns Paiute Tribe (BPT). 2016. Evaluate the life history of native salmonids in the Malheur Subbasin. FY 2016 Annual Report. Natural Resources Department, Fisheries Program.

Cavender, T. M. 1978. Taxonomy and distribution of the bull trout, Salvelinus confluentus (Suckley), from the American Northwest. California Fish and Game 64: 139-174. 19 pp.

Combes, S. 2003. Protecting freshwater ecosystems in the face of global climate change. In: Hansen LJ et al. (eds) Buying time: a user's manual for building resistance and resilience to climate change in natural systems. WWF, Washington, UDA. Pp. 175-214. 44 pp.

Costello, A.B., T.E. Down, S.M. Pollard, C.J. Pacas, and E.B. Taylor. 2003. The influence of history and contemporary stream hydrology on the evolution of genetic diversity within species: an examination of microsatellite DNA variation in bull trout, Salvelinus confluentus (Pisces: Salmonidae). Evolution. 57(2):328-344. 17 pp.

Day, K. 2015. Watershed function, water quality, and water uses. Report prepared for the Colville National Forest forest plan revision March 2, 2015.

Donald, D.B. and D.J. Alger. 1993. Geographic distribution, species displacement, and niche overlap for lake trout and bull trout in mountain lakes. Canadian Journal of Zoology 71:

238-247. 10 pp.

Dunham, J.B. and B.E. Rieman. 1999. Metapopulation structure of bull trout: Influences of physical, biotic, and geometrical landscape characteristics. Ecological Applications 9:642-655. 15 pp.

Fishbase 2015. http://www.fishbase.org/Summary/SpeciesSummary.php?ID=2690&AT=bull+trout 2pp.

Fraley, J.J., and B.B. Shepard. 1989. Life history, ecology and population status of migratory bull trout (Salvelinus confluentus) in the Flathead Lake and River System, Montana. Northwest Science 63(4):133-143.

Frissell, C.A. 1999. An ecosystem approach to habitat conservation for bull trout: groundwater and surface water protection. Open File Report Number 156-99. Flathead Lake Biological Station, University of Montana, Polson, MT, 46 pp.

Furniss, M.J., T.D. Roelofs, and C.S. Yee. 1991. Road construction and maintenance. American Fisheries Society Special Publication 19:297-323. 14 pp.

Goetz, F. 1989. Biology of the bull trout, Salvelinus confluentus, a literature review. Willamette National Forest. Eugene, Oregon. 60 pp.

Goetz, F., E. Jeanes, and E. Beamer. 2004. Bull trout in the nearshore. Preliminary draft. U.S. Army Corps of Engineers, Seattle, Washington, June, 2004, 396 pp.

Gregory, J.S., and B.L.Gamet. 2009. Cattle trampling of simulated bull trout redds. North American Journal of Fisheries Management 29:361-366.

Gucinski, Hermann; Furniss, Michael J.; Ziemer, Robert R.; Brookes, Martha H. 2001. Forest roads: a synthesis of scientific information. Gen. Tech. Rep. PNWGTR-509. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 103 p.

Haas, G. R., and J. D. McPhail. 1991. Systematics and distributions of Dolly Varden (Salvelinus malma) and bull trout (Salvelinus confluentus) in North America. Can. J. Fish. Aquat. Sci. 48: 2191-2211. 21 pp.

Hard, J. 1995. A quantitative genetic perspective on the conservation of intraspecific diversity. American Fisheries Society Symposium 17: 304-326. 22 pp.

Hari, R. E., D. M. Livingstone, R. Siber, P. Burkhardt-Holm, and H. Guttinger. 2006. Consequences of climatic change for water temperature and brown trout populations in alpine rivers and streams. Global Change Biology 12:10–26. 17 pp.

Healey, M.C. and A. Prince. 1995. Scales of variation in life history tactics of Pacific salmon and the conservation of phenotype and genotype. American Fisheries Society Symposium 17:176-84. 10 pp.

IPCC (Intergovernmental Panel on Climate Change). 2007. Climate change 2007: the physical science basis. Available: www.ipcc.ch. (February 2007). 1007 pp.

ISAB (Independent Scientific Advisory Board). 2007. Climate change impacts on Columbia River basin fish and wildlife. ISAB 2007-2. Portland, Oregon. 2007. 146 pp.

Leary, R.F. and F.W. Allendorf. 1997. Genetic confirmation of sympatric bull trout and Dolly Varden in western Washington. Transactions of the American Fisheries Society 126:715-720. 6 pp.

Leary, R.F., F.W. Allendorf, and S.H. Forbes. 1993. Conservation genetics of bull trout in the Columbia and Klamath River drainages. Conservation Biology [CONSERV. BIOL.]

7:856-865.
Leathe, S.A. and P. Graham. 1982. Flathead Lake Fish Food Habits Study. Environmental Protection Agency, through Steering Committee for the Flathead River Basin Environmental Impact Study. 208 pp.
Lee, D.C., J.R. Sedell, B.E. Rieman, R.F. Thurow, J.E. Williams, and others. 1997. Broadscale Assessment of Aquatic Species and Habitats. Pages 1057-1496 in S. J. Arbelbide, editor. An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins: Vol. III. USDA Forest Service General Technical Report PNW-GTR-405
Magnuson, J.J., Robertson, D.M., Benson, B.J., Wynne, R.H., Livingstone, D.M., Arai, T., Assel, R.A., Barry, R.G., Card, V., Kuusisto, E., Granin, N.G., Prowse, T.D., Stewart, K.M., and Vuglinski, V.S. 2000. Historical trends in lake and river cover in the Northern Hemisphere. Science 289:1743-1746. 5 pp.
MBTSG (Montana Bull Trout Scientific Group). 1998. The relationship between land management activities and habitat requirements of bull trout. Prepared for Montana Bull Trout Restoration Team. Helena, Montana. 86 pp.
McMahon, T.E., A.V. Zale, F.T. Barrows, J.H. Selong and R.J. Daney. 2007. Temperature and competition between bull trout and brook trout: a test of the elevation refuge hypothesis. Transactions of the American Fisheries Society 136: 1313-1326.
McPhail, J.D., and J.S. Baxter. 1996. A Review of Bull Trout (Salvelinus confluentus) Life-history and Habitat Use in Relation to Compensation and Improvement Opportunities. University of British Columbia. Fisheries Management Report #104. 37 pp.
Meffe, G.K., and C.R. Carroll. 1994. Principles of conservation biology. Sinauer Associates, Inc. Sunderland, Massachusetts. 8 pp.
Mehan, W.R. 1991. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19.
Meredith, C., B, Roper and E. Archer, 2014. Reductions in instream wood in streams near roads in the Interior Columbia River Basin. North American Journal of Fisheries Management, 34:493-506.
ODEQ (Oregon Department of Environmental Quality). 1995. National pollution discharge elimination system permit evaluation report. Facility Bourne Mining Corporation. December 11, 2003. File number 11355. 8pp.
Ouren, D.S., C. Hass, C.P. Melcher, S.C. Stewart, P.D. Ponds, N.R. Sexton, L. Burris, T. Fancher, and Z.H. Bowen. 2007. Environmental effects of off-highway vehicles on Bureau of Land Management lands: A literature synthesis, annotated bibliographies, extensive bibliographies, and internet resources: U.S. Geological Survey Open-File Report 2007-1353.
Platts, W. S. 1991. Livestock grazing. pp. 389-424 in Meehan, ed., Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Soc., Bethesda, Maryland. 751 p.
Porter, M. and M. Nelitz. 2009. A future outlook on the effects of climate change on bull trout (Salvelinus confluentus) habitats in the Cariboo-Chilcotin. Prepared by ESSA Technologies Ltd.for Fraser Salmon and Watersheds Program, B.C. Ministry of Environment, and Pacific Fisheries Resource Conservation Council. 10 pp.
Potyondy, J.P, and T.W. Geier. 2010. Forest Service watershed condition classification

technical guide. Available at : http://www.fs.fed.us/biology/resources/pubs/watershed/maps/watershed_classification_guide2011FS978.pdf. Accessed October 4, 2016.

Pratt, K.L. 1985. Pend Oreille trout and char life history study. Idaho Department of Fish and Game, Boise, Idaho. 74 pp.

Pratt, K.L. 1992. A Review of bull trout life history. 00. 5-9. In Proceedings of the Gearhart Mountain Bull Trout Workshop, ed. Howell, P.J. and D.V. Buchanan. Gearhart Mountain, OR. Corvallis, OR: Oregon Chapter of the American Fisheries Society. August 1992. 8 pp.

Quigley, T.M., and S.J. Arbelbide, tech. eds. 1997. An assessment of ecosystem components in the Interior Columbia Basin and portions of the Klamath and Great Basins: volume III. Gen. Tech. Rep. PNW-GTR-405. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 4 vol. 13 pp.

Quinn, T. P. 2005. The behavior and ecology of pacific salmon and trout. 2005. University of Washington Press. 1st edition. 9 pp.

Ratliff, D.E., and P.J. Howell. 1992. The status of bull trout populations in Oregon. Pages 10-17 in: P.J. Howell and D.V. Buchanan (eds). Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis. 8 pp.

Reeves, G. H.; B. R. Pickard, K.N. Johnson. 2016. An initial evaluation of potential options for managing riparian reserves of the Aquatic Conservation Strategy of the Northwest Forest Plan. Gen. Tech. Rep. PNW-GTR-937. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 97 p.

Rieman, B., and J. Clayton. 1997. Wildfire and native fish: Issues of forest health and conservation of sensitive species. Fisheries 22:6-14. 10 pp.

Rieman, B., D. Lee, D. Burns, R. Gresswell, M. Young, R. Stowell, J. Rinne, and P. Howell. 2003. Status of native fishes in the western United States and issues for fire and fuels management. Forest Ecology and Management 178: 197-211.

Rieman, B., D. Lee, G. Chandler and D. Myers. 1995. Does wildfire threaten extinction for salmonids? Responses of redband trout and bull trout following recent large fires on the Boise National Forest. Proceedings-Fire Effects on Rare and Endangered Species and Habitat Conference. Coeur d' Alene, Idaho. November 13-16, 1995.

Rieman, B.E., and F.W. Allendorf. 2001. Effective population size and genetic conservation criteria for bull trout. North American Journal of Fisheries Management 21:756-764. American Fisheries Society, Bethesda, Maryland. 10 pp.

Rieman, B.E., and J.B. Dunham. 2000. Metapopulations and salmonids: a synthesis of life history patterns and empirical observations. Ecology of Freshwater Fish 9:51-64. 14 pp.

Rieman, B.E., and J.D. McIntyre. 1993. Demographic and habitat requirements of bull trout Salvelinus confluentus. General Technical Report INT-GTR- 302. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, Utah. 42 pp.

Rieman, B.E. and J.D. McIntyre. 1996. Spatial and temporal variability in bull trout redd counts. North American J. of Fisheries Manage. 16: 132-146. 10pp.

Rieman, B.E., D.C. Lee and R.F. Thurow. 1997. Distribution, status and likely future trends of Bull trout within the Columbia River and Klamath River basins. North American Journal of Fisheries Management 17:1111-1125. 48 pp.

Rieman, B.E., D. Isaak, S. Adams, D. Horan, D. Nagel, C. Luce, D. Myers. 2007. Anticipated

Climate Warming Effects on Bull Trout Habitats and Populations Across the Interior Columbia River Basin. Transactions of the American Fisheries Society. 136:1552-1565. 16 pp.

Rieman, B.E., J.T. Peterson and D.L. Myers. 2006. Have brook trout (Salvelinus fontinalis) displaced bull trout (Salvelinus confluentus) along longitudinal gradients in central Idaho streams? Canadian Journal of Fisheries and Aquatic Sciences. Vol. 63, No. 1, pp. 63–78. 16 pp.

Reiss, K. Yuki, K. Gallo, P. Dawson, D. Konnoff, and L. Croft. 2008. Process for evaluating the contribution of national forest system lands to aquatic ecological sustainability. A regional pilot process conducted on the Okanogan-Wenatchee and Colville National Forests. USDA Forest Service, Pacific Northwest Region, Region 6. Portland, Oregon. June 5, 2008.

Rodtka, M.C. and J.P. Volpe. 2007. Effects of water temperature on interspecific competition between juvenile bull trout and brook trout in an artificial stream. Transactions of the American Fisheries Society 136: 1714-1727.

Saunders, D.A., R.J. Hobbs, and C.R. Margules. 1991. Biological consequences of ecosystem fragmentation: A review. Conservation Biology 5:18-32. 15 pp.

Schill, D.J. 1992. River and stream investigations. Job Performance Report, Project F-73-R-13. Idaho Department of Fish and Game, Boise, Idaho. 66 pp.

Seattle City Light (SCL). 2009. Boundary Hydroelectric Project (FERC No. 2144): Study No. 9 Fish Distribution, Timing, and Abundance Study Final Report. Prepared by Terrapin Environmental, Golder Associates, and Tetra Tech. March 2009.

Sestrich, C.M., T.E. McMahon and M.K. Young. 2011. Influence of fire on native and nonnative salmonid populations and habitat in a Western Montana basin. Transactions of the American Fisheries Society 140: 136-146.

Shuter, B.J., and Meisner, J.D. 1992. Tools for assessing the impact of climate change on freshwater fish populations. GeoJournal 28(1):7-20. 22 pp.

Simpson, J.C., and R.L. Wallace. 1982. Fishes of Idaho. University Press of Idaho. Moscow, ID. 5 pp.

Spence, B.C., G.A. Lomnicky, R.M. Hughes, and R.P. Novitzki. 1996. An ecosystem approach to salmonid conservation. ManTech Environmental Research Services, Inc., Corvallis, Oregon, to National Marine Fisheries Service, Habitat Conservation Division, Portland, Oregon (Project TR-4501-96-6057).

Spruell P., A.R. Hemmingsen, P.J. Howell, N. Kanda1 and F.W. Allendorf. 2003. Conservation genetics of bull trout: Geographic distribution of variation at microsatellite loci. Conservation Genetics 4: 17–29. 14 pp.

Spruell, P., B.E. Rieman, K.L. Knudsen, F.M. Utter, and F.W. Allendorf. 1999. Genetic population structure within streams: microsatellite analysis of Bull trout populations. Ecology of Freshwater Fish 8:114-121. 8 pp.

Stewart, D.B., N.J. Mochnacz, C.D. Sawatzky, T.J. Carmichael, and J.D. Reist. 2007. Fish life history and habitat use in the Northwest territories: Bull trout (Salvelinus confluentus). Canadian Manuscript Report of Fisheries and Aquatic Sciences 2801. Department of Fisheries and Oceans, Winnipeg, MB, Canada, 2007, 54 pp.

Sweeney, B. W. and J. D. Newbold, 2014. Streamside forest buffer width needed to protect stream water quality, habitat, and organisms: A Literature Review. Journal of the

American Water Resources Association (JAWRA) 50(3): 560-584. DOI: 10.1111/jawr.12203

Taylor, B.E., S. Pollard, and D. Louie. 1999. Mitochondrial DNA variation in bull trout (Salvelinus confluentus) from northwestern North America: implications for zoogeography and conservation. Molecular Ecology 8:1155-1170. 16 pp.

Thomas, G. 1992. Status of bull trout in Montana. Report prepared for Montana Department of Fish, Wildlife and Parks, Helena, Montana. 108 pp.

Trombulak, S.C. and C.A. Frissell. 2000. Review of the ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14: 18-30.

USDA (U.S. Department of Agriculture) Forest Service. 2003. Hells Canyon National Recreation Area Comprehensive Management Plan. Wallowa-Whitman National Forest.

USDA Forest Service. 2001. The 2001 Roadless Area Conservation Rule (36 CFR 294). Washington D.C.

USDA Forest Service. 2016. Pacific Northwest and Pacific Southwest Regions ARCS.

USDA (U.S. Department of Agriculture), and USDI (U.S. Department of the Interior). 1995. Decision Notice/Decision Record Finding of No Significant Impact, Environmental Assessment for the Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon, and Washington, Idaho, and portions of California (PACFISH). 211 pp.

USFS (USDA Forest Service) and BLM (USDI Bureau of Land Management). 1994. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents in the range of the northern spotted owl and standards and guidelines for management of habitat for late-successional and old growth forest related species. (Place of publication unknown). 74 p. (plus Attachment A: standards and guides).

U.S. Forest Service, National Marine Fisheries Service, and U.S. Fish and Wildlife service. 2002. Agreement letter on procedures to consult on Forest plan revision.

USFWS (U.S. Fish and Wildlife Service). 1996. Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the Endangered Species Act. Federal Register Vol. 61 4722-4725.

USFWS. 1998a. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Klamath River and Columbia River Distinct Population Segments of Bull Trout. Federal Register /Vol. 63, No. 111 /Wednesday, June 10, 1998.

USFWS. 1998b. A framework to assist in making endangered species act determinations of effect for individual or grouped actions at the bull trout subpopulation watershed scale.

USFWS. 1998c. Effects to bull trout from continued implementation of land and resource management plans and resource management plans as amended by the interim strategy for managing fish-producing watersheds in eastern Oregon and Washinton, Idaho, western Montana, and portions of Nevada (INFISH), and the interim strategy for managing anadromous fish-producing watersheds in eastern Oregon and Washinton, Idaho, and portions of California (PACFISH). USFWS Regions 1 and 6.

USFWS. 1999. Determination of threatened status for bull trout in the coterminous United States; Final Rule. Federal Register Vol. 64 58190-58933. 25 pp.

USFWS. 2002a. Bull trout (Salvelinus confluentus) draft recovery plan - Chapter 1: Introduction. U.S. Fish and Wildlife Service, Portland, Oregon, October, 2002, 137 pp.

USFWS. 2002b. Bull trout (*Salvelinus confluentus*) draft recovery plan – chapter 2 Klamath

River. U.S. Fish and Wildlife Service, Portland, Oregon. 93 pp.
USFWS. 2004a. Draft Recovery Plan for the Coastal-Puget Sound Distinct Population Segment of Bull Trout (Salvelinus confluentus). U.S. Fish and Wildlife Service, Portland, Oregon. 297 pp.
USFWS. 2004b. Draft Recovery Plan for the Jarbidge Distinct Population Segment of Bull Trout (Salvelinus confluentus). U.S. Fish and Wildlife Service, Portland, Oregon. 148 pp.
USFWS. 2005. Box Canyon Hydroelectric Project FERC License Biological Opinion. April 29, 2005. FWS Reference 1-9-02-F-0620.
USFWS. 2008. Bull trout (Salvelinus confluentus) 5-year review: summary and evaluation. Portland, Oregon. 55 pp.
USFWS. 2010. Revised designation of critical habitat for bull trout in the coterminous United States. Final Rule. Federal Register Vol 75, No. 200. 63898-64070.
USFWS. 2010a. Bull trout final critical habitat justification: rationale for why habitat is essential, and documentation of occupancy. U.S. Fish and Wildlife Service, Portland OR.
USFWS. 2015. Recovery plan for the coterminous United States population of bull trout (Salvelinus confluentus). U.S. Fish and Wildlife Service, Portland, Oregon. xii + 179 pp.
USFWS. 2015a. Coastal recovery unit implementation plan for bull trout (Salvelinus confluentus). U.S. Fish and Wildlife Service, Lacey, Washington, and Portland, Oregon. 155 pp.
USFWS. 2015b. Klamath recovery unit implementation plan for bull trout (Salvelinus confluentus). U.S. Fish and Wildlife Service, Klamath Falls, Oregon. 35 pp.
USFWS. 2015c. Mid-Columbia recovery unit implementation plan for bull trout (Salvelinus confluentus). U.S. Fish and Wildlife Service, Portland, Oregon. 345 pp.
USFWS. 2015d. Columbia headwaters recovery unit implementation plan for bull trout (Salvelinus confluentus). U.S. Fish and Wildlife Service, Kalispell, Montana, and Spokane, Washington. 179 pp.
USFWS. 2015e. Upper Snake recovery unit implementation plan for bull trout (Salvelinus confluentus). U.S. Fish and Wildlife Service, Boise, Idaho. 113 pp.
USFWS. 2015f. St. Mary recovery unit implementation plan for bull trout (Salvelinus confluentus). U.S. Fish and Wildlife Service, Kalispell, Montana. 30 pp.
USFWS. 2016. Endangered Species Act - section 7 consultation. Biological opinion LeClerc Creek cattle grazing allotment project Pend Oreille County, Washington. U.S. Fish and Wildlife Service Reference 01EWFW00-2015-F-0285. U.S. Fish and Wildlife Service, Washington Fish and Wildlife Office. Spokane, Washington. 38 pp.
USFWS and NMFS (National Marine Fisheries Service). 1998. Consultation handbook: procedures for conducting consultation and conference activities under Section 7 of the Endangered Species Act. 315pp.
USFWS and NMFS. 2016. Interagency cooperation – Endangered Species Act of 1973, as amended: Definition of destruction or adverse modification of critical habitat. Federal Register Nol. 81, 7214-7217.
WDFW (Washington Department of Fish and Wildlife). 2015. Washington's State Wildlife Action Plan: 2015 Update. Washington Department of Fish and Wildlife, Olympia, Washington, USA. 290 pp. + Appendices.

WDFW (Washington Department of Fish and Wildlife), FishPro Inc., and Beak Consultants. 1997. Grandy Creek trout hatchery biological assessment. March 1997. Olympia,Washington.

WDFW (Washington Department of Fish and Wildlife). 2015. Washington's State Wildlife Action Plan: 2015 Update. Washington Department of Fish and Wildlife, Olympia, Washington, USA. 290 pp. + Appendices.

WDOE (Washington Department of Ecology). 2002. Evaluating criteria for the protection of freshwater aquatic life in Washington's surface water quality standards - dissolved oyxgen: Draft discussion paper and literature summary. Publication Number 00-10-071. Washington Department of Ecology, Olympia, WA, 90 pp.

Whiteley, A.R., P. Spruell, F.W. Allendorf. 2003. Population Genetics of Boise Basin Bull Trout (Salvelinus confluentus). University of Montana, Division of Biological Sciences. Report to the U.S. Forest Service, Rocky Mountain Research Station, Boise, ID. 37 pp.

Whitesel, T. A., J. Brostrom, T. Cummings, J. Delavergne, W. Fredenberg, H. Schaller, P. Wilson, and G. Zydlewski. 2004. Bull trout recovery planning: a review of the science associated with population structure and size. Science team report #2004-01, U.S. Fish and Wildlife Service, Portland, Oregon. 68 pp.

Wondzell, S.M. and J.G. King. 2003. Post fire erosional processes in the Pacific Northwest and Rocky Mountain regions. Forest Ecology and Management 178: 75-87.

LITERATURE CITED - SPALDING'S CATCHFLY

Black, S. H., M. Shepherd, and M. Vaughan. 2011. Rangeland management for pollinators. Rangelands 33*:* 9–13.

Cullen, S. and R. V. Taylor, and H. Schmalz. 2011. Do cattle eat Spalding's catchfly? An cxamination of browse rates in grazed and un-grazed areas of the Zumwalt Prairie Preserve. Unpublished report, Nature Conservancy, Zumwalt Prairie Preserve, on file. Enterprise, OR.

Dingeldein, J, RV Taylor, H Schmalz and V Jansen. 2010. Demography, Phenology and Predation of Spalding's Catchfly (Silene spaldingii) on the Zumwalt Prairie Preserve, 2006-2009. The Nature Conservancy of Oregon.

Halofsky, J.E. and D.L. Peterson. 2016. Climate change vulnerabilities and adaptation options for forest vegetation management in the northwestern USA. Atmosphere, 7(3), p.46.

Johnson, CG and S Simon. 1987. Plant Associations of the Wallowa-Snake Province. R6-ECOL-TP-255B-86, US Department of Agriculture, Pacific Northwest Region, Wallowa-Whitman National Forest, Baker City, Oregon Toweill DE, Thomas JE (2002) North American elk: ecology and management. Smithsonian Institution Press, Washington, DC.

Kimoto, C., DeBano, S.J., Thorp, R.W., Taylor, R.V., Schmalz, H., DelCurto, T., Johnson, T., Kennedy, P.L. and Rao, S., 2012. Short-term responses of native bees to livestock and implications for managing ecosystem services in grasslands. Ecosphere, 3(10), pp.1-19)

Lesica, P. and N. Rudd. 2011. Guidelines for monitoring trend of Silene spaldingii populations in key conservation areas. Presented to Spalding's Catchfly Technical Team meeting, November, 2011.

Moholt, K. 2015. In draft, as of March 9, 2015; 2014 Annual Report Spalding's Catchfly, Silene spaldingii, Wallowa Lake Key Conservation Area. Bio-Resources, Inc., 306 NE 1st Street, Enterprise, OR 97828. Report prepared for Wallowa Land Trust, Inc., 116 South

River St. Enterprise, Oregon 97828.
Taylor, R, and M. Finnerty. 2013. Spalding's Catchfly Monitoring on the Wallowa Whitman Forest, Monitoring results from Crow Creek 2008-2012. The Nature Conservancy, Zumwalt Prairie Preserve, Enterprise, Oregon.
Taylor, R.V., J. Dingeldein, and H. Schmalz. 2012. Final Report - Demography, phenology, and factors influencing reproduction of the rare wildflower Spalding's Catchfly (Silene spaldingii) on the Zumwalt Prairie. March 2012.
Tisdale, EW. 1986. Canyon grasslands and associated shrublands of west-central Idaho and adjacent areas. Bulletin No. 40. Forest, Wildlife, and Range Experiment Station, University of Idaho, Moscow. 42 pp.
USDA (U.S. Department Agriculture) Forest Service. 2005c. Biological Assessment for the USDA Forest Service, Pacific Northwest Region, Invasive Plant Program. USDA Forest Service, Pacific Northwest Region, Portland, OR. June 17, 2005. 452pp + appendices.
USDA Forest Service. 2006. USDA. 2006. Biological Assessment for the Peola Range Allotment. Project Report, Umatilla National Forest, Pendleton, Oregon.
USDA Forest Service. 2008b. Invasive Plant Biological Assessment (project BA for Invasive Plants Treatment Project), Umatilla and Wallowa-Whitman National Forests, September 16, 2008. Pendleton and Baker City, OR.
USDI (U.S. Department of Interior) Fish and Wildlife Service. 2005. Biological Opinion, Joseph Creek Rangeland Analysis, Lower Grande Ronde Subbasin, Wallowa County, Oregon – Formal Consultation (1-17-05-F-0640), on file Wallowa-Whitman National Forest, Baker City, Oregon.
USDI Fish and Wildlife Service. 2007. Recovery Plan for *Silene spaldingii* (Spalding's Catchfly).

Personal Communication

Brooks, Paula. 2017. Paula Brooks pers. comm. June 2017
Ferriel, R. 2011. Email from Roger Ferriel, BLM, Baker City to Gretchen Sausen, USFWS concerning twenty-two Spalding's catchfly plants documented near Redmont grade in canyon grasslands above the Grande Ronde River, Wallowa County, Oregon. Email sent on August 18, 2011.
Hustafa, Jerry. 2017. Personal communication with Jerry Hustafa June 2017.
Nellestijn, Gerry. 2015. Email with Erin Kuttel regarding status of the Salmo Watershed Aquatic Ecosystem Health Action Plan (in Draft). Including identified threats and proposed action items for the Salmo watershed. Salmo Streamkeepers. Salmo, British Columbia.

LITERATURE CITED - WOLVERINE

Aubry, K.B., K.S. McKelvey, and J.P. Copeland. 2007. Distribution and broadscale habitat relations of the wolverine in the contiguous United States. Journal of Wildlife Management 71: 2147-2158.
Aubry, K.B., J. Rohrer, C.M. Raley, R.D. Weir, and S. Fitkin. 2014. Wolverine distribution and ecology in the North Cascades Ecosystem: 2014 Annual Report. USDA Forest Service, Pacific Northwest Research Station, Olympia, WA. http://wolverinefoundation.org/wp-

content/uploads/2015/01/NorthCascadesWolverineStudy_Annual-Report2014_Final.pdf
Austin, M. 1998. Wolverine winter travel routes and response to transportation corridors in Kicking Horse Pass between Yoho and Banff National Parks. M.S. Thesis, University of Calgary, Calgary, Alberta, CA.
Banci, V. 1994. Wolverine. Pages 99-127 in L.F. Ruggiero, K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski, tech. eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. USDA Forest Service, General Technical Report RM-254.
Burkholder, B. 1962. Observations concerning wolverine. J. Mammal. 43: 263-264. 1982.
Copeland, J.P. 1996. Biology of the wolverine in central Idaho. M.S. Thesis, University of Idaho, Mosow, ID.
Copeland, J.P., and R.E. Yates. 2006. Wolverine population assessment in Glacier National Park, progress report. USDA Forest Service, Rocky Mountain Research Station, Missoula, MT.
Copeland, J.P., J.M. Peek, C.R. Groves, W.E. Melquist, K.S. McKelvey, G.W. McDaniel, C.D. Long, and C.E. Harris. 2007. Seasonal habitat associations of the wolverine in central Idaho. Journal of Wildlife Management 71: 2201-2212.
Copeland, J.P., K.S. McKelvey, K.B. Aubry, L. Landa, J. Persson, R.M. Inman, J. Krebs, E. Lofroth, H. Golden, J.R. Squire, A. Magoun, M.K. Schwartz, J. Wilmot, C.L. Copeland, R.E. Yates, I. Kojola, and R. May. 2010. The bioclimatic envelope of the wolverine (Gulo gulo): do climatic constraints limit its geographic distribution? Canadian Journal of Zoology 88: 233-246.
de Vos, A. 1964. Range changes of mammals in the Great Lakes region. American Midland Naturalist 71: 210-231.
Gaines, W.L., P.H. Singleton, and R.C. Ross. 2003. Assessing the cumulative effects of linear recreation routes on wildlife habitats on the Okanogan and Wenatchee national forests. U.S. Department of Agriculture, Forest Service, Gen. Tech. Rep. PNW-GTR-586.
Gaines, W.L.; Peterson, D.W.; Thomas, C.A.; Harrod, R.J. 2012. Adaptations to climate change: Colville and Okanogan-Wenatchee National Forests. U.S. Department of Agriculture, Forest Service, Gen. Tech. Rep. PNW-GTR-862.
Hash, H.S. 1987. Wolverine. In Novak, M., J.A. Baker, and M.E. Obbard. Comps. Eds. Wild furbearer management and conservation in North America. Ontario Ministry of Natural Resources, Toronto, CA.
Heinemeyer, K.S. 2012. Central Idaho wolverine and winter recreation study: February 2012 update. Rocky Mountain Research Station, Missoula, Montana. 4 pp.
Hiller, T.L. 2011. Oregon furbearer program report, 2010-2011. Oregon Department of Fish and Wildlife, Salem, Oregon, USA. Available online: http://www.dfw.state.or.us/resources/hunting/small_game/docs/2011_furbearer_report.pdf. Accessed 15 November 2011.
Holden, T. 1997. [The] 1997 aerial snow tracking surveys results. Unpublished report prepared for the Malheur National Forest. John Day, OR, USDA Forest Service: 4 p.
Hornocker, M.G., and H.S. Hash. 1981. Ecology of the wolverine in northwestern Montana. Canadian Journal of Zoology 59: 1286-1301.
Inman, R.M., M.L. Packila, K.H. Inman, B.C. Aber, R. Spence, and D. McCauley. 2009. Greated Yellowstone Wolverine Program, Progress Report, December 2009. Wildlife

Conservation Society, General Technical Report, Bozeman, MT.
Inman, R.M., M.L. Packila, K.H. Inman, A.J. McCue, G.C. White, J. Persson, B.C. Aber, M.L. Orme, K.L. Alt, S.L. Cain, J.A. Fredrick, B.J. Oakleaf, S.S. Sartorius. 2012. Spatial ecology of wolverines at the southern periphery of distribution. Journal of Wildlife Management 76: 778-792.
Krebs, J.A., E.C. Lofroth, J. Copeland, V. Banci, D. Cooley, H. Golden, A. Magoun, R. Mulders, and B. Shults. 2004. Synthesis of survival rates and causes of mortality in North American wolverines. Journal of Wildlife Management 65: 520-530.
Krebs, J., E.C. Lofroth, and I. Parfitt. 2007. Multiscale habitat use by wolverines in British Columbia, Canada. Journal of Wildlife Management 71: 2180-2192.
Kurten, B. and R.L. Rausch. 1959. Biometric comparisons between North American and European mammas. I. A comparison between Alaskan and Fennoscandian wolverine (Gulo gulo Linnaeus). Acta Arctica 11: 1-21.
Landa, A., O. Strand, J.D.C. Linnell, and T. Skogland. 1998. Home-range sizes and altitude selection for arctic foxes and wolverines in an alpine environment. Canadian Journal of Zoology 76: 448-457.
Lawler, J.J., Raymond, C.L., Ryan, M.E., Case, M.J., Rochefort, R.M. 2014. Climate change, wildlife, and wildlife habitat in the North Cascade Range. Pages 191-260 in Raymond, C.L.; Peterson, D.L.; Rochefort, R.M. eds. Climate change vulnerability and adaptation in the North Cascades Region, Washington. U.S. Department of Agriculture, Forest Service, Gen. Tech. Rep. PNW-GTR-892.
Lofroth, E.C., and P.K. Ott. 2007. Assessment of the sustainability of wolverine harvest in British Columbia, Canada. Journal of Wildlife Management 71: 2193-2200.
Magoun, A.J., and P. Valkenburg. 1983. Breeding behavior of free-ranging wolverines (Gulo gulo). Acta Zoologica Fennici 174: 175-177.
Magoun, A., and J.P. Copeland. 1998. Characteristics of wolverine reproductive den sites. Journal of Wildlife Management 62: 1313-1320.
Magoun, A.J., P. Valkenburg, C.D. Long, and J.K. Long. 2011. Monitoring wolverines in northeast Oregon-2011. Final Report.Kuna, Idaho, The Wolverine Foundation: 32 pages.
Magoun, A.J., P. Valkenburg, C.D. Long, and J.K. Long. 2013. Monitoring wolverines in northeast Oregon, January 2011-December 2012. Final report. The Wolverine Foundation, Inc., Kuna, Idaho, USA. http://www.dfw.state.or.us/conservationstrategy/
May, R., A. Landa, J. van Dijk, J.D.C. Linnell, and R. Andersen. 2006. Impact of infrastructure on habitat selection of wolverines Gulo gulo. Wildlife Biology 12(3): 285-295.
McKelvey, K.S., K.B. Aubry, and M.K. Schwartz. 2008. The use of anecdotal occurrence data for rare or elusive species: the illusion of reality and a call for evidentiary standards. BioScience 58: 549-555.
McKelvey, K.S., J.P. Copeland, M.K. Schwartz, J.S. Littell, K.B. Aubry, J.R. Squires, S.A. Parks, M.M. Elsner, and G.S. Mauger. 2011. Climate change predicted to shift wolverine distributions, connectivity, and dispersal corridors. Ecological Applications 21: 2882-2897.
McKelvey, K.S., K.B. Aubry, N.J. Anderson, A.P. Clevenger, J.P. Copeland, K.S. Heinemeyer, R.M. Inman, J.R. Squires, J.S. Waller, K.L. Pilgrim, and M.K. Schwartz. 2014. Recovery of wolverines in the western United States: recent extirpation and recolonization or range retraction and expansion? Journal of Wildlife Management 78:

325-334.
Moriarty, K.M., W.J. Zielinski, A.G. Gonzales, T.E. Dawson, K.M. Boatner, C.A. Wilson, F.V. Schlexer, K.L. Pilgrim, J.P. Copeland, and M.K. Schwartz. 2009. Wolverine confirmation in California after nearly a century: native or long-distance immigrant? Northwest Science 83(2): 154-162.
Newby, F.E., and P.L. Wright. 1955. Range extension of the wolverine in Montana. Journal of Mammalogy 36: 248-253.
Newby, F.E., and J.J. McDougal. 1964. Distribution and status of the wolverine in Montana. Journal of Mammalogy 45: 485-488.
Packila, M.L., R.M. Inman, K.H. Inman, A.J. McCue. 2007. Wolverine road crossings in western Greater Yellowstone. Pp. 103–120 in Greater Yellowstone Wolverine Program, Cumulative Report May 2007. Wildlife Conservation Society, Ennis, MT.
Pasitschniak-Arts, M., and S. Lariviere. 1995. Gulo gulo. Mammalian Species, American Society of Mammalogists. 499: 1-10.
Persson, J. 2005. Female wolverine (Gulo gulo) reproduction: reproductive costs and winter food availability. Canadian Journal of Zoology 83: 1453-1459.
Persson, J., A. Landa, R. Andersen, and P. Segerstrom. 2006. Reproductive characteristics of female wolverines (Gulo gulo) in Scandinavia. Journal of Mammalogy 87: 75-79.
Pulliainen, E. 1968. Breeding biology of the wolverine (Gulo gulo L.) in Finland. Annales Zoologica Fennici 5: 338-344.
Rausch, R.L. and A.M. Pearson. 1972. Notes on the wolverine in Alaska and the Yukon Territory Journal of Wildlife Management 36: 249-268.
Rowland, M.M., M.J. Wisdom, D.H. Johnson, B.C. Wales, J.P. Copeland, and F.B. Edelmann. 2003. Evaluation of landscape models for wolverine in the interior Northwest, United States of America. Journal of Mammalogy 84:92–105.
Ruggiero, L.F., Aubry, K.B., Buskirk, S.W., Lyon, L.J. and Zielinski, W.J., 1994. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States.
Schwartz, M.K., K.B. Aubry, K.S. McKelvey, K.L. Pilgrim, J.P. Copeland, J.R. Squires, R.M. Inman, S.M. Wisely, and L.F. Ruggiero. 2007. Inferring geographic isolation of wolverines in California using historical DNA. Journal of Wildlife Management 71: 2170-2179.
Schwartz, M.K., J.P. Copeland, N.J. Anderson, J.R. Squires, R.M. Inman, K.S. McKelvey, K.L. Pilgrim, L.P. Waits, and S.A. Cushman. 2009. Wolverine gene flow across a narrow climatic niche. Ecology 90: 3222-3232.
Squires, J.R., J.P. Copeland, T.J. Ulizio, M.K. Schwartz, and L.F. Ruggiero. 2007. Sources and patterns of wolverine mortality in western Montana. Journal of Wildlife Management 71: 2213-2220.
USFWS (U.S. Fish and Wildlife Service). 2011. U.S. Fish and Wildife Service Species Assessment and Listing Priority Assignment Form. Scientific Name: Gulo gulo luscus. Common Name: North American wolverine . Region 6 (Mountain-Prairie Region). 49 pp. Document can be found here: https://ecos.fws.gov/docs/candidate/assessments/2011/r6/A0FA_V01.pdf
USFWS (U.S. Fish and Wildlife Service). 2016. Proposed Rule for the North American Wolverine: Proposed rule; reopening of comment period. Federal Register 81: 71670-

71671.
WDFW (Washington Department of Fish and Wildlife). 2015. Washington's State Wildlife Action Plan: 2015 Update. Washington Department of Fish and Wildlife, Olympia, Washington, USA.
Wales, B.C., K. Mellen-McLean, W.L. Gaines, and L. Suring. 2011. Focal species assessment of current condition and the proposed action (alternative B) for the Blue Mountains forest plan revisions. Unpublished report on file at: USDA Forest Service, Wallowa-Whitman nationa forest, Blue Mountain Forest Plan Revison Team, Baker City, OR.
Wilson, D.E. 1982. Wolverine. In Chapman, J.A., and G.A. Feldhamer, eds. Wild mammals of North America. Biology, management and economics. John Hopkins University Press, Baltimore, MD.
Wisdom, M.J., Holthausen, R.S., Wales, B.C. [and others]. 2000. Source habitat for terrestrial vertebrates of focus in the interior Columbia basin: broad-scale trends and management implications. U.S. Department of Agriculture, Forest Service, Gen. Tech. Rep. PNW-GTR-485. Portland, OR.

In Litteris REFERENCES

Borysewicz, M. 2017. From Wolverine Conservation Strategy Matrix provided in email from M.Borysewicz, USFS, to Michelle Eames dated May 15, 2017.

Personal Communication

Kranich, C. 2011. Personal communication with Cindy Kranich 14 Dec. 2011.

LITERATURE CITED - WHITEBARK PINE

Agee, J.K. 1993. Fire ecology of Pacific Northwest forests. Island Press. Washington, D.C. 493 pp.
Arno, S.F. 2001. Community types and natural disturbance processes. Pages 74–88, Chapter 4 In Tomback, D.F., S.F. Arno, and R.E. Keane (eds.). Whitebark Pine Communities: Ecology and Restoration. Island Press. Washington, D.C. 440 pp.
Arno, S.F. and R.J. Hoff. 1989. Silvics of whitebark pine (Pinus albicaulis). U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT. General Technical Report INT–253. January 1989. 11 pp.
Arno, S.F. and R.J. Hoff. 1990. Pinus albicaulis Engelm. Whitebark pine. Pages 268–279 In Burns, R.M. and B.H. Honkala (tech. coords.). Silvics of North America. USDA Forest Service, Agriculture Handbook 654. Washington, D.C. 675 pp.
Aubry, C., D. Goheen, R. Shoal, T. Ohlson, T. orenz, A. Bower, C. Mehmel, and R. Sniezko. 2008. Whitebark pine restoration strategy for the Pacific Northwest Region, 2009-2013. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. 212 p. Available online: http://ecoshare.info/uploads/documents/WPB_Strategy_PNW_093008cl.pdf
COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2010. COSEWIC assessment and status report on the whitebark pine Pinus albicaulis in Canada.

Committee on the Status of Endangered Wildlife in Canada. Ottawa, Canada. Available online at: http://www.sararegistry.gc.ca/status/status_e.cfm. x + 44 pp.
Critchfield, W.B. and E.L. Little, Jr. 1966. Geographic Distribution of the Pines of the World. U.S.D.A. For. Serv. Misc. Public. 991, Washington, D.C.
Devine, W., Aubry, C., Bower, A., Miller, J., Maggiulli Ahr, N. 2012. Climate change and forest trees in the Pacific Northwest: a vulnerability assessment and recommended actions for national forests. Olympia, WA: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. 102 p.
Farnes, P.E. 1990. SNOTEL and snow course data: describing the hydrology of whitebark pine ecosystems. Pages 302–304 In Schmidt, W.C. and K.J. McDonald (compilers). Proceedings-Symposium on Whitebark Pine Ecosystems: Ecology and Management of a High-Mountain Resource. 1989 March 29–31. Boseman, Montana. General Technical Report INT–270. Ogden, Utah. USDA Forest Service, Intermountain Research Station. 386 pp.
Hosie, R.C. 1969. Native Trees of Canada. Can. Forest Service. Queen's Printer for Canada. Ottawa. 380 pp.
Hutchins, H.E. and R.M. Lanner. 1982. The central role of Clark's nutcracker in the dispersal and establishment of whitebark pine. Oecologia 55:192–201.
Keane, R.E., D. Tomback, C. Aubry, A. Bower, E. Campbell, M. Jenkins, M. Manning, S. McKinney, M. Murray, D. Perkins, D. Reinhart, C. Ryan, A.W. Schoettle, and C.M. Smith. 2010. A range-wide restoration strategy for whitebark pine (Pinus albicaulis). General Technical Report RMRS–GTR–XXX. Fort Collins, CO. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 126 pp. + Tables, Figures, and Appendix.
Keane, Robert E., Tomback, D.F., Aubry, C.A., Bower, A.D., Campbell, E.M., Cripps, C.L., Jenkins, M.B., Mahalovich, M.F., Manning, M., McKinney, S.T., Murray, M.P., Perkins, D.L., Reinhart, D.P., Ryan, C., Schoettle, A.W.; Smith, C.M. 2012. A range-wide restoration strategy for whitebark pine (Pinus albicaulis). Gen. Tech. Rep. RMRS-GTR-279. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 108 p.
Kral, R. 1993. Pinus. In: Flora of North America Editorial Committee, eds. Flora of North America north of Mexico, volume 2, pteridophytes and gymnosperms. New York and Oxford: Oxford University Press: 373–398.
Krugman, S.L., Jenkinson, J.L. 1974. Pinus. In: Seeds of woody plants in the United States. Washington, DC: U.S. Department of Agriculture, Forest Service: 598–638.
Lanner, R.M. 1990. Biology, taxonomy, evolution, and geography of stone pines of the world. Pages 14–24 in W.C. Schmidt and K.J. McDonald (compilers). Symposium on whitebark pine ecosystems: ecology and management of a high-mountain resource. USDA Forest Service. Gen. Tech. Rpt. INT-270. June 1990. 386 pp.
Lanner, R.M. 1996. Made for Each Other: A Symbiosis of Birds and Pines. Oxford University Press. New York, NY. 155 pp.
Larson, E.R. 2009. Status and dynamics of whitebark pine (Pinus albicaulis Engelm.) forests in southwest Montana, central Idaho, and Oregon, U.S.A. Ph.D. dissertation. University of Minnesota. Twin Cities, Minnesota. 176 pp.
Liston, A., W.A. Robinson, D. Pinero, and E.R. Alvarez-Buylla. 1999. Phylogenetics of Pinus

(Pinaceae) Based on Nuclear Ribosomal DNA Internal Transcribed Spacer Region Sequences. Molecular Phylogenetics and Evolution. 11(1):95-109.

Lorenz, T.J., C. Aubry, and R. Shoal. 2008. A review of the literature on seed fate in whitebark pine and the life history traits of Clark's nutcracker and pine squirrels. USDA Forest Service, Pacific Northwest Research Station. Portland, Oregon. General Technical Report PNW–GTR–742. April 2008. 62 pp.

McCaughey, W.W. and D.F. Tomback. 2001. The natural regeneration process. Pages 105–120, Chapter 6 In Tomback, D.F., S.F. Arno, and R.E. Keane (eds.). Whitebark Pine Communities: Ecology and Restoration. Island Press. Washington, D.C. 440 pp.

McCaughey, W.W. and W.C. Schmidt. 2001. Taxonomy, distribution, and history. Pages 29–40, Chapter 2 In Tomback, D.F., S.F. Arno, and R.E. Keane (eds.). Whitebark Pine Communities: Ecology and Restoration. Island Press. Washington, D.C. 440 pp.

McKinney, W.T., C.E. Fiedler, and D.F. Tomback. 2009. Invasive pathogen threatens bird-pine mutualism: implications for sustaining a high-elevation ecosystem. Ecological Applications 19:597–607.

Miller-Struttmann, N.E., Geib, J.C., et al. 2015. Functional mismatch in a bumble bee pollination mutualism under climate change. Science 349: 1541-1544.

Morgan, P. and M.P. Murray. 2001. Landscape ecology and isolation: implications for conservation of whitebark pine. 2001. Pages 289–309, Chapter 14 In Tomback, D.F., S.F. Arno, and R.E. Keane (eds.). Whitebark Pine Communities: Ecology and Restoration. Island Press. Washington, D.C. 440 pp.

Munson, S.M, and A.A. Sher. 2015. Long-term shifts in the phenology of rare and endemic rocky mountain plants. American Journal of Botany 102 (8): 1268 – 1276.

Raffa, K.F., B.H. Aukema, B.J. Bentz, A.L. Carroll, J.A. Hicke, M.G. Turner, and W.H. Romme.
2008. Disturbances prone to anthropogenic amplification: the dynamics of bark beetle eruptions. BioScience 58:501–517.

Schwandt, J.W. 2006. Whitebark pine in peril: a case for restoration. United States Department of Agriculture. Forest Service Report R1–06–28. August 2006. Available online at: http://www.fs.fed.us/r1-r4/spf/fhp/publications. 20 pp.

Schwandt, J.W., I.B. Lockman, J.T. Kliejunas, and J.A. Muir. 2010. Current health issues and management strategies for white pines in the western United States and Canada. Forest Pathology 40:226–250.

Syring, J., Willyard, A., Cronn, R. and Liston, A. 2005. Evolutionary relationships among Pinus (Pinaceae) subsections inferred from multiple low-copy nuclear loci. American Journal of Botany 92: 2086-2100.

Syring, J., Farrell, K. Businskỳ, R. Cronn, R. Liston, A. 2007. Widespread genealogical nonmonophyly in species of Pinus subgenus Strobus. Systematic Biology 56(2):163-181.

Tomback , D. 1982. Dispersal of whitebark pine seeds by Clark's nutcracker: A mutualism hypothesis. Journal of Animal Ecology 51:451–467.

Tomback, D.F., Arno, S.F., and R.E. Keane. 2001. The compelling case for management intervention. Pages 4–25 In Tomback, D.F., S.F. Arno, and R.E. Keane (eds.). Whitebark Pine Communities: Ecology and Restoration. Island Press. Washington, D.C. 440 pp.

Tomback, D.F., L.A. Hoffmann and S.K. Sund. 1990. Coevolution of whitebark pine and nutcrackers: implications for forest regeneration. Pages 118–129 in W.C. Schmidt and K.J. McDonald (compilers). Symposium on whitebark pine ecosystems: ecology and management of a high-mountain resource. USDA Forest Service. Gen. Tech. Rpt. INT-270. June 1990. 386 pp.

USDA (U.S. Department of Agriculture) Forest Service, Pacific Northwest Region. 2008. Whitebark Pine Restoration Strategy for the Pacific Northwest Region 2009-2013.

USFWS (U.S. Fish and Wildlife Service). 2011. 12-month finding on a petition to list Punus albicaulis as endangered or threatened with critical habitat. 76 FR 42631.

USFWS. 2016. Species Assessment and Listing Priority Assignment Form. Scientific Name: Pinus albicaulis. Common Name: Whitebark pine. Lead region: Region 6 (Mountain-Prairie Region). 05/16/2016. 57 pp.

USFWS. 2017. Colville National Forest revised land management plan Biological Opinion reference: 01EWFW00-2017-F-0456. See Appendix B6 pp 78-79.

Ward, K., R. Shoal, and C. Aubry. 2006. Whitebark pine in Washington and Oregon: a synthesis of current studies and historical data. USDA Forest Service, Pacific Northwest Region. February 2006.

In Litteris and Personal Communication

Honeycutt, K. 2017. Conservation strategy-CNF Plan comparison matrix. Received in email dated May 30, 2017.

Wales, B. 2018. Email from Barb Wales, USFS, regarding allotments that have some probability of white bark pine occurrence.

Comparison of PACFISH/INFISH to Draft Forest Plan Direction	
INFISH/PACFISH Goals	***Responsive Forest Plan Direction***
(1) Maintain or restore water quality, to a degree that provides for stable and productive riparian and aquatic ecosystems.	**Riparian Management Area DC-1.** 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.** Key riparian processes and conditions (including slope stability and associated vegetative root strength, bank stability, wood delivery to streams, and, within the riparian management areas, input of leafy and other organic matter to aquatic and terrestrial systems, solar shading, microclimate, and water quality) are operating consistent with natural disturbance regimes. **Scale:** Subwatershed **Riparian Management Area DC-3.** The recreation opportunity spectrum in MA4 is semi-primitive to primitive. **Scale:** Subwatershed **Riparian Management Area DC-4.** The Wetland/Riparian Vegetation Condition indicator from the Watershed Condition Framework assessment from 2011 provides a basis for addressing the function and condition of native riparian vegetation along streams, water bodies, and wetlands. (Watershed Condition Classification technical Guide FS-278, July 2008). 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/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-5.** 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 forestwide planning; subwatershed scale for project planning. **Riparian Management Area DC-6.** 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. 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-7.** Riparian shrub communities occupy their historical range and extent. Individual plants are capable of reaching the full potential for a typical individual of a particular species, as defined by plant height, width, and growth form. Individual plants are able to propagate, or reproduce, vegetatively and/or sexually. Plant communities are similar in species composition, age class structure, canopy density, and ground cover to plant associations (Croweand Clausnitzer 1997) that are representative of a particular setting. **Scale:** Subwatershed. **Riparian Management Area DC-8.** 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-9.** 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. **Riparian Function DC-1.** The species composition and structural diversity of native plant communities in riparian management areas, including wetlands, provides adequate side channels, pools, undercut

	banks, unembedded substrates, submerged and overhanging large wood, log jams, and beaver dams. 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 forestwide planning; subwatershed scale for project planning. **Riparian Function DC-2.** Management Area 4 Riparian management Areas (RMAs) reflect a natural composition of native flora and fauna and a distribution of physical, chemical, and biological conditions appropriate to natural disturbance regimes affecting the area. **Scale:** Subwatershed. **Riparian Function 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. **Riparian Function DC-4.** Riparian vegetation has the species composition, structural diversity, age class diversity, and extent that is characteristic of the setting in which it occurs and the hydrologic and disturbance regimes in which it developed. The condition and composition of small habitat patches may change over small temporal and spatial scales but remains relatively constant at larger scales. **Scale:** Subwatershed to subbasin. **Riparian Function DC-5.** Riparian shrub communities occupy their historical range and extent. Individual plants are capable of reaching the full potential for a typical individual of a particular species, as defined by plant height, width, and growth form. Individual plants are able to propagate, or reproduce, vegetatively and/or sexually. Plant communities are similar in species composition, age

	class structure, canopy density, and ground cover to plant associations (Crowe and Clausnitzer 1997) that are representative of a particular setting. **Scale:** Subwatershed. **Riparian Function 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. **Riparian Function DC-7.** The species composition and structural diversity of native plant communities in riparian management areas, including wetlands, provides adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank 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:** Subwatershed to watershed. **Riparian Function DC-7.** The potential for large wood recruitment to streams from within forested riparian areas, and from low-order streams to higher order streams, is similar to the potential in reference watersheds with similar forest vegetation types. **Scale:** Watershed. **Stream Channel Function DC-1.** The physical integrity of the aquatic system, including shorelines, banks, and bottom configurations, are properly functioning and in dynamic equilibrium with the flow and sediment regimes under which aquatic systems have evolved. **Scale:** Subwatershed to watershed. **Stream Channel Function DC-2.** Channel morphology, structure, complexity, and diversity are in ranges that are characteristic of the local geology, climate, and geologic processes. **Scale:**

	Watershed. **Stream Channel Function DC-3.** Measures of channel stability and morphology, including width/depth ratio, bank stability, bank angle, pool frequency, pool size, pool depth, and pool volume are within reference ranges and matches the frequency distribution of reference sites for a given channel type and channel size. **Scale:** Subwatershed to Subbasin. **Stream Channel Function DC-4.** The sediment regime under which aquatic ecosystems evolved is maintained, including the timing, volume, rate and character of input, storage, and transport. **Scale:** Watershed. **Stream Channel Function DC- 5**. Large wood frequency and volume are within the range of variation and potential for streams in individual watersheds. The spatial and temporal distribution of wood in individual streams varies depending on valley, riparian, and channel characteristics and the disturbance processes (fire, flood, debris flow) responsible for transferring material from hillslopes to streams. The frequency distribution of large wood among individual streams is similar to the frequency distribution of reference sites. **Scale:** Watershed. **Stream Channel Function DC-6.** In forested watersheds, the distribution and frequency of wood forced channel morphology (forced step pool and forced pool riffle streams), in which the majority of pools are formed by individual pieces or accumulations of large wood, and wood-rich pool riffle streams (Montgomery et al. 1995) is comparable to the distribution in reference watersheds. **Scale:** Watershed. **Stream Channel Function DC-7.** Pool frequency, size, depth, and volume are within ranges expected of given channel and valley types. **Scale:** Subwatershed to watershed. **Stream Channel Function DC-8.** Channel-floodplain connections are intact. Channel bed and bank erosion rates are within natural ranges and do not result in degraded aquatic or riparian habitats or channel alteration. **Scale:** Subwatershed to Subbasin. **Stream Channel Function DC-9.** Bank erosion is within a range that does not degrade aquatic or riparian

	habitats or that leads to channel alteration. **Scale:** Subwatershed to subbasin. **Stream Channel Function DC-10.** The frequency distribution of stream channel and habitat conditions for any given attribute, approaches the frequency distribution of reference conditions for the same attribute in similar channel types. **Scale:** Watershed to sub-basin. **Water Quality DC-1**. Water quality (e.g., temperature, turbidity, and dissolved oxygen) of surface and groundwater is sufficient to support healthy riparian, aquatic, and wetland ecosystems. It is within the range that maintains the biological, physical, and chemical integrity of the system and is capable of benefiting the survival, growth, reproduction, and mobility of individuals composing aquatic and riparian communities. **Scale**: Watershed. **Water Quality DC-2**. The quality of water within and emanating from the national forests is sufficient to provide for state-designated beneficial uses, including human uses and meets applicable local, state, and tribal water quality criteria. **Scale**: Subbasin. **Water Quality DC-3**. Water quality in streams within the national forests is sufficient to meet applicable state, local, and tribal water quality criteria. **Scale**: Forestwide. **Water Use DC-1.** Water is available in sufficient quantity and quality to meet downstream human needs as well as the needs of aquatic species considering the range of possible climate change scenarios. **Scale**: Watershed to Subbasin. **Water Use DC-2.** Water quality and quantity of groundwater resources, including seeps, springs, fens, and other groundwater-dependent ecosystems, is sufficient to provide for the extent and diversity of species associated with these habitats. **Scale:** Watershed to Subbasin. **Federally Listed Species DC -1.** Federally listed species (aquatic and terrestrial) are recovered or delisted. Management activities improve the conservation status of listed species and designated critical habitat. Habitats are managed in accordance with conservation planning documents, recovery plans, best available scientific information, and local knowledge. Critical habitat components (i.e., Primary Constituent Elements and Primary Biological Features) are protected and restored to achieve species

	recovery. **Aquatic:** For listed aquatic species, on NFS lands spawning, rearing, and migratory habitat is widely available and inhabited. Listed aquatic species have access to historic habitat and appropriate life history strategies (i.e., resident, fluvial, adfluvial and anadromy) are supported. Recovery is promoted through cooperation and coordination with tribes, state agencies, federal agencies, and other interested groups. **Scale:** A variety of spatial scales and hydrologic boundaries (ranging from individual projects to subwatersheds to areas as large as populations). Species recovery plans identify activities necessary for recovery at the project (reach), subwatershed and population scales. Species' recovery plans further describe high-priority restoration actions at these scales that address identified limiting factors and threats to listed species and designated critical habitats. **Objective 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. • Improve forest vegetative conditions (acres) • Improve soil hydrologic function in areas of detrimental soil disturbance (acres) • Reduce road-related sedimentation and reducing hydrologic connectivity of the road system (road miles) • Restore floodplain connections, channel morphology, channel structure, and flow regime (flood flows and low flows) (stream miles) • Restore riparian/wetland species composition (riparian acres) by increasing natural seedling establishment, planting, fencing, or modifying riparian management (riparian acres) • Increase 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) • Increase extent and vegetative species diversity of off-channel and isolated wetlands by restoring hydrologic pathways, modifying existing water diversions, or fencing (number of sites) • Increase the number and extent of beaver-created wetlands (sites)

	• Improve riparian habitat conditions (riparian acres) • Restore channel morphology to reflect natural conditions (miles) • Increase habitat complexity through channel reconstruction, placement of large wood or other structures, habitat enhancement (miles) • Increase aquatic habitat connectivity through culvert replacement (number of culverts)
(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.	**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 habitats are key for the recovery of threatened and endangered fish species and provide important habitat components for all native aquatic species. Essential Fish Habitat for commercially-fished salmon species, in the Middle Columbia Basin and Snake River Basin, supports sustainable populations of these species, per the Magnuson-Stevens Act of 1996. **Scale:** Watershed. **Aquatic Habitat Function DC-2.** The transfer of wood, sediment, nutrients, and other material that occurs following fires, wind storms, floods, and other natural disturbances is capable of creating and maintaining the range and diversity of riparian and aquatic habitat conditions that occurs in reference watersheds. **Scale:** Watershed. **Aquatic Habitat Function DC-3.** 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. 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. **Aquatic Habitat Function DC-4.** Aquatic habitat elements (e.g., substrate, pools, cover, food, and water quantity and quality) are properly functioning and are sufficiently distributed to ensure egg and embryo survival, fry emergence, and juvenile survival of aquatic species to support self-sustaining populations of native resident and anadromous fish. Spawning and rearing areas contain a minimal amount of fine sediment, ranging in size from silt to coarse sand. **Scale:** Subwatershed to subbasin. **Aquatic 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. Migratory habitats support juvenile and adult mobility and survival between spawning, rearing, overwintering, and foraging habitats that contain areas that: • are free of obstruction and excessive levels of predators of federally listed aquatic species; • have minimal physical, biological, or water quality and quantity impediments (including permanent, partial, intermittent, or seasonal barriers); and • contain natural cover such as large wood, aquatic vegetation, rocks and boulders, side channels, and undercut banks. **Scale:** Subwatershed to subbasin. **Aquatic Habitat Function DC-6.** The potential for large wood recruitment to streams from within forested riparian areas, and from low-order streams to higher-order streams, is similar to the potential in reference watersheds containing the same (riparian) forest vegetation types. (This partly restates WF-1, but is more explicit). **Scale:** Watershed.

	Aquatic Habitat Function DC-7. Aquatic habitats in which the distribution of conditions (e.g., bank stability, substrate size, pool depths, size and frequencies, channel morphology, large woody debris size and frequency) in the population of watersheds on the Forest is similar to the distribution of conditions in the population of similar, reference watersheds. The distribution of conditions in individual streams vary depending on valley, riparian, and channel characteristics. **Scale:** Reference conditions can be drawn from the Forest or Provincial scales. Conditions assessed at the subbasin scale for Forest planning and watershed or subwatershed for project planning. **Aquatic Habitat 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. Riparian Management Areas DC-1 thru 9 (see above) Stream Channel Function DC-1 thru 10 (see above) **Soil Quality DC-1.** The productive potential of forest and range soils is maintained at levels that contribute to long-term sustainability of ecosystems considering the range of possible climate change scenarios. Soil physical and chemical properties (texture, porosity, strength, coarse fragment content, and fertility) and organic matter (surface woody debris, humus) are at levels that maintain soil productive potential and hydrologic function (infiltration, percolation, and runoff). **Scale:** Subwatershed to watershed depending on the severity of the disturbance. **Soil Quality DC-2.** Surface erosion rates and sediment deposition are within the natural range of variability for each biophysical setting, with an appropriate amount of Effective Ground Cover in the form of live and dead vegetation. **Scale:** Subwatershed to watershed depending on the severity of the disturbance. **Roads and Trails DC-1.** Road systems are safe and responsive to public needs and desires, are affordable and efficiently managed, have minimal effect on aquatic and terrestrial systems, and are in balance with available funding. Administrative use supports Forest Service management objectives. Conflicts between user groups are minimized, and users take on appropriate challenges and risks. **Scale:** Forestwide.

	Water Quality DC-1 thru 3 (see above) **Water Use DC-1 and 2 (see above)** **Federally Listed Species DC -1 (see above)** **Objective 1.1 Watershed Function (see above)**
(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.	**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. **Hydrologic Function DC-2.** The sediment regime, including the timing, volume, rate, and character of sediment input, storage, and transport, is within the natural range of variability. **Scale:** Subwatershed to watershed. **Hydrologic Function DC-3.** The timing, duration, and variability of floodplain inundation and water table elevation in wetlands, seeps, springs, and subsurface water connectivity are within the natural range of variability and support the establishment, maintenance, and succession of riparian plant communities. **Scale:** Subwatershed to watershed. **Riparian Management Areas DC-1 thru 9 (see above)** **Riparian Function DC 1 thru 7 (see above)** **Water Use DC-1 and 2 (see above)** **Federally Listed Species DC -1 (see above)** **Objective 1.1 Watershed Function (see above)**
(4) Maintain or restore natural timing and variability of the	**Wetland Function and Groundwater-dependent Ecosystem Function DC-1.** The extent and diversity of

water table elevation in meadows and wetlands.	wetland types is maintained or increased. **Scale:** Subbasin. **Wetland Function and Groundwater-dependent Ecosystem Function 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. **Wetland Function and Groundwater-dependent Ecosystem Function DC-3.** Springs, peatlands and groundwater fed wetlands are maintaining or regaining their ecological structure and function. **Scale:** Subwatershed. **Wetland Function and Groundwater-dependent Ecosystem Function DC-4.** The aquifer supplying water to groundwater-dependent ecosystems is not being affected by groundwater withdrawal or loss of recharge. Soils of groundwater dependent ecosystems are intact and functional; erosion and deposition are within the natural range. Runout channels, if present, are functioning naturally and are not entrenched, eroded, or substantially altered. **Scale:** Subwatershed. **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. **Scale:** Subwatershed. **Riparian Management Areas DC-1 thru 9 (see above)** **Federally Listed Species DC -1 (see above)** **Objective 1.1 Watershed Function (see above)**
(5) Maintain or restore diversity and productivity of native and desired non-native plant communities in riparian zones.	**Invasive Species DC-1.** Healthy, native and desired nonnative animal communities and native plant communities dominate the landscape and are resilient given current and projected climate conditions. Invasive species and other undesirable species (terrestrial and aquatic plants and animals) are absent or occur in small areas and have limited or no impacts on viability of native and desired nonnative

	species. Existing invasive and undesirable species do not expand their current distributions over the life of the Plan, and their current distributions will be reduced to the extent possible over that period of time. Invasive and undesirable species do not significantly diminish the ability of the national forests to provide the goods and services communities expect or the habitat that plant and animal community diversity depends upon. New invasive species resulting from changes in plant and animal habitats due to changes in climate occur only at low levels. **Scale:** Watershed. **Plant Species Composition DC-2.** The mix of species in the grass and shrub layer of forests, as well as shrub land and grassland vegetation, contain a diverse array of native species distributed across the landscape reflecting historical conditions. Perennial native bunchgrasses dominate many grasslands and shrublands. Native grasses, grass-like plants (sedges and rushes), forbs and various shrubs characterize the forest understory. Riparian zones consist of meadows with obligate wetland species including native grasses, sedges and rushes, riparian hardwoods and structurally diverse shrublands. **Scale:** Minimum scale of subwatershed. Scale may be changed to watershed or subbasin level if justified as more appropriate though project analysis. **Special Plant Habitats DC-1.** Special plant habitats include mountain mahogany, aspen, cottonwood, sagebrush steppe, and whitebark pine. They provide high quality habitat for associated species. The distribution and abundance of structural stages and vegetation density classes within these special plant habitats are consistent with their NRV and create conditions that are ecologically resilient, sustainable, and compatible with maintaining disturbance processes within the desired conditions. Variations in the mix of structural stages and vegetation density combinations across the landscape allow special plant habitats to respond to potential changes in climate. **Riparian Management Areas DC-1 thru 9 (see above)** **Riparian Function DC 1 thru 7 (see above)** **Federally Listed Species DC -1 (see above)** **Objective 1.1 Watershed Function (see above)**

(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.**	**Hydrologic Function DC 1 thru 3 (see above)** **Riparian Management Areas DC-1 thru 9 (see above)** **Riparian Function DC 1 thru 7 (see above)** **Stream Channel Function DC-1 thru 10 (see above)** **Soil Quality DC-1 and 2 (see above)** **Water Quality DC-1 thru 3 (see above)** **Plant Species Composition DC-2 (see above)** **Special Plant Habitats DC-1 (see above)** **Riparian Function DC-7 (see above)** **Riparian Management Area DC-9 (see above)** **Stream Channel Function DC-5 (see above)**
(7) Maintain or restore riparian and aquatic habitats necessary to foster the unique genetic fish stocks that evolved within the specific geo-climatic region.	**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 as regional forester's sensitive species, and surrogate species, is of adequate quality, distribution, and abundance to contribute to maintaining native and desired nonnative species diversity. This includes the ability of species and individuals to interact, disperse, and find security within habitats in the planning area. These habitat conditions are resilient and sustainable considering the range of possible climate change scenarios. **Scale:** The desired condition for species diversity can be applied at a variety of scales (i.e., forestwide, watershed, and subwatershed). During project analysis and implementation, this desired condition should be used concurrently with information outlined in the strategy and design criteria part of this plan and with consideration of the best available climate

	change projections. **Species Diversity DC-2.** Population strongholds for the fish surrogate species provide high quality habitat and support expansion and recolonization of species to adjacent unoccupied habitats. These areas conserve key demographic processes likely to influence the sustainability of aquatic species. **Scale:** The desired condition for species diversity can be applied at a variety of scales (i.e., forestwide, watershed, and subwatershed). During project analysis and implementation, this desired condition should be used concurrently with information outlined in the strategy and design criteria part of this plan and with consideration of the best available climate change projections. **Species Diversity DC-3.** An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish exist. Low levels of occurrence of nonnative predatory, interbreeding, or competing species exist, and if present, they are temporally and spatially isolated from federally listed species. **Scale:** The desired condition for species diversity can be applied at a variety of scales (i.e., forestwide, watershed, and subwatershed). During project analysis and implementation, this desired condition should be used concurrently with information outlined in the strategy and design criteria part of this plan and with consideration of the best available climate change projections. **Species Diversity DC-4.** Specialized habitat components, such as caves, standing dead trees, seeps, and springs, are found across the landscape in amounts and types commensurate with the natural communities in which they occur. **Scale:** The desired condition for species diversity can be applied at a variety of scales (i.e., forestwide, watershed, and subwatershed). During project analysis and implementation, this desired condition should be used concurrently with information outlined in the strategy and design criteria part of this plan and with consideration of the best available climate change projections. **Species Diversity DC-5.** Management activities improve the conservation status of species identified as being surrogate species or of local or regional conservation concern. Habitats and populations are managed in accordance with conservation planning documents, recovery plans, best available scientific information, and local knowledge. **Scale:** The desired condition for species

	diversity can be applied at a variety of scales (i.e., forestwide, watershed, and subwatershed). During project analysis and implementation, this desired condition should be used concurrently with information outlined in the strategy and design criteria part of this plan and with consideration of the best available climate change projections. **Riparian Management Areas DC-1 thru 9 (see above)** **Riparian Function DC 1 thru 7 (see above)** **Stream Channel Function DC-1 thru 10 (see above)** **Water Quality DC-1 thru 3 (see above)** **Water Use DC-1 and 2 (see above)** **Roads and Trails DC-1 see above)** **Plant Species Composition DC-2 (see above)** **Federally Listed Species DC -1 (see above)** **Hydrologic Function DC 1 thru 3 (see above)** **Soil Quality DC-1 and 2 (see above)** **Special Plant Habitats DC-1 (see above)** **Riparian Function DC-7 (see above)** **Riparian Management Area DC-9 (see above)**

	Stream Channel Function DC-5 (see above) **Wetland Function and Groundwater-dependent Ecosystem Function DC-1 thru 5 (see above)** **Aquatic Habitat Function DC 1 and 8 (see above)** **Objective 1.1 Watershed Function (see above)**
(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.	**Riparian Function DC 1 thru 7 (see above)** **Aquatic Habitat Function DC 1 and 8 (see above)** **Federally Listed Species DC -1 (see above)** **Invasive Species DC 1 (see above)** **Hydrologic Function DC 1 thru 3 (see above)** **Plant Species Composition DC-2 (see above)** **Species Diversity DC 1 thru 5 (see above)** **Riparian Management Areas DC-1 thru 9 (see above)**
INFISH/PACFISH Riparian Management Objectives	***Responsive Forest Plan Direction***
(1) Pool Frequency by Channel Type	**Standard WM-1S**. When watershed function[50] desired conditions are being achieved and watersheds are functioning properly[51], projects shall maintain[52] those conditions. When watershed function desired

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

	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 restore[53] or not retard attainment[54] of desired conditions. Short-term[55] adverse effects from project activities may occur when they support or do not diminish long-term[56] 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}, 1872 Mining law, valid state water right, etc.). In those cases, project effects shall be minimized and not retard attainment of desired conditions for watershed function, to the extent possible within Forest Service authorities. Use ARCS Attachment B to assist in determining compliance with this standard. **Standard RMA-1S.** Riparian Management Areas include portions of watersheds where aquatic and riparian-dependent resources receive primary management emphasis. When riparian management area desired conditions are functioning properly, projects shall protect or maintain those conditions. When riparian management area desired conditions are not yet achieved or riparian management areas have

[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).

52 See glossary for definitions of "maintain" and "degrade".

[53] See glossary for definitions of "restore".

[54] See glossary for definitions of "retard attainment".

[55] See glossary for definition of "short-term adverse effects" See the Implementation Plan for application of the definition.

56 See glossary for definition of "long-term recovery". See the Implementation Plan for application of the definition.

	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.[57] Short-term adverse effects from project activities may occur when they support long-term recovery of riparian management area desired conditions.[58] Exceptions to this standard include situations where Forest Service authorities are limited (Alaska National Interest Lands Conservation Act {ANILCA}, 1872 Mining law, valid state water right, etc.). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of desired conditions to the extent possible within Forest Service authorities. Use ARCS Attachment 2 (e.g. diagnostic indicators and RMA ecological process and function descriptions) to assist in determining compliance with this standard. **Guideline GM-3G.** The purpose of this guideline is to manage livestock grazing to help attain and maintain aquatic and riparian desired conditions over time. Specifically, it is intended to maintain or improve vegetative and stream conditions, help ensure the viability of aquatic species, provide important contributions to the recovery of ESA-listed species, and facilitate attainment of State water quality standards. The annual livestock use and disturbance indicators described below should be applied to help achieve,

57 Per Watershed Condition Framework Technical Guide, USDA Forest Service (2011b), subsequent versions of this guide and/or other comparable methods. 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).

58 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.

	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.[59] Specific indicators and indicator values should be prescribed and adjusted, if needed, in a manner that reflects existing and natural conditions for the specific geo-climatic, hydrologic and vegetative setting in which they are being applied. Indicators and indicator values should be adapted over time based on long-term monitoring and evaluation of conditions and trends. Alternative use and disturbance indicators and values, including those in current ESA consultation documents, may be used if they are based on best available science and monitoring data and meet the purpose of this guideline. 4. In subwatersheds that are functioning properly [60] for water quality, aquatic habitat, and riparian and wetland vegetation, protect or maintain those conditions by managing annual livestock grazing use and disturbance as follows [61]: • maintain a minimum of 6-inch residual stubble height [62] of key herbaceous species on the greenline, except for sites in late-seral conditions,[63] being managed under any grazing system that

59 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).

60 Subwatershed classification as "properly functioning", "functioning-at-risk", or "impaired function" should be determined based on a weight-of-evidence approach that considers, at a minimum, the water quality, aquatic habitat, and riparian/wetland vegetation indicators of the Watershed Condition Framework (WCF). WCF "properly functioning", "functioning-at-risk", or "impaired function" descriptions are equivalent to "functioning appropriately", "functioning-at-risk" and "functioning at unacceptable risk" categories within the matrix of pathways and indicators (MPI) used by USFWS (USFWS 1998) and to "properly functioning" or "at-risk" or "not properly functioning" categories within the MPI used by NMFS (NMFS 1996). Where ESA-listed species or critical habitat are present, use ARCS Attachment B (MPI) to determine conditions for water quality, aquatic habitat, and riparian/wetland vegetation indicators. Only WCF and MPI information relevant to livestock grazing need be considered. Local inventory, assessment and monitoring data and information can be used to refine initial classifications made per WCF or MPI.

61 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.

	supports a late-seral ecological stage, where a minimum of 4-inch to 6-inch stubble height should be maintained; • utilize no more than 30-45 percent of deep-rooted herbaceous vegetation in the active floodplain[64] and, as needed, in other critical portions of the riparian management area; • limit streambank alteration[65] 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. 5. In subwatersheds that are functioning-at-risk or that have impaired function for water quality, aquatic habitat, and/or riparian and wetland vegetation and where grazing contributes to those conditions, enable recovery by managing annual livestock grazing use and disturbance as follows: • maintain a minimum of 6-inch to 8-inch residual stubble height of key herbaceous species on the greenline; • on sites with late-season grazing [66] and where willow is or should be an important component of the riparian vegetation community, maintain a minimum of 8-inch residual herbaceous stubble height • utilize no more than 30-35 percent of deep-rooted herbaceous vegetation in the active floodplain

62 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.

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

64 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).

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

66 Late season grazing generally begins after sugar storage in woody vegetation is complete and leaf fall has started. Upland plant seeds have shattered and mean air temperatures begin to cool.

	and, as needed, in other critical portions of the riparian management area; • limit streambank alteration to no more than 15-20 percent; and • limit use of woody species to no more than 20-30 percent of current year's leaders along streambanks and, as needed, in other critical portions of the riparian management area. More conservative values, within and potentially beyond the ranges described above, should be used when 1) relevant indicators (e.g., water quality, aquatic habitat, riparian vegetation) are highly departed from desired conditions and are not improving due to livestock grazing; 2) ESA-listed aquatic species and critical habitat sensitive to grazing impacts are present and conditions are not improving due to livestock grazing, with particular emphasis on high potential fish production reaches (e.g., low gradient, unconfined stream reaches); or 3) grazing-related requirements of water quality restoration plans for impaired waters (e.g., site potential shade) are not being met and conditions are not improving due to livestock grazing. Implement other applicable actions contained in ESA Recovery Plans and water quality restoration plans. **ARCS Attachment 2:** Blue Mountains Matrix of Pathways and Watershed Condition Framework Indicators **Pool Frequency and Quality**: Refer to matrix indicators descriptions for *Functioning Appropriately, Functioning at Risk and Functioning at Unacceptable Risk* when within the range of ESA listed fish species and their habitat. For Umatilla National Forest use pools per mile values from (McKinney et al. 1996) to characterize *Functioning Appropriately* conditions. Refer to Watershed Condition Framework Aquatic Habitat Condition indicator and Channel Shape and Function attribute when outside the range ESA listed fish species and their habitat. **ARCS Attachment 2 - Indicator Modification** When a MPI or WCF indicator value is not physically or biologically appropriate, given the inherent characteristics (geoclimatic setting) of the area, the value should be modified. Indicator values should be refined to better reflect conditions that are functionally attainable in a specific watershed or stream reach based on local geology, land and channel form, climate, historic and potentially recoverable fish species

	habitat, and potential vegetation. Modification of default indicator values may be completed through a variety of methods such as watershed and project analysis. It can be done using results of broad-scale and Forest-wide monitoring and collection and evaluation of watershed and/or stream reach specific data. It may be appropriate to evaluate habitat and riparian attributes at scales larger than an individual watershed but it should be recognized that watersheds of any size or scale will contain a finite range of channel, habitat, or riparian attributes and that these attributes may vary between watersheds. Because there are a number of ways to modify the default MPIs, each with strengths and weaknesses, the specific methods and data to be used need to be defined and agreed upon by the Forest Service, NMFS, and FWS in watersheds with ESA listed fish and their critical habitat. Regardless of what methods are used, written documentation of the methods and procedures, quality and source of data, and rationale supporting the modifications should be included in record documentation. In watersheds with ESA listed fish and/or critical habitat, modification of MPIs will be coordinated with NOAA Fisheries and/or FWS through Section 7 consultations.
(2) Water Temperature	**Standard WM-1S (same as described above)**. **Standard RMA-1S (same as described above)**. **Guideline GM-3G (same as described above)**. **ARCS Attachment 2:** Blue Mountains Matrix of Pathways and Watershed Condition Framework Indicators **Temperature**: Refer to matrix indicators descriptions for *Functioning Appropriately*, *Functioning at Risk and Functioning at Unacceptable Risk* when within the range of ESA listed fish species and their habitat. Refer to Watershed Condition Framework Water Quality Condition indicator and Impaired Waters and Water Quality Problems attribute when outside the range ESA listed fish species and their habitat.

	ARCS Attachment 2 - Indicator Modification (same as described above).
(3) Large Woody Debris: greater than 20 pieces per mile; greater than 12 inch diameter; and greater than 35 foot length).	**Standard WM-1S (same as described above)**. **(same as described above)**. **Guideline GM-3G (same as described above)**. **ARCS Attachment 2:** Blue Mountains Matrix of Pathways and Watershed Condition Framework Indicators **Large Woody Debris**: Refer to matrix indicators descriptions for *Functioning Appropriately*, *Functioning at Risk and Functioning at Unacceptable Risk* when within the range of ESA listed fish species and their habitat. Refer to Watershed Condition Framework Aquatic Habitat Condition indicator and Large Woody Debris attribute when outside the range ESA listed fish species and their habitat. **ARCS Attachment 2 - Indicator Modification (same as described above)**.
(4) Bank Stability (greater than 80% stable)	**Standard WM-1S (same as described above)**. **Standard RMA-1S (same as described above)**.

	Guideline GM-3G (same as described above). **ARCS Attachment 2:** Blue Mountains Matrix of Pathways and Watershed Condition Framework Indicators **Streambank Condition**: Refer to matrix indicators descriptions for *Functioning Appropriately*, *Functioning at Risk and Functioning at Unacceptable Risk* when within the range of ESA listed fish species and their habitat. Refer to Watershed Condition Framework Aquatic Habitat Condition indicator and Channel Shape and Function attribute when outside the range ESA listed fish species and their habitat. **ARCS Attachment 2 - Indicator Modification (same as described above)**.
(5) Lower Bank Angle (greater than 75% of banks with greater than 90% angle.	**Standard WM-1S (same as described above)**. **Standard RMA-1S (same as described above)**. **Guideline GM-3G (same as described above)**. **ARCS Attachment 2:** Blue Mountains Matrix of Pathways and Watershed Condition Framework Indicators **Streambank Condition**: Refer to matrix indicators descriptions for *Functioning Appropriately*, *Functioning at Risk and Functioning at Unacceptable Risk* when within the range of ESA listed fish

	species and their habitat. Refer to Watershed Condition Framework Aquatic Habitat Condition indicator and Channel Shape and Function attribute when outside the range ESA listed fish species and their habitat. **ARCS Attachment 2 - Indicator Modification (same as described above)**.
(6) Width/Depth Ratio (less than 10)	**Standard WM-1S (same as described above)**. **Standard RMA-1S (same as described above)**. **Guideline GM-3G (same as described above)**. **ARCS Attachment 2:** Blue Mountains Matrix of Pathways and Watershed Condition Framework Indicators **Width/Depth Ratio**: Refer to matrix indicators descriptions for *Functioning Appropriately, Functioning at Risk and Functioning at Unacceptable Risk* when within the range of ESA listed fish species and their habitat. Refer to Watershed Condition Framework Aquatic Habitat Condition indicator and Channel Shape and Function attribute when outside the range ESA listed fish species and their habitat. **ARCS Attachment 2 - Indicator Modification (same as described above)**.

(7) Substrate	**Standard WM-1S (same as described above)**. **Standard RMA-1S (same as described above)**. **Guideline GM-3G (same as described above)**. **ARCS Attachment 2:** Blue Mountains Matrix of Pathways and Watershed Condition Framework Indicators **Substrate/Turbidity**: Refer to matrix indicators descriptions for *Functioning Appropriately, Functioning at Risk and Functioning at Unacceptable Risk* when within the range of ESA listed fish species and their habitat. Refer to Watershed Condition Framework Water Quality Condition indicator and Impaired Waters and Water Quality Problems attribute when outside the range ESA listed fish species and their habitat. **ARCS Attachment 2 - Indicator Modification (same as described above)**.
1995 March 1 NMFS Biological Opinion 6. Watershed Analysis - Conducted prior to revising RMOs or reducing RHCA widths	**ARCS Attachment 2 - Indicator Modification** Watershed analysis is not required to modify MPI and/or WCF indicators. A process to modify indicators is outlined in ARCS Attachment 2 and is decribed above under pool frequency by channel type.
1998 June 22 NMFS Biological Opinion 3 - Use Streamlining & Matrix of Pathways & Indicators - All other ongoing actions that may affect steelhead should be assessed via the Level 1 streamlining teams using the matrix	**Standard WM-1S, Standard RMA-1S, and Guideline GM-3G** (described above) required use of the matrix of pathways and indicators when ESA listed fish and their critical habitat are present. Matrix indicators serves as diagnostic criteria to assist in evaluating attainment or progress towards attainment of multiple aquatic and riparian desired conditions and compliance with key standards and guidelines. Forest interdisciplinary team aquatic specialists will also continue to use the matrix of pathways and indicators when evaluating projects when ESA listed steelhead and their designated critical habitat may be affected

	by the proposed action.
INFISH/PACFISH RHCAs	***Forest Plan Riparian Management Areas (RMAs)***
Interim RHCA widths would apply where watershed analysis has not been completed. Site-specific widths may be increased where necessary to achieve riparian management goals and objectives, or decreased where interim widths are not needed to attain RMOs or avoid adverse effects. Establishment of RHCA's would require completion of watershed analysis to provide the ecological basis for the change. However, interim RHCAs may be modified by amendment in the absence of watershed analysis where stream reach or site-specific data support the change. In all cases, the rationale supporting RHCA widths and their effects would be documented.	Riparian Management Area widths will be based on the direction described below for fish-bearing and permanently flowing non-fish bearing streams, constructed ponds and reservoirs, and wetlands greater than 1 acre, lakes and natural ponds, and seasonally flowing or intermittent streams, wetlands, seeps and springs less than 1 acre, and unstable and potentially unstable areas. Riparian Management Area widths may only be adjusted based on a watershed analysis.
Standard Widths Defining Interim RHCAs: The four categories of stream or water body and the standard widths for each are: **(1) Category 1 - Fish-bearing streams: 300 feet**	**Fish-bearing streams** - consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest. In degraded or incised streams, the riparian management area should extend from the edge of the active channel to the outer extent of the former floodplain. It is expected that riparian management area widths along fish-bearing streams will not be less than described here.
(2) Category 2 – Permanently flowing non-fish bearing streams: 150 feet	**Permanently flowing non-fish bearing streams** - consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet total, including both sides of the stream channel), whichever is greatest. In degraded or incised streams, the riparian management area should extend from the water's edge to the outer extent of the former floodplain.
(3) Category 3 – Ponds, lakes, reservoirs, and wetlands: 150 feet	**Constructed ponds and reservoirs, and wetlands greater than 1 acre** –consist of the body of water or wetland and: the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or the extent of unstable and potentially unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the wetland greater than 1 acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is greatest.

	Lakes and natural ponds - consist of the body of water and the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or to the extent of unstable and potentially unstable areas, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance, whichever is greatest.
(4) Category 4 – Seasonally flowing intermittent streams, small wetlands, and landslide prone areas: stream channel width, landslide prone area, 100 feet in priority watersheds, and 50 in non-priority watersheds.	**Seasonally flowing or intermittent streams, wetlands, seeps and springs less than 1 acre, and unstable and potentially unstable areas** - This category applies to features with high Draft Environmental Impact Statement – Volume 3, Glossary and Acronyms Proposed Revised Land Management Plans 44 for the Blue Mountains National Forests variability in size and site-specific characteristics. At a minimum, the riparian management areas should 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. • Intermittent streams are defined as any nonpermanent flowing drainage feature having a definable channel and evidence of annual scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two physical criteria. Including intermittent streams, springs, and wetlands within riparian management areas is important for full implementation of the ARCS. Accurate identification of these features is critical to the correct implementation of the strategy and protection of the intermittent stream and wetland functions and processes. Identification of these features is difficult at times due to the lack of surface water or wet soils during dry periods. Fish-bearing intermittent streams are distinguished from non-fish-bearing intermittent streams by the presence of any species of fish for any duration. Many intermittent streams may be used as spawning and rearing streams, refuge areas during flood events in larger rivers and streams or travel routes for fish emigrating from lakes. In these instances, the guidelines for fish-bearing streams would apply to those sections of the intermittent stream used by the fish.
1995 March 1 Biological Opinion 6. Watershed Analysis - Conducted prior to revising RMOs or reducing RHCA widths	Watershed analyses shall be conducted or updated prior to proposing any changes to RMA widths.

INFISH/PACFISH Key and Priority Watersheds	*Responsive Forest Plan Direction*
Key Watersheds (PACFISH) Priority Watersheds (INFISH). Key and Priority Watersheds provide a pattern across the landscape where habitat for anadromous fish and inland native fish would receive special attention and treatment. Priority for these designations is to protect or restore habitat for listed fish stocks, stocks of special interest or concern, or salmonid assemblages of critical value for productivity and diversity. All watersheds that contain designated critical habitat for listed anadromous fish will be treated as Key, but will be refined through broad scale assessments and analyses.	**Key Watersheds.** Key Watersheds are a network of watersheds that are important to rare species and/or serve as critical sources of high-quality water for those species and/or municipalities. Special management direction applies to these watersheds. They are selected because of their extraordinary resource values. They may serve as strongholds for important aquatic resources or have the potential to do so. They may be areas crucial to Threatened or Endangered fish and other aquatic and riparian species of concern and/or interest. Key Watersheds may also comprise areas that provide high-quality water important for maintenance of downstream aquatic and riparian populations. In addition, they could serve as municipal drinking water sources for communities in the region. Management emphasizes minimizing risk and maximizing restoration or retention of ecological health. Because part of the Key Watershed selection process is based on the habitat requirements of Federally-listed species and species of conservation concern, the network helps address species-level diversity (fine filter) by conserving and/or restoring critical biophysical processes.
1998 June 22 NMFS Biological Opinion 8 - Key Watersheds within the Upper Columbia River Basin ESU and the Snake River Basin ESU should be treated as key watersheds (as directed by PF) and as designated critical habitat.	**Standard KW-1S.** In Key Watersheds or subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species that are functioning properly there shall be no net increase (1 mile of road-related risk reduction for every new mile of road construction), where they are functioning-at-risk, there shall be a net decrease (1.5 miles of road-related risk reduction for every new mile of road construction), and where they are impaired function, there shall be a net decrease (2.0 miles of road-related risk reduction for every new mile of road construction) in system roads that affect hydrologic function. Priority for road-related risk reduction shall be given to roads that pose the greatest relative ecological risks to riparian and aquatic ecosystems. Road-related risk reduction will occur prior to new road construction unless logistical restrictions require post-construction risk reduction. This standard shall apply to the affected subwatershed when new system road construction is proposed in that subwatershed, and shall not be offset by reductions in open-road densities in other subwatersheds.

A crosswalk of PACFISH Key and INFISH Priority watersheds to the Plan Key and Priority Watersheds is found in a table following this crosswalk.	
INFISH/PACFISH Watershed Analysis	***Responsive Forest Plan Direction***
Watershed analysis. Watershed analysis emphasizes the importance of determining watershed status, resilience and capabilities, examining ecological relationships, and identifying watershed restoration and monitoring objectives, strategies, and priorities prior to planning actions in the watershed. Watershed analysis ideally should be completed before actions are planned, rather than in response to actions that are already planned. Ideally watershed analysis should be carried out in Priority Watersheds prior to planning and implementing new land management actions that may affect listed fish or their habitats. Watershed analysis is required prior to road building in RHCAs, salvage logging in RHCAs of watersheds with designated critical habitat, and new recreation facilities in RHCAs.	**Watershed analysis.** Watershed analysis is an interdisciplinary evaluation of important geomorphic and ecological processes operating in specific watersheds. These analyses: (1) evaluates the condition and trend of watersheds, riparian zones and aquatic ecosystems, (2) assesses connectivity of the watershed for terrestrial and aquatic flora and fauna species, (3) identifies and evaluates resource conditions and trends, and (4) provides the context for management. These types of analyses provide a basis for development of watershed-scale management and restoration strategies and is a tool for more specifically defining desired conditions, developing management objectives and strategies, and designing monitoring strategies. 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
INFISH/PACFISH Watershed Restoration	***Responsive Forest Plan Direction***
Watershed and Habitat Restoration. Prioritize Key and Priority watersheds for restoration. Information from watershed analysis used to determine restoration needs and priorities. Retarget existing	**Watershed Restoration.** Includes a more formalized and structured process for watershed restoration than the existing strategies. Concepts from the Pacific Northwest Region’s Aquatic Restoration Strategy (USDA Forest Service 2005) and adopts the six-step National Watershed Condition Framework (WCF)

funding to establish a watershed restoration management program.	process for planning and implementing watershed restoration. Recognizes broad-scale aquatic resource protection/passive restoration during all land management activities as an essential foundation for restoration. The foundation of the passive restoration direction in the plan stems from a suite of robust standards and guidelines which form the basis for design criteria that mitigate the effects to sensitive resources, such as wetlands and riparian areas. Active restoration builds upon this foundation, through targeted, strategically-focused active restoration implemented via the WCF process of watershed assessment, selection of Potential WCF and WCF Priority Watersheds, and development, implementation and monitoring of multi-year, watershed-scale restoration plans. Priority Watersheds identified through the WCF process are expected to generally, but not always, be a subset of the broader Key Watershed network. WCF is a near-term (5-7 years) implementation process for restoration across the broader, long-term Key Watershed network. Includes quantitative, measureable objectives for restoration. Describes the general scope and scale of various restoration treatments (e.g., miles of streams restored, miles of road improved or decommissioned) expected to be implemented during the life of the plan and ultimately, the number of watersheds in which all essential restoration actions are expected to be completed.
INFISH/PACFISH Monitoring	***Responsive Forest Plan Direction***
Monitoring. Monitoring program required to evaluate project implementation (compliance) and effectiveness of PACFISH as a strategy for protecting and improving aquatic habitat conditions on federal lands. This includes implementation, effectiveness, and validation monitoring.	**Monitoring and Evaluation.** Includes a consistent, explicit, and structured approach to monitoring and adaptive management (i.e., implementation, effectiveness, and validation monitoring). Both broad-scale and Forest plan level monitoring are included. Specific elements are focused on determining whether restoration objectives are being attained, whether water quality BMPs and other standards and guidelines are being implemented and are effective at the site-scale, determining the status and trend of watershed conditions and aquatic ecosystems, assessing changes in the distribution of ESA-listed aquatic species and species of conservation concern, and tracking the status and trend of stream temperatures. Linkages between monitoring and other components of the ARCS are also clearly defined (e.g., watershed analysis).
1998 June 22 NMFS Biological Opinion 7 - Strengthen Monitoring and Commitment to PACFISH to insure the strategy is properly implemented. Implementation has been inconsistent. Strengthened implementation should include increased emphasis on watershed analyses and the development of a schedule for each unit to complete such analysis in a timely	Four types of monitoring will address plan and ARCS implementation. First, forest plan implementation monitoring will occur that correlates to the Blues Mountains ARCS and is responsive to the 2012 Planning Rule 219.12.a.5. This includes the: i) status of watershed conditions. ii) status of select ecological conditions

manner	iii) status of ecological conditions (see 219.9) related to T&E, candidate, and conservation concern species iv) status of surrogate species (related to 219.9 Diversity) vi) changes due to climate change and other stressors vii) progress toward meeting DCs and Objectives, including multiple use opportunities. Implementation monitoring would measure the effects of various activities such as, watershed restoration, timber harvest, grazing, road building, decommissioning, or fuels treatment. Second, there will be continued to be a commitment to broad-scale effectiveness monitoring through the Pacfish/InFish Biological Opinion Monitoring Program (PIBO) that occurs 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. The PIBO program would continue to provide the Blue Mountain Forests with the status and trend of instream habitat and riparian conditions. Third, project-level monitoring will to evaluate implementation and effectiveness of LRMP direction and assess impacts on site-specific resources of concern. One example of this is the use of the National Water Quality Best Management Practices program to evaluate project BMPs that address non-point source pollution and are intended to that protect and restore water quality and aquatic resources. Finally, there will be periodic regional office reviews that will address plan and project implementation issues and concerns.
1995 March 1 Biological Opinion 6.a. - The PACFISH monitoring committee will conduct and report annually on implementation, effectiveness, photo, and validation monitoring.	The Line Manager Certification Report fulfilled the annual reporting requirements of the 1998 and 2003 Biological Opinions on Interim Infish/Pacfish strategies and the Terms and Conditions in the Incidental Take Statements associated with these Biological Opinions. There is currently no plan to continue this annual report submitted to the Deputy team for forests that have left the Infish/Pacfish strategies.

	However, there will be implementation and effectiveness monitoring (see response to 1998 BiOp above) to address the ARCS.
1995 March 1 Biological Opinion 6.b. - Submit annual report to NMFS on implementation of requirements in this BiOp	See response to 1998 BiOp above
1995 March 1 Biological Opinion 6.c. - Conduct quality control team random spot checks of the implementation of PACFISH and LRMP	No respective plan component.
INFISH/PACFISH Standards and Guidelines	***Responsive Forest Plan Direction***
Timber Related Direction	
Timber Standard TM-1. Prohibit timber harvest, including fuelwood cutting, in Riparian Habitat Conservation Areas (RHCAs), except as described below. Do not include RHCAs in the land base used to determine the Allowable Sale Quantity; however, any volume harvested can contribute to the timber sale program. **a. Where catastrophic events such as fire, flooding, volcano, wind, or insects cause damage that results in degraded riparian conditions, allow salvage and fuel cutting in RHCAs only where present and future woody debris needs are met, where cutting would not retard or prevent attainment of other riparian Management objectives (RMOs), and where adverse effects can be avoided to aquatic resources. Ecosystem Analysis at the Watershed Scale shall be completed prior to harvest, including salvage and fuel wood cutting, in RHCAs.** • **b. Apply silvicultural practices for RHCAs to acquire desired vegetation characteristics where needed to attain RMOs. Apply silvicultural practices in a manner that does not retard attainment of RMOs and that avoids adverse effects to inland native fish.**	**Standard TM-1S.** Silvicultural treatments shall occur in riparian management areas only as necessary to maintain, enhance, or restore desired conditions for aquatic and riparian resources. When conducted, these activities shall avoid or minimize adverse effects to aquatic and riparian resources. Vegetation in riparian management areas shall not be subject to regularly scheduled timber harvest because they are not part of the timber suitability landbase. **Standard TM-2S.** Fuelwood cutting shall not be authorized in RMAs unless specifically designed to attain aquatic and riparian desired conditions. **Guideline TM-3G.** Use of existing or construction of new landings, designated skid trails, staging, and decking should not occur in riparian management areas, unless they are associated with projects designed to improve riparian management areas conditions. These features should: • be of minimum size, • be located outside the active floodplain, and • avoid negative effects to large wood, bank integrity, temperature, and sediment levels. **Guideline TM-4G.** Yarding activities should achieve full suspension over the active channel; unless other alternatives will have less damage to riparian areas and stream channels. **Standard TM-5S.** Silvicultural practices shall include provisions, as appropriate, to avoid detrimental changes in water temperatures, blockages of water courses; including protection for streams, stream

	banks, shorelines, lakes, wetlands, and other bodies of water, and deposits of sediment. **Standard TM-6S.** Silvicultural practices shall include provisions (e.g. BMPs) for the maintenance or restoration of soil resources. **Standard TM-7S.** Timber harvest on lands not suitable for timber production should occur only to meet desired conditions for each management area other than timber production. **Standard TM-10S.** 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. **Standard RMA-1S**. Riparian Management Areas include portions of watersheds where aquatic and riparian-dependent resources receive primary management emphasis. When riparian management area desired conditions are functioning properly, projects shall protect or maintain those conditions. When riparian management area desired conditions are not yet achieved or riparian management areas have impaired function or are functioning-at-risk and to the degree that project activities would contribute to those conditions, projects or permitted activities shall restore or not retard attainment of desired conditions.[67] Short-term adverse effects from project activities may occur when they support long-term recovery of riparian management area desired conditions.[68] Exceptions to this standard include situations where Forest Service authorities are limited (Alaska National Interest Lands Conservation Act {ANILCA}, 1872 Mining law, valid state water right, etc.). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of

67 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).

68 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.

	desired conditions to the extent possible within Forest Service authorities. Use ARCS Attachment B (e.g. diagnostic indicators and RMA ecological process and function descriptions) to assist in determining compliance with this standard. **ARCS Attachment 2 (Riparian Management Areas)** - RMAs are areas where aquatic and riparian-dependent resources receive primary emphasis and management activities must be designed to benefit those resources. Riparian function and ecological processes descriptions in ARCS Attachment 2 are intended to: 1. Ensure interdisciplinary teams consider and understand the appropriate riparian ecological processes when planning silvicultural practices within or affecting RMAs designed to maintain or improve these processes. 2. Provide additional information to help interpret Standard RMA-1S. RMA-1S is intended to maintain riparian areas when at desired conditions and restore/not retard attainment of desired conditions when RMAs are impaired. To fully implement this standard interdisciplinary teams must identify important ecological processes within the analysis area, the status (at desired condition or impaired) of these processes, and evaluate impacts to see how an action maintains, restores, and does not retard attainment of these processes. Descriptions below can help frame the type of processes to consider, the spatial scale they operate, and the important interactions between terrestrial and aquatic ecosystems that need to be considered when defining desired conditions and describing project effects. **Guideline RMA-3G.** 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. **Standard WM-1S**. When watershed function[69] desired conditions are being achieved and watersheds are functioning properly[70], projects shall maintain[71] those conditions. When watershed function desired

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

	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 restore[72] or not retard attainment[73] of desired conditions. Short-term[74] adverse effects from project activities may occur when they support or do not diminish long-term[75] 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}, 1872 Mining law, valid state water right, etc.). In those cases, project effects shall be minimized and not retard attainment of desired conditions for watershed function, to the extent possible within Forest Service authorities. Use ARCS Attachment B to assist in determining compliance with this standard. **Suitable uses and activities in Riparian Management Areas-** Riparian Management Areas are **generally unsuitable** for: • New Road or Trail Construction

[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).

71 See glossary for definitions of "maintain" and "degrade".

[72] See glossary for definitions of "restore".

[73] See glossary for definitions of "retard attainment".

[74] See glossary for definition of "short-term adverse effects" See the Implementation Plan for application of the definition.

75 See glossary for definition of "long-term recovery". See the Implementation Plan for application of the definition.

	• Salable mineral activities, such as gravel and sand • Energy Development (e.g. wind farms, utility corridors, pipelines, etc. Riparian Management Areas are **unsuitable** for: • Regularly scheduled timber production (regularly scheduled timber harvest on suitable lands); since they are not part of our timber suitability landbase. • Grazing management that degrades aquatic habitat conditions or impedes attainment of aquatic and riparian-dependent resources Riparian Management Areas are **generally suitable** for: • Silvicultural treatments necessary to maintain, enhance or restore conditions for aquatic and riparian resources. When conducted, these activities shall avoid or minimize adverse effects to aquatic and riparian resources and not degrade or retard attainment of aquatic and riparian-dependent resources • Timber Harvest and Mechanical fuel treatment may be allowed under certain circumstance to meet Riparian Management Area DCs • Grazing management that does not degrade or retard attainment of aquatic and riparian-dependent resources • Motor Vehicle use consistent with 36 CFR 212 of the Travel Management Rule
1995 March 1 Biological Opinion Timber 5.b.1. Conduct EAWS and site-specific analyses in priority watersheds prior to harvest, salvage, or thinning in RHCAs. Demonstrate how the action will not retard/prevent attainment of RMOs or adversely affect salmon and their habitat.	**Standard RMA-1S**. Riparian Management Areas include portions of watersheds where aquatic and riparian-dependent resources receive primary management emphasis. When riparian management area desired conditions are functioning properly, projects shall protect or maintain those conditions. When riparian management area desired conditions are not yet achieved or riparian management areas have impaired function or are functioning-at-risk and to the degree that project activities would contribute to those conditions, projects or permitted activities shall restore or not retard attainment of desired conditions.[76] Short-term adverse effects from project activities may occur when they support long-term

76 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

	recovery of riparian management area desired conditions.[77] Exceptions to this standard include situations where Forest Service authorities are limited (Alaska National Interest Lands Conservation Act {ANILCA}, 1872 Mining law, valid state water right, etc.). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of desired conditions to the extent possible within Forest Service authorities. Use ARCS Attachment B (e.g. diagnostic indicators and RMA ecological process and function descriptions) to assist in determining compliance with this standard. **Standard 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 recovery[78] 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. **Watershed analysis** - will be reviewed, updated or conducted prior to:

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).

77 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.

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

	• proposing changes to RMA widths • timber salvage or construction of facilities in RMAs • construction of permanent system roads in RMAs
1995 March 1 Biological Opinion Timber 5.b.2. Conduct EAWS in priority watersheds prior to new/proposed timber sales if the existing clearcut area (ECA) exceeds 15% of the potentially forested area.	**Watershed analysis (see above)**
1995 March 1 Biological Opinion Timber 5.b.3. Conduct EAWS in priority watersheds prior to new/proposed actions reducing RHCA widths.	**Watershed analysis (see above)**
Roads Related Direction	
Road Standard RF-1. Cooperate with federal, tribal, state, and country agencies and cost-share partners to achieve consistency in road design, operation, and maintenance necessary to attain RMOs.	No respective plan component.
Road Standard RF-2. For each existing or planned road, meet the RMOs and avoid adverse effects on aquatic resources as described below: **a. Ecosystem Analysis at the Watershed Scale shall be completed prior to construction of new roads or landings in RHCAs.** **b. Road and landing locations in RHCAs shall be minimized.** **c. Initiate development and implementation of a Road Management Plan or a Transportation Management Plan. At a minimum, the plan shall address the following items:** • **Road design criteria, elements, and standards that govern construction and reconstruction.** • **Road management objectives for each road.** • **Criteria that govern road operation, maintenance, and management.** • **Requirements for pre-, during-, and post-storm**	**Watershed Analysis** - watershed analyses shall be conducted or updated prior to construction of permanent system roads in RMAs. **Standard KW-1S.** In Key Watersheds or subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species that are functioning properly there shall be no net increase (1 mile of road-related risk reduction for every new mile of road construction), where they are functioning-at-risk, there shall be a net decrease (1.5 miles of road-related risk reduction for every new mile of road construction), and where they are impaired function, there shall be a net decrease (2.0 miles of road-related risk reduction for every new mile of road construction) in system roads that affect hydrologic function. Priority for road-related risk reduction shall be given to roads that pose the greatest relative ecological risks to riparian and aquatic ecosystems. Road-related risk reduction will occur prior to new road construction unless logistical restrictions require post-construction risk reduction. This standard shall apply to the affected subwatershed when new system road construction is proposed in that subwatershed, and shall not be offset by reductions in open-road densities in other subwatersheds. **Guideline 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

inspections and maintenance. • **Regulation of traffic during wet periods to minimize erosion and sediment delivery and accomplish other objectives.** • **Implementation and effectiveness of monitoring plans for road stability, drainage, and erosion control.** • **Mitigation plans for road failures.** **d. Avoid sediment delivery to streams from the road surface.** • **Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is infeasible or unsafe.** • **Route road drainage away from potentially unstable stream channels, fills, and hillslopes.** **e. Avoid disruption of natural hydrologic flow paths.** **f. Avoid side casting of soils or snow. Side casting of road material is prohibited on road segments within or abutting RHCAs.**	to improve riparian management areas conditions. These features should: • be of minimum size, • be located outside the active floodplain, and • avoid negative effects to large wood, bank integrity, temperature, and sediment levels. **Guideline RF-1G.** New roads and trails should not be constructed within riparian management areas unless no other feasible alternative exists. **Guideline RF-2G.** Temporary roads, including stream crossings, in RMAs should be minimized. Temporary roads, if constructed, should be managed to protect and restore aquatic and riparian desired conditions. **Standard RF-3S.** Side-casting (placement of unconsolidated earthen waste materials resulting from road construction or maintenance) in riparian management areas shall be avoided. **Standard RF-4S.** Fill material shall not be placed on organic debris in riparian management areas. **Standard RF-5S.** Disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow shall be avoided when constructing or reconstructing roads or landings either inside or outside of riparian management areas. **Guideline RF-6G.** Wetlands and unstable areas should be avoided when reconstructing existing roads or constructing new roads and landings. Minimize impacts where avoidance is not practical. **Standard RF-7S.** New or replaced permanent stream crossings shall be designed to allow for the 100-year flood and its bedload and debris. 100-year flood estimates will reflect the best available science regarding potential effects of climate change. **Standard RF-8S.** Where physically feasible, construction or reconstruction of stream crossings will avoid diversion of streamflow out of the channel and down the road in the event of crossing failure. **Standard RF-9S**. Construction or reconstruction of stream crossings shall provide and maintain passage

	for all life stages of all native and desired non-native aquatic and riparian-dependent organisms. Crossing designs shall reflect the best available science regarding potential effects of climate change on peak flows and low flows. **Guideline RF-11G.** Design roads to minimize delivery of water and sediment from roads to streams. Avoid or minimize disruption of hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow when constructing, reconstructing, and maintenance of roads or landing. **Guideline RF-12G.** Road drainage should be routed away from potentially unstable channels, fills, and hillslopes to the extent practicable. **Standard RF-13S.** Road maintenance and new road construction shall be designed to minimize adverse effects to threatened, endangered, proposed, or candidate aquatic species and their habitat. **Standard WM-2S.** All projects shall be implemented in accordance with Best Management Practices, as described in National and Regional Technical Guides. **Suitable uses and activities in Riparian Management Areas (see above)**
Road Standard RF-3. Determine the influence of each road on the RMOs. **Meet RMOs and avoid adverse effects on inland native fish *[listed anadromous fish]* by:** **a) Reconstructing road and drainage features that do not meet design criteria or operation and maintenance standards, or that have been shown to be less effective than designed for controlling sediment delivery, or that**	**Standard KW-1S.** In Key Watersheds or subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species that are functioning properly there shall be no net increase (1 mile of road-related risk reduction for every new mile of road construction), where they are functioning-at-risk, there shall be a net decrease (1.5 miles of road-related risk reduction for every new mile of road construction), and where they are impaired function, there shall be a net decrease (2.0 miles of road-related risk reduction for every new mile of road construction) in system roads that affect hydrologic function. Priority for road-related risk reduction shall be given to roads that pose the greatest relative ecological risks to riparian and aquatic ecosystems. Road-related risk reduction will occur prior to new road construction unless logistical restrictions require post-construction risk reduction. This standard shall apply to the affected subwatershed when new system road construction is proposed in that

retard attainment of RMOs, or do not protect priority watersheds *[designated critical habitat for listed anadromous fish]* from increased sedimentation. **b) Prioritizing reconstruction based on current and potential damage to inland native fish and their priority watersheds *[listed anadromous fish and their designated critical habitat]*, the ecological value of the riparian resources affected, and the feasibility of options such as helicopter logging and road relocation out of RHCAs.** **Closing and stabilizing or obliterating, and stabilizing roads not needed for future management activities. Prioritize these actions based on the current and potential damage to inland native fish in priority watersheds *[listed anadromous fish and***	subwatershed, and shall not be offset by reductions in open-road densities in other subwatersheds. **Standard WM-1S**. When watershed function[79] desired conditions are being achieved and watersheds are functioning properly[80], projects shall maintain[81] 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 restore[82] or not retard attainment[83] of desired conditions. Short-term[84] adverse effects from project activities may occur when they support or do not diminish long-term[85] 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}, 1872 Mining law, valid state water right, etc.). In those cases, project effects shall be minimized and not retard attainment of desired conditions for watershed function, to the extent possible within Forest Service authorities. Use ARCS

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

[2] 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).

81 See glossary in the Plan for definitions of “maintain” and “degrade”.

[82] See glossary in the Plan for definitions of “restore”.

[83] See glossary in the Plan for definitions of “retard attainment”.

[84] See glossary in the Plan for definition of “short-term adverse effects” See the Implementation Plan for application of the definition.

85 See glossary in the Plan for definition of “long-term recovery”. See the Implementation Plan for application of the definition.

***their designated critical habitat],* and the ecological value of the riparian resources affected.**	Attachment 2 to assist in determining compliance with this standard. **Standard WM-2S.** All projects shall be implemented in accordance with Best Management Practices, as described in National and Regional Technical Guides. **Standard 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 recovery[86] 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. **Standard RF-8S.** Where physically feasible, construction or reconstruction of stream crossings will avoid diversion of streamflow out of the channel and down the road in the event of crossing failure. **Guideline RF-12G.** Road drainage should be routed away from potentially unstable channels, fills, and hillslopes to the extent practicable. **Guideline RF-11G.** Design roads to minimize delivery of water and sediment from roads to streams. Avoid or minimize disruption of hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow when constructing, reconstructing, and maintenance of roads or landing. **Standard RF-13S.** Road maintenance and new road construction shall be designed to minimize adverse

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

	effects to threatened, endangered, proposed, or candidate aquatic species and their habitat.
Road Standard RF-4. Construct new and improve existing culverts, bridges, and other stream crossings to accommodate a 100-year flood, including associated bedload and debris, where those existing structures would or do pose a substantial risk to riparian conditions. Such improvements should include those structures that do not meet design and operation maintenance criteria that have been shown to be less effective than designed for controlling erosion, or that retard attainment of RMOs. Priority for upgrading shall be based on risks and the ecological value of the riparian resources affected. Construct and maintain crossings to prevent diversion of stream flow out of the channel and down the road in the event of crossing failures.	**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. **Standard RF-8S.** Where physically feasible, construction or reconstruction of stream crossings will avoid diversion of streamflow out of the channel and down the road in the event of crossing failure. **Standard RF-9S**. Construction or reconstruction of stream crossings shall provide and maintain passage for all life stages of all native and desired non-native aquatic and riparian-dependent organisms. Crossing designs shall reflect the best available science regarding potential effects of climate change on peak flows and low flows. **Guideline RF-10G.** Fish passage barriers should be retained where they serve to restrict access by undesirable nonnative species and are consistent with restoration of habitat for native species.
Road Standard RF-5. Provide and maintain fish passage at all crossings of existing and potential fish-bearing streams.	**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. **Standard RF-9S.** Construction or reconstruction of stream crossings shall provide and maintain passage for all life stages of all native and desired non-native aquatic and riparian-dependent organisms. Crossing designs shall reflect the best available science regarding potential effects of climate change on peak flows and low flows. **Guideline RF-10G.** Fish passage barriers should be retained where they serve to restrict access by undesirable nonnative species and are consistent with restoration of habitat for native species.
1995 March 1 NMFS Biological Opinion – Roads 5.c.1 For proposed/new roads, where road density is greater than 2 miles/square mile in Priority Watersheds, reduce road mileage and emphasize road closure, obliteration, and revegetation.	**Standard KW-1S.** In Key Watersheds or subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species that are functioning properly there shall be no net increase (1 mile of road-related risk reduction for every new mile of road construction), where they are functioning-at-risk, there shall be a net decrease (1.5 miles of road-related risk reduction for every new mile of road construction), and where they are impaired function, there shall be a net decrease (2.0 miles of road-related risk reduction for every new mile of road construction) in system roads that affect hydrologic function. Priority for road-related risk reduction shall be given to roads that pose the greatest

	relative ecological risks to riparian and aquatic ecosystems. Road-related risk reduction will occur prior to new road construction unless logistical restrictions require post-construction risk reduction. This standard shall apply to the affected subwatershed when new system road construction is proposed in that subwatershed, and shall not be offset by reductions in open-road densities in other subwatersheds.
1995 March 1 NMFS Biological Opinion – Roads 5.c.2 Complete and implement road transportation plans as required by PACFISH.	No respective plan component.
Grazing Related Direction	
Grazing Standard GM-1. Modify grazing practices (for example, accessibility of riparian areas to livestock, length of grazing season, stocking levels, timing of grazing) that retard or prevent attainment of RMOs or are likely to adversely affect aquatic resources. Suspend grazing if adjusting practices is not effective in meeting RMOs.	**Standard 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 recovery[87] 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. **Standard RMA-1S**. Riparian Management Areas include portions of watersheds where aquatic and riparian-dependent resources receive primary management emphasis. When riparian management area desired conditions are functioning properly, projects shall protect or maintain those conditions. When riparian management area desired conditions are not yet achieved or riparian management areas have impaired function or are functioning-at-risk and to the degree that project activities would contribute to those conditions, projects or permitted activities shall restore or not retard attainment of desired conditions. Short-term adverse effects from project activities may occur when they support long-term recovery of riparian management area desired conditions. Exceptions to this standard include situations

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

	where Forest Service authorities are limited (Alaska National Interest Lands Conservation Act {ANILCA}, 1872 Mining law, valid state water right, etc.). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of desired conditions to the extent possible within Forest Service authorities. Use ARCS Attachment 2 to assist in determining compliance with this standard. **Standard GM-1S.** Manage livestock grazing to attain aquatic and riparian desired conditions. Where livestock grazing is found to prevent or retard attainment of aquatic and riparian desired conditions, modify grazing practices (such as number of livestock, timing, and physical structures). If adjusting practices is not effective, remove livestock from that area using appropriate administrative authorities and procedures. **Guideline GM-3G.** The purpose of this guideline is to manage livestock grazing to help attain and maintain aquatic and riparian desired conditions over time. Specifically, it is intended to maintain or improve vegetative and stream conditions, help ensure the viability of aquatic species, provide important contributions to the recovery of ESA-listed species, and facilitate attainment of State water quality standards. The annual livestock use and disturbance indicators described below 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.[88] Specific indicators and indicator values should be prescribed and adjusted, if needed, in a manner that reflects existing and natural conditions for the specific geo-climatic,

88 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).

	hydrologic and vegetative setting in which they are being applied. Indicators and indicator values should be adapted over time based on long-term monitoring and evaluation of conditions and trends. Alternative use and disturbance indicators and values, including those in current ESA consultation documents, may be used if they are based on best available science and monitoring data and meet the purpose of this guideline. 6. In subwatersheds that are functioning properly [89] for water quality, aquatic habitat, and riparian and wetland vegetation, protect or maintain those conditions by managing annual livestock grazing use and disturbance as follows [90]: • maintain a minimum of 6-inch residual stubble height [91] of key herbaceous species on the greenline, except for sites in late-seral conditions,[92] being managed under any grazing system that supports a late-seral ecological stage, where a minimum of 4-inch to 6-inch stubble height should

89 Subwatershed classification as “properly functioning”, “functioning-at-risk”, or “impaired function” should be determined based on a weight-of-evidence approach that considers, at a minimum, the water quality, aquatic habitat, and riparian/wetland vegetation indicators of the Watershed Condition Framework (WCF). WCF “properly functioning”, “functioning-at-risk”, or “impaired function” descriptions are equivalent to “functioning appropriately”, “functioning-at-risk” and “functioning at unacceptable risk” categories within the matrix of pathways and indicators (MPI) used by USFWS (USFWS 1998) and to “properly functioning” or “at-risk” or “not properly functioning” categories within the MPI used by NMFS (NMFS 1996). Where ESA-listed species or critical habitat are present, use ARCS Attachment B (MPI) to determine conditions for water quality, aquatic habitat, and riparian/wetland vegetation indicators. Only WCF and MPI information relevant to livestock grazing need be considered. Local inventory, assessment and monitoring data and information can be used to refine initial classifications made per WCF or MPI.

90 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.

91 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.

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

	be maintained; • utilize no more than 30-45 percent of deep-rooted herbaceous vegetation in the active floodplain[93] and, as needed, in other critical portions of the riparian management area; • limit streambank alteration[94] 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. 7. In subwatersheds that are functioning-at-risk or that have impaired function for water quality, aquatic habitat, and/or riparian and wetland vegetation and where grazing contributes to those conditions, enable recovery by managing annual livestock grazing use and disturbance as follows: • maintain a minimum of 6-inch to 8-inch residual stubble height of key herbaceous species on the greenline; • on sites with late-season grazing [95] and where willow is or should be an important component of the riparian vegetation community, maintain a minimum of 8-inch residual herbaceous stubble height • utilize no more than 30-35 percent of deep-rooted herbaceous vegetation in the active floodplain and, as needed, in other critical portions of the riparian management area; • limit streambank alteration to no more than 15-20 percent; and • limit use of woody species to no more than 20-30 percent of current year's leaders along streambanks and, as needed, in other critical portions of the riparian management area. More conservative values, within and potentially beyond the ranges described above, should be used when

93 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).

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

95 Late season grazing generally begins after sugar storage in woody vegetation is complete and leaf fall has started. Upland plant seeds have shattered and mean air temperatures begin to cool.

	1) relevant indicators (e.g., water quality, aquatic habitat, riparian vegetation) are highly departed from desired conditions and are not improving due to livestock grazing; 2) ESA-listed aquatic species and critical habitat sensitive to grazing impacts are present and conditions are not improving due to livestock grazing, with particular emphasis on high potential fish production reaches (e.g., low gradient, unconfined stream reaches); or 3) grazing-related requirements of water quality restoration plans for impaired waters (e.g., site potential shade) are not being met and conditions are not improving due to livestock grazing. Implement other applicable actions contained in ESA Recovery Plans and water quality restoration plans. **Suitable uses and activities in Riparian Management Areas (see above)**
Grazing Standard GM-2. New livestock handling and/or management facilities shall be located outside of RHCAs. For existing livestock handling facilities inside RHCAs, assure that facilities do not prevent attainment of RMOs. Relocate or close facilities where these objectives cannot be met.	**Standard GM-2S.** New livestock handling and/or management facilities shall be located outside riparian management areas unless they do not prevent or retard attainment of aquatic and riparian desired conditions. **Guideline GM-4G.** During allotment management planning, existing livestock handling or management facilities that prevent or retard attaining aquatic and riparian desired conditions should be removed, as appropriate.
Grazing Standard GM-3. Limit livestock trailing, bedding, watering, loading, salting, and other handling efforts to those areas and times that would not retard attainment of RMOs or adversely affect aquatic resources.	**Standard GM-6S.** Livestock grazing shall be managed and implemented to avoid trampling federally listed threatened or endangered fish redds. **Guideline GM-5G.** Livestock trailing, watering, loading, and other handling in riparian management areas should be avoided or minimized.
Grazing Standard GM-4. Adjust wild horse and burro management to avoid impacts that prevent attainment of RMOs or adversely affect aquatic resources.	**Wild Horses DC-1**. A viable, free-roaming wild horse herd (consistent with the desire of the herd management plan in effect at the time of project level planning) that is genetically diverse and is in ecological balance with other approved multiple uses is present within the Murderers Creek Wild Horse Territory. In concert, this leads toward stable or improving habitat conditions. **Scale:** The Murderers Creek Wild Horse Territory/Herd Management Area.
1995 March 1 NMFS Biological Opinion 1. Access to Spawning Habitats and Redds - FS should eliminate or adequately restrict access, including livestock, off-road vehicles, anglers, etc., during spawning and incubation periods to prevent harassment. Effectiveness of effort could be maximized by expanding outreach and education programs in cooperation w/ State agencies to promote awareness.	**Standard GM-1S.** Manage livestock grazing to attain aquatic and riparian desired conditions. Where livestock grazing is found to prevent or retard attainment of aquatic and riparian desired conditions, modify grazing practices (such as number of livestock, timing, and physical structures). If adjusting practices is not effective, remove livestock from that area using appropriate administrative authorities and procedures. **Standard GM-6S.** Livestock grazing shall be managed and implemented to avoid trampling federally

	listed threatened or endangered fish redds. **Standard 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 recovery[96] 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.
Minerals Related Direction	
Minerals Standard MM-1. Avoid adverse impacts to listed species and designated critical habitat from mineral operations. If the Notice of Intent indicates that a mineral operation would be located in an RHCA and could affect attainment of RMOs or could adversely affect listed anadromous fish, then require a reclamation plan, approved Plan of Operations (or other such governing document), and reclamation bond. For effects that cannot be avoided, such plans and bonds must address the following items to attain RMOs and avoid adverse effects on listed anadromous fish: the costs of removing facilities, equipment, and materials; recontouring disturbed areas to approximate pre-mining topography; isolating and neutralizing or removing toxic or potentially toxic materials; salvage and replacement of topsoil; and seedbed preparation and revegetation. Ensure Reclamation Plan contain measurable	**Mineral and Geological Resources DC-1.** Exploration, development, and production of mineral and energy resources contribute to the social and economic needs as well as local communities, and are conducted so as to minimize adverse environmental effects on national forest surface resources. Reasonable access is provided to valid existing mineral claims, as well as for exploration and production of leasable and locatable mineral resources. Areas such as congressionally designated wilderness areas, wild and scenic rivers, municipal watersheds, or other areas of high natural or cultural resource value may be withdrawn from future mineral entry. **Guideline MM-1G.** For operations in RMAs, ensure operators take all practicable measures to maintain, protect, and rehabilitate water quality and habitat for fish and wildlife and other riparian dependent resources that may be affected by the operations. Ensure operations do not retard or prevent attainment of aquatic and riparian desired conditions. Exceptions to this guideline include situations where Forest Service has limited discretional authorities. In those cases, project effects should be minimized and should not prevent or retard attainment of aquatic and riparian desired conditions to the extent possible

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

attainment and bond release criteria for each reclamation activity.	within those authorities. **Guideline MM-4G.** Mineral operations should minimize adverse effects to aquatic and riparian-dependent resources in RMAs. Require BMPs and other appropriate conservation measures to mitigate potential mine operation effects. **Standard MM-5S.** Mineral activities on 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 resources". A likelihood that a threatened or endangered species "take" (defined in Section 3[18] of the ESA of 1973 as amended) incidental to the mining activity is an example of a significant resource disturbance. Other significant disturbances that do not involve incidental take might involve effects on channel stability or stream hydraulics. • If the District Ranger determines that placer mining operations are causing or will likely cause significant disturbance to surface resources, the District Ranger shall contact and inform the operator to seek voluntary compliance with 36 CFR 228 mining regulations and to cease operations until compliance. **Standard WM-1S**. When watershed function[97] desired conditions are being achieved and watersheds are functioning properly[98], projects shall maintain[99] those conditions. When watershed function desired

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

[2] 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).

99 See glossary in the Plan for definitions of "maintain" and "degrade".

	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 restore[100] or not retard attainment[101] of desired conditions. Short-term[102] adverse effects from project activities may occur when they support or do not diminish long-term[103] 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}, 1872 Mining law, valid state water right, etc.). In those cases, project effects shall be minimized and not retard attainment of desired conditions for watershed function, to the extent possible within Forest Service authorities. Use ARCS Attachment B to assist in determining compliance with this standard. **Standard WM-2S.** All projects shall be implemented in accordance with Best Management Practices, as described in National and Regional Technical Guides. **Standard RMA-1S**. Riparian Management Areas include portions of watersheds where aquatic and riparian-dependent resources receive primary management emphasis. When riparian management area desired conditions are functioning properly, projects shall protect or maintain those conditions. When riparian management area desired conditions are not yet achieved or riparian management areas have impaired function or are functioning-at-risk and to the degree that project activities would contribute to

[100] See glossary in the Plan for definitions of "restore".

[101] See glossary in the Plan for definitions of "retard attainment".

[102] See glossary in the Plan for definition of "short-term adverse effects" See the Implementation Plan for application of the definition.

103 See glossary in the Plan for definition of "long-term recovery". See the Implementation Plan for application of the definition.

	those conditions, projects or permitted activities shall restore or not retard attainment of desired conditions.[104] Short-term adverse effects from project activities may occur when they support long-term recovery of riparian management area desired conditions.[105] Exceptions to this standard include situations where Forest Service authorities are limited (Alaska National Interest Lands Conservation Act {ANILCA}, 1872 Mining law, valid state water right, etc.). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of desired conditions to the extent possible within Forest Service authorities. Use ARCS Attachment B (e.g. diagnostic indicators and RMA ecological process and function descriptions) to assist in determining compliance with this standard. **Standard 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 recovery[106] 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.

104 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).

105 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.

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

	Suitable uses and activities in Riparian Management Areas (see above)
Minerals Standard MM-2. Locate structures, support facilities, and roads outside RHCAs. Where no alternative to siting facilities in RHCAs exists, locate and construct the facilities in ways that avoid impacts to RHCAs and streams and that avoid adverse effects on aquatic resources. Where no alternative to road construction exists, keep roads to the minimum necessary for the approved mineral activity. Close, obliterate, and revegetate roads no longer required for mineral or land management activities.	**Mineral and Geological Resources DC-1.** Exploration, development, and production of mineral and energy resources contribute to the social and economic needs as well as local communities, and are conducted so as to minimize adverse environmental effects on national forest surface resources. Reasonable access is provided to valid existing mineral claims, as well as for exploration and production of leasable and locatable mineral resources. Areas such as congressionally designated wilderness areas, wild and scenic rivers, municipal watersheds, or other areas of high natural or cultural resource value may be withdrawn from future mineral entry. **Guideline MM-2G.** To the maximum extent possible locate and manage structures, support facilities, and roads outside riparian management areas. Where none exists, 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. **Guideline RF-1G.** New roads and trails should not be constructed within riparian management areas unless no other feasible alternative exists. **Guideline RF-2G.** Temporary roads, including stream crossings, in RMAs should be minimized. Temporary roads, if constructed, should be managed to protect and restore aquatic and riparian desired conditions. **Standard RF-3S.** Side-casting (placement of unconsolidated earthen waste materials resulting from road construction or maintenance) in riparian management areas shall be avoided. **Standard RF-4S.** Fill material shall not be placed on organic debris in riparian management areas. **Standard RF-5S.** Disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow shall be avoided when constructing or reconstructing roads or landings either inside or outside of riparian management areas. **Guideline RF-6G.** Wetlands and unstable areas should be avoided when reconstructing existing roads or

	constructing new roads and landings. Minimize impacts where avoidance is not practical. **Standard RF-7S.** New or replaced permanent stream crossings shall be designed to allow for the 100-year flood and its bedload and debris. 100-year flood estimates will reflect the best available science regarding potential effects of climate change. **Standard RF-8S.** Where physically feasible, construction or reconstruction of stream crossings will avoid diversion of streamflow out of the channel and down the road in the event of crossing failure. **Guideline RF-11G.** Design roads to minimize delivery of water and sediment from roads to streams. Avoid or minimize disruption of hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow when constructing, reconstructing, and maintenance of roads or landing. **Guideline RF-12G.** Road drainage should be routed away from potentially unstable channels, fills, and hillslopes to the extent practicable. **Standard RF-13S.** Road maintenance and new road construction shall be designed to minimize adverse effects to threatened, endangered, proposed, or candidate aquatic species and their habitat. **Standard KW-1S.** In Key Watersheds or subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species that are functioning properly there shall be no net increase (1 mile of road-related risk reduction for every new mile of road construction), where they are functioning-at-risk, there shall be a net decrease (1.5 miles of road-related risk reduction for every new mile of road construction), and where they are impaired function, there shall be a net decrease (2.0 miles of road-related risk reduction for every new mile of road construction) in system roads that affect hydrologic function. Priority for road-related risk reduction shall be given to roads that pose the greatest relative ecological risks to riparian and aquatic ecosystems. Road-related risk reduction will occur prior to new road construction unless logistical restrictions require post-construction risk reduction. This standard shall apply to the affected subwatershed when new system road construction is proposed in that subwatershed, and shall not be offset by reductions in open-road densities in other subwatersheds. **Suitable uses and activities in Riparian Management Areas (see above)**

Minerals Standard MM-3. Prohibit solid and sanitary waste facilities in RHCAs. If no alternative to locating mine waste (waste rock, spent ore, tailings) facilities in RHCAs exists, and if releases can be prevented and stability can be ensured, the: **a. Analyze the waste material using the best conventional sampling methods and analytic techniques to determine its chemical and physical stability characteristics.** **b. Locate and design the waste facilities using the best conventional techniques to ensure mass stability and prevent the release of acid or toxic materials. If the best conventional technology is not sufficient to prevent such releases and ensure stability over the long term, prohibit such facilities in RHCAs.** **c. Monitor waste and waste facilities to confirm predictions of chemical and physical stability, and make adjustments to operations as needed to avoid adverse effects to aquatic resources and to attain RMOs.** **d. Reclaim and monitor waste facilities to assure chemical and physical stability and revegetation, to avoid adverse effects to aquatic resources, and to attain the RMOs.** **Require reclamation bonds adequate to ensure long-term chemical and physical stability and successful revegetation of mine waste facilities.**	**Mineral and Geological Resources DC-1.** Exploration, development, and production of mineral and energy resources contribute to the social and economic needs as well as local communities, and are conducted so as to minimize adverse environmental effects on national forest surface resources. Reasonable access is provided to valid existing mineral claims, as well as for exploration and production of leasable and locatable mineral resources. Areas such as congressionally designated wilderness areas, wild and scenic rivers, municipal watersheds, or other areas of high natural or cultural resource value may be withdrawn from future mineral entry. **Guideline MM-1G.** For operations in RMAs, ensure operators take all practicable measures to maintain, protect, and rehabilitate water quality and habitat for fish and wildlife and other riparian dependent resources that may be affected by the operations. Ensure operations do not retard or prevent attaining aquatic and riparian desired conditions. Exceptions to this guideline include situations where Forest Service has limited discretional authorities. In those cases, project effects should be minimized and should not prevent or retard attaining aquatic and riparian desired conditions to the extent possible within those authorities. **Guideline MM-2G.** To the maximum extent possible locate and manage structures, support facilities, and roads outside riparian management areas. Where none exists, 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. **Standard 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. **Guideline MM-4G.** Mineral operations should minimize adverse effects to aquatic and riparian-dependent resources in RMAs. Require BMPs and other appropriate conservation measures to mitigate potential mine operation effects.
Minerals Standard MM-4. For leasable minerals, prohibit surface occupancy within RHCAs for oil, gas, and geothermal exploration and development activities where contracts and	**Guideline MM-2G.** To the maximum extent possible locate and manage structures, support facilities, and roads outside riparian management areas. Where none exists, locate and manage them to minimize effects upon aquatic and riparian-dependent desired conditions. Existing roads should be maintained to minimize

leases do not already exist, unless there are no other options for location and RMOs can be attained and adverse effects to aquatic resources can be avoided. Adjust the operating plans of existing contracts to (1) eliminate impacts that prevent attainment of RMOs and (2) avoid adverse effects to native aquatic species.	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. **Guideline MM-4G.** Mineral operations should minimize adverse effects to aquatic and riparian-dependent resources in RMAs. Require BMPs and other appropriate conservation measures to mitigate potential mine operation effects. **Standard WM-2S.** All projects shall be implemented in accordance with Best Management Practices, as described in National and Regional Technical Guides. **Suitable uses and activities in Riparian Management Areas (see above)**
Minerals Standard MM-5. Permit sand and gravel mining and extraction within RHCAs only if no alternatives exist, if the action(s) will not retard or prevent attainment of RMOs, and if adverse effects to native aquatic species can be avoided.	**Mineral and Geological Resources DC-1.** Exploration, development, and production of mineral and energy resources contribute to the social and economic needs as well as local communities, and are conducted so as to minimize adverse environmental effects on national forest surface resources. Reasonable access is provided to valid existing mineral claims, as well as for exploration and production of leasable and locatable mineral resources. Areas such as congressionally designated wilderness areas, wild and scenic rivers, municipal watersheds, or other areas of high natural or cultural resource value may be withdrawn from future mineral entry. **Guideline MM-1G.** For operations in RMAs, ensure operators take all practicable measures to maintain, protect, and rehabilitate water quality and habitat for fish and wildlife and other riparian dependent resources that may be affected by the operations. Ensure operations do not retard or prevent attainment of aquatic and riparian desired conditions. Exceptions to this guideline include situations where Forest Service has limited discretional authorities. In those cases, project effects should be minimized and should not prevent or retard attainment of aquatic and riparian desired conditions to the extent possible within those authorities. **Guideline MM-4G.** Mineral operations should minimize adverse effects to aquatic and riparian-dependent resources in RMAs. Require BMPs and other appropriate conservation measures to mitigate potential mine operation effects. **Standard MM-5S.** Mineral activities on 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 resources". A likelihood that a threatened or endangered species "take" (defined in Section 3[18] of the ESA of 1973 as amended) incidental to the mining activity is an example of a significant resource disturbance. Other significant disturbances that do not involve incidental take might involve effects on channel stability or stream hydraulics. • If the District Ranger determines that placer mining operations are causing or will likely cause significant disturbance to surface resources, the District Ranger shall contact and inform the operator to seek voluntary compliance with 36 CFR 228 mining regulations and to cease operations until compliance. **Suitable uses and activities in Riparian Management Areas (see above)**
Minerals Standard MM-6. Develop inspection, monitoring, and reporting requirements for mineral activities. Evaluate and apply the results of inspection and monitoring to modify mineral plans, leases, or permits as needed to avoid adverse effects on native aquatic species and to eliminate impacts that prevent attainment of RMOs.	**Guideline MM-4G.** Mineral operations should minimize adverse effects to aquatic and riparian-dependent resources in RMAs. Require BMPs and other appropriate conservation measures to mitigate potential mine operation effects. **Standard MM-5S.** Mineral activities on 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 resources". A likelihood that a threatened or endangered species "take" (defined in Section 3[18] of the ESA of 1973 as amended) incidental to the mining activity is an example of a significant resource disturbance. Other significant disturbances that do not involve incidental take might involve effects on channel stability or stream hydraulics. • If the District Ranger determines that placer mining operations are causing or will likely cause significant disturbance to surface resources, the District Ranger shall contact and inform the operator to seek voluntary compliance with 36 CFR 228 mining regulations and to cease operations until compliance.
1995 March 1 NMFS Biological Opinion Mining 5.a.1 Locate new mines outside RHCAs unless de minimus risk of adverse effects.	**Guideline MM-1G.** For operations in RMAs, ensure operators take all practicable measures to maintain, protect, and rehabilitate water quality and habitat for fish and wildlife and other riparian dependent resources that may be affected by the operations. Ensure operations do not retard or prevent attainment of aquatic and riparian desired conditions. Exceptions to this guideline include situations where Forest Service has limited discretional authorities. In those cases, project effects should be minimized and

	should not prevent or retard attainment of aquatic and riparian desired conditions to the extent possible within those authorities. **Guideline MM-2G.** To the maximum extent possible locate and manage structures, support facilities, and roads outside riparian management areas. Where none exists, 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. **Standard 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. **Guideline MM-4G.** Mineral operations should minimize adverse effects to aquatic and riparian-dependent resources in RMAs. Require BMPs and other appropriate conservation measures to mitigate potential mine operation effects. **Suitable uses and activities in Riparian Management Areas (see above)**
1995 March 1 NMFS Biological Opinion Mining 5.a.2 Conduct watershed analysis prior to approving Plans of Operations for LAA actions.	No respective plan component.
1995 March 1 NMFS Biological Opinion Mining Management 4 - Work with EPA and States to ensure that draft plans of operation for new mines are conditioned so they do not adversely affect groundwater or surface water quality in a manner that retards attainment of RMOs or adversely affect salmon.	**Ground-Water Dependent Ecosystem DC-2**. The aquifer supplying water to groundwater-dependent ecosystems is not being affected by groundwater withdrawal or loss of recharge. Soils of groundwater dependent ecosystems are intact and functional; erosion and deposition are within the natural range. Runout channels, if present, are functioning naturally and are not entrenched, eroded, or substantially altered. Vegetation is composed of the anticipated cover of plant species associated with the site environment; hydric species are present and are not replaced by upland species. Livestock herbivory and trampling are not adversely affecting sites. **Scale**: Subwatershed. **Standard 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. **Standard WM-2S.** All projects shall be implemented in accordance with Best Management Practices, as described in National and Regional Technical Guides.
Recreation Related Direction	
Recreation Standard RM-1. Design, construct, and operate recreation facilities (including trails) and dispersed sites in a manner that does not retard or prevent attainment of RMOs and avoids effects on aquatic resources. Complete Ecosystem Analysis at the Watershed Scale prior to construction of new recreation facilities in RHCAs. For existing recreation facilities inside RHCAs, assure that facilities or use of facilities will not prevent attainment of RMOs or adversely affect native aquatic species. Relocate or close recreation facilities where RMOs cannot be met or adverse effects on aquatic resources cannot be avoided.	**Guideline RM-1G.** New facilities or infrastructure should not be placed within expected long-term channel migration zones if it has the potential to impact channel or floodplain function. If some facilities must occur in RMAs (e.g., road stream crossings, boat ramps, docks, and interpretive trails), locate and design them to minimize impacts on floodplains and other riparian dependent resource conditions (e.g., within geologically stable areas, avoiding major spawning sites). **Guideline RM-2G.** Existing recreation facility components that are causing unacceptable impacts in riparian management areas should be removed or relocated. Site condition should be restored to improve riparian area function. **Suitable uses and activities in Riparian Management Areas (see above)**
Recreation Standard RM-2. Adjust dispersed and developed recreation practices that retard or prevent attainment of RMOs or adversely affect aquatic resources. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific sites closures are not effective in meeting RMOs and avoiding adverse effects on aquatic resources, eliminate the practice or occupancy.	**Guideline RM-2G.** Existing recreation facility components that are causing unacceptable impacts in riparian management areas should be removed or relocated. Site condition should be restored to improve riparian area function. **Standard WM-2S.** All projects shall be implemented in accordance with Best Management Practices, as described in National and Regional Technical Guides.
Recreation Standard RM-3. Address attainment of RMOs and potential effects on listed anadromous fish (*inland native fish*)	**Standard WM-1S**. When watershed function[107] desired conditions are being achieved and watersheds are functioning properly[108], projects shall maintain[109] those conditions. When watershed function desired

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

and designated critical habitat in Wild and Scenic Rivers, Wilderness, and other Recreation Management plans.	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 restore[110] or not retard attainment[111] of desired conditions. Short-term[112] adverse effects from project activities may occur when they support or do not diminish long-term[113] 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}, 1872 Mining law, valid state water right, etc.). In those cases, project effects shall be minimized and not retard attainment of desired conditions for watershed function, to the extent possible within Forest Service authorities. Use ARCS Attachment 2 to assist in determining compliance with this standard. **Standard WM-2S.** All projects shall be implemented in accordance with Best Management Practices, as described in National and Regional Technical Guides. **Standard RMA-1S**. Riparian Management Areas include portions of watersheds where aquatic and

[2] 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).

109 See glossary in the Plan for definitions of "maintain" and "degrade".

[110] See glossary in the Plan for definitions of "restore".

[111] See glossary in the Plan for definitions of "retard attainment".

[112] See glossary in the Plan for definition of "short-term adverse effects" See the Implementation Plan for application of the definition.

113 See glossary in the Plan for definition of "long-term recovery". See the Implementation Plan for application of the definition.

	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. Short-term adverse effects from project activities may occur when they support long-term recovery of riparian management area desired conditions. Exceptions to this standard include situations where Forest Service authorities are limited (Alaska National Interest Lands Conservation Act {ANILCA}, 1872 Mining law, valid state water right, etc.). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of desired conditions to the extent possible within Forest Service authorities. Use ARCS Attachment B to assist in determining compliance with this standard.
1995 March 1 NMFS Biological Opinion – Roadless Areas 5.d.2 Ensure actions have a de minimus risk of degrading the functions and values of these areas.	Roadless Areas are identified in the 2001 Roadless Area Conservation Rule which generally prohibits road construction and reconstruction and the cutting, sale or removal of timber in the IRAs identified in that rule. The regulation based RACR management direction cannot be changed through plan revision. For the most part the plan has allocated these areas into Management Area 3A, non-motorized backcountry and MA 3B, motorized backcountry. There are also some IRAs that have been allocated into the MA 1B, recommended wilderness area and some other special area allocations.
1995 March 1 NMFS Biological Opinion – Roadless Areas 5.d.2 Provide maps, pertinent description, road construction plans and analysis of impacts of proposed road system on designated critical habitat to NMFS for roadless areas.	No respective plan component.
1995 March 1 NMFS Biological Opinion 1. Access to Spawning	**Standard RE-5S.** Minimize adverse effects to ESA listed, proposed, and candidate species and their

Habitats and Redds - FS should eliminate or adequately restrict access, including livestock, off-road vehicles, anglers, etc., during spawning and incubation periods to prevent harassment. Effectiveness of effort could be maximized by expanding outreach and education programs in cooperation w/ State agencies to promote awareness.	designated and proposed critical habitat in accordance with Forest Service authorities. Management activities shall not retard recovery[114] 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.
Fire Related Direction	
Fire Standard FM-1. Design fuel treatment and fire suppression strategies, practices, and actions so as to not prevent attainment of RMOs and to minimize disturbances of riparian ground cover and vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management actions could perpetuate or be damaging to long-term ecosystem function or aquatic resources.	**Guideline FM-8G.** Minimum impact suppression tactics (MIST) should be utilized in sensitive areas, such as designated wilderness areas, designated wild and scenic river corridors, research natural areas, botanical areas, riparian management areas, cultural and historic sites, developed recreation areas, special use permit areas that have structures, and historic and recreational trails. MIST techniques should also be used for post fire restoration activities. **Standard FM-12S.** Pumps and charged hoses shall not be back flushed into stream channels, wetlands, or surface water. **Standard FM-3S.** Portable pump set-ups shall include containment provisions for fuel spills and fuel containers shall have appropriate containment provisions. Vehicles shall be parked in locations that avoid entry of spilled fuel into streams. When drafting, pumps shall be screened at drafting sites to prevent entrainment of aquatic species, screen area shall be sized to prevent impingement on the screens, and shall have one-way valves to prevent back-flow into streams. Use NMFS-approved screening criteria where listed fish or critical habitat are present. **Standard FM-10S.** Ensure prescribed burn projects contribute to and do not retard the attainment of the

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

	aquatic and riparian desired conditions. **Guideline RMA-4G.** Water drafting sites should be located and managed to minimize adverse effects on stream channel stability, sedimentation, and in-stream flows needed to maintain riparian resources, channel conditions, and fish habitat. To prevent the spread of invasive species, water should not be discharged into other water bodies. **Guideline FM-7G.** Pumping directly from a stream channel should be avoided if chemical products are to be injected directly into the system. When chemicals are used, pumping should be conducted from a fold-a-tank that is located outside the riparian area. **Guideline FM-9G.** Prescribed burn direct ignition in RMAs should not be used unless site/project scale effects analysis demonstrates that it would not retard attainment of aquatic and riparian desired conditions. **Guideline FM-6G.** Disturbed areas, such as firelines, drop-points, camps, roads, and trails, should be restored by actions such as scattering slash piles, replacing logs and boulders, scarifying soils, recontouring terrain, and reseeding with native species. **Guideline FM-4G.** Locate and configure firelines to minimize sedimentation to waterbodies, capture of overland and streamflows, and development of unauthorized roads and trails. Restore firelines following suppression or prescribed fire activities. **Standard FM-5S.** To minimize soil damage when chipping fuels within riparian management areas, chip bed depths on dry soils shall be limited to 7.5 cm or less (Busse et al. 2005). **Guideline FM-11G.** Chemicals or retardant should not be used for suppression or mop-up within riparian areas. **Guideline FM-2G.** Aerial application of chemical retardant, foam, or other fire chemicals is prohibited within 300 feet (slope distance) of perennial and intermittent waterways. Waterways are defined as any body of water (including lakes, rivers, streams, and ponds) whether or not it contains aquatic life except in cases where human life or public safety is threatened and chemical use could be reasonably expected to alleviate that threat. This includes open water that may not be mapped as such on avoidance area

	maps and intermittent streams that are running or holding surface water at the time of retardant use. **Guideline 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 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. **Standard WM-1S**. When watershed function[115] desired conditions are being achieved and watersheds are functioning properly[116], projects shall maintain[117] 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 restore[118] or not retard attainment[119] of desired conditions. Short-term[120] adverse effects from project activities may occur when

115 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 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).

117 See glossary in the Plan for definitions of "maintain" and "degrade".

[118] See glossary in the Plan for definitions of "restore".

[119] See glossary in the Plan for definitions of "retard attainment".

[120] See glossary in the Plan for definition of "short-term adverse effects" See the Implementation Plan for application of the definition.

	they support or do not diminish long-term[121] 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}, 1872 Mining law, valid state water right, etc.). In those cases, project effects shall be minimized and not retard attainment of desired conditions for watershed function, to the extent possible within Forest Service authorities. Use ARCS Attachment B to assist in determining compliance with this standard.
Standard FM-2. Locate incident bases, camps, helibases, staging areas, helispots, and other centers for incident activities outside of RHCAs. If the only suitable location for such activities is within the RHCAs, an exemption may be granted following a review and recommendation by a resource advisor. The advisor would prescribe the location, use conditions, and rehabilitation requirements, with avoidance of adverse effects to aquatic resources a primary goal. Use an interdisciplinary team, including a fishery biologist, to predetermine incident base and helibase locations during pre-suppression planning.	**Guideline 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 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.
Standard FM-3. Prohibit delivery of chemical retardant, foam, or additives to surface waters. An exception may be warranted in situations where overriding immediate safety imperatives exist, or, following a review and recommendation by a resource advisor and a fishery biologist, when the action agency determines an escaped fire would cause more long-term damage to fish habitats than chemical delivery to surface waters.	**Standard FM-3S.** Portable pump set-ups shall include containment provisions for fuel spills and fuel containers shall have appropriate containment provisions. Vehicles shall be parked in locations that avoid entry of spilled fuel into streams. When drafting, pumps shall be screened at drafting sites to prevent entrainment of aquatic species, screen area shall be sized to prevent impingement on the screens, and shall have one-way valves to prevent back-flow into streams. Use NMFS-approved screening criteria where listed fish or critical habitat are present. **Guideline FM-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

121 See glossary in the Plan for definition of “long-term recovery”. See the Implementation Plan for application of the definition.

	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. **Guideline RMA-4G.** Water drafting sites should be located and managed to minimize adverse effects on stream channel stability, sedimentation, and in-stream flows needed to maintain riparian resources, channel conditions, and fish habitat. To prevent the spread of invasive species, water should not be discharged into other water bodies. **Guideline FM-7G.** Pumping directly from a stream channel should be avoided if chemical products are to be injected directly into the system. When chemicals are used, pumping should be conducted from a fold-a-tank that is located outside the riparian area.
Standard FM-4. Prescribed burn projects and prescriptions should be designed to contribute to the attainment of the RMOs.	**Guideline FM-8G.** Minimum impact suppression tactics (MIST) should be utilized in sensitive areas, such as designated wilderness areas, designated wild and scenic river corridors, research natural areas, botanical areas, riparian management areas, cultural and historic sites, developed recreation areas, special use permit areas that have structures, and historic and recreational trails. MIST techniques should also be used for post fire restoration activities. **Standard RMA-5S.** Pumps shall be screened at drafting sites to prevent entrainment of fish and shall have one-way valves to prevent back-flow into streams. **Standard FM-3S.** Portable pump set-ups shall include containment provisions for fuel spills and fuel containers shall have appropriate containment provisions. Vehicles shall be parked in locations that avoid entry of spilled fuel into streams. When drafting, pumps shall be screened at drafting sites to prevent entrainment of aquatic species, screen area shall be sized to prevent impingement on the screens, and shall have one-way valves to prevent back-flow into streams. Use NMFS-approved screening criteria where listed fish or critical habitat are present. **Guideline RMA-4G.** Water drafting sites should be located and managed to minimize adverse effects on stream channel stability, sedimentation, and in-stream flows needed to maintain riparian resources, channel conditions, and fish habitat. To prevent the spread of invasive species, water should not be

	discharged into other water bodies. **Guideline FM-11G.** Chemicals or retardant should not be used for suppression or mop-up within riparian areas. **Guideline FM-2G.** Aerial application of chemical retardant, foam, or other fire chemicals is prohibited within 300 feet (slope distance) of perennial and intermittent waterways. Waterways are defined as any body of water (including lakes, rivers, streams, and ponds) whether or not it contains aquatic life except in cases where human life or public safety is threatened and chemical use could be reasonably expected to alleviate that threat. This includes open water that may not be mapped as such on avoidance area maps and intermittent streams that are running or holding surface water at the time of retardant use. **Standard FM-5S.** To minimize soil damage when chipping fuels within riparian management areas, chip bed depths on dry soils shall be limited to 7.5 cm or less (Busse et al. 2005). **Guideline FM-6G.** Disturbed areas, such as firelines, drop-points, camps, roads, and trails, should be restored by actions such as scattering slash piles, replacing logs and boulders, scarifying soils, recontouring terrain, and reseeding with native species. **Guideline FM-7G.** Pumping directly from a stream channel should be avoided if chemical products are to be injected directly into the system. When chemicals are used, pumping should be conducted from a fold-a-tank that is located outside the riparian area. **Guideline FM-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 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. **Standard RMA-1S**. Riparian Management Areas include portions of watersheds where aquatic and riparian-dependent resources receive primary management emphasis. When riparian management area desired conditions are functioning properly, projects shall protect or maintain those conditions. When riparian management area desired conditions are not yet achieved or riparian management areas have

	impaired function or are functioning-at-risk and to the degree that project activities would contribute to those conditions, projects or permitted activities shall restore or not retard attainment of desired conditions.[122] Short-term adverse effects from project activities may occur when they support long-term recovery of riparian management area desired conditions.[123] Exceptions to this standard include situations where Forest Service authorities are limited (Alaska National Interest Lands Conservation Act {ANILCA}, 1872 Mining law, valid state water right, etc.). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of desired conditions to the extent possible within Forest Service authorities. Use ARCS Attachment B (e.g. diagnostic indicators and RMA ecological process and function descriptions) to assist in determining compliance with this standard.
Standard FM-5. Immediately establish an emergency team to develop a rehabilitation treatment plan to attain RMOs and avoid adverse effects on aquatic resources whenever RHCAs are significantly damaged by a wildfire or a prescribed fire is burning out of prescription.	No respective plan component.
1995 March 1 NMFS Biological Opinion – Fire Suppression 5.a Annual briefing for fire overhead teams on ESA requirements for habitat protection.	No respective plan component.
1995 March 1 NMFS Biological Opinion – Fire Suppression 5.b Following a fire affecting RHCAs, evaluate implementation of measures in Fire Situation Analysis, and evaluate effectiveness of rehab efforts. Report to NMFS 15 months after containment.	No respective plan component.

122 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).

123 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.

Lands Related Direction	
Standard LH-1. For hydroelectric and other surface water development proposals, require instream flows and habitat conditions that maintain or restore riparian resources, favorable channel conditions, and fish passage, reproduction, and growth. Coordinate this process with the appropriate state agencies. During relicensing of hydroelectric projects, provide to the Federal Energy Regulatory Commission (FERC) written and timely license conditions that require fish passage and flows and habitat conditions that maintain/restore riparian resources and channel integrity. Coordinate relicensing projects with the appropriate state agencies.	**Standard KW-2S.** In Key Watersheds and subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species, hydroelectric and other surface water development authorizations shall include requirements for in-stream flows and habitat conditions that maintain or restore native fish and other desired aquatic species populations, riparian dependent resources, favorable channel conditions, and aquatic connectivity. **Standard 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. **Guideline LH-3G.** If existing support facilities are located within the riparian management areas, they should be operated and maintained to restore or enhance aquatic and riparian dependent resources. At time of permit re-issuance, consider removing support facilities, where practical. **Standard LH-2S.** New support facilities shall be located outside of riparian management areas. Support facilities include any facilities or improvements (e.g., workshops, housing, switchyards, staging areas, and transmission lines) not directly integral to the production of hydroelectric power or necessary for the implementation of prescribed protection, mitigation or enhancement measures. **Standard WM-1S**. When watershed function[124] desired conditions are being achieved and watersheds are functioning properly[125], projects shall maintain[126] those conditions. When watershed function desired

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

	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 restore[127] or not retard attainment[128] of desired conditions. Short-term[129] adverse effects from project activities may occur when they support or do not diminish long-term[130] 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}, 1872 Mining law, valid state water right, etc.). In those cases, project effects shall be minimized and not retard attainment of desired conditions for watershed function, to the extent possible within Forest Service authorities. Use ARCS Attachment 2 to assist in determining compliance with this standard. **Standard RMA-1S**. Riparian Management Areas include portions of watersheds where aquatic and riparian-dependent resources receive primary management emphasis. When riparian management area desired conditions are functioning properly, projects shall protect or maintain those conditions. When riparian management area desired conditions are not yet achieved or riparian management areas have

[2] 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).

126 See glossary in the Plan for definitions of "maintain" and "degrade".

[127] See glossary in the Plan for definitions of "restore".

[128] See glossary in the Plan for definitions of "retard attainment".

[129] See glossary in the Plan for definition of "short-term adverse effects" See the Implementation Plan for application of the definition.

130 See glossary in the Plan for definition of "long-term recovery". See the Implementation Plan for application of the definition.

	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. Short-term adverse effects from project activities may occur when they support long-term recovery of riparian management area desired conditions. Exceptions to this standard include situations where Forest Service authorities are limited (Alaska National Interest Lands Conservation Act {ANILCA}, 1872 Mining law, valid state water right, etc.). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of desired conditions to the extent possible within Forest Service authorities. Use ARCS Attachment 2 to assist in determining compliance with this standard.
Standard LH-2. Locate new hydroelectric ancillary facilities outside RHCAs. For existing ancillary facilities inside the RHCA that are essential to proper management, provide recommendations to FERC to assure that the facilities would not prevent attainment of the RMOs and that adverse effects on aquatic resources are avoided. Where these objectives cannot be met, proved recommendations to FERC that such ancillary facilities should be relocated. Locate, operate, and maintain hydroelectric facilities that must be located in RHCAs to avoid adverse effects on aquatic resources.	**Standard LH-2S.** New support facilities shall be located outside of riparian management areas. Support facilities include any facilities or improvements (e.g., workshops, housing, switchyards, staging areas, and transmission lines) not directly integral to the production of hydroelectric power or necessary for the implementation of prescribed protection, mitigation or enhancement measures. **Standard KW-2S.** In Key Watersheds and subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species, hydroelectric and other surface water development authorizations shall include requirements for in-stream flows and habitat conditions that maintain or restore native fish and other desired aquatic species populations, riparian dependent resources, favorable channel conditions, and aquatic connectivity. **Standard KW-3S.** In Key Watersheds and in subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species, new hydroelectric facilities and water developments shall not be located in a Key Watershed unless it can be demonstrated that there are minimal risks and/or no adverse effects to the fish and water resources for which the Key Watershed was established. **Standard LH-1S.** Authorizations for all new and existing special uses, including, but not limited to water diversion or transmission facilities (e.g., pipelines and ditches), energy transmission lines, roads, hydroelectric, and other surface water development proposals, shall result in the re-establishment, restoration, or mitigation of habitat conditions and ecological processes identified as being essential for the maintenance or improvement of habitat conditions for fish, water and other riparian dependent species and resources. These processes include in-stream flow regimes, physical and biological connectivity, water quality, and integrity and complexity of riparian and aquatic habitat.

	Guideline LH-3G. If existing support facilities are located within the riparian management areas, they should be operated and maintained to restore or enhance aquatic and riparian dependent resources. At time of permit re-issuance, consider removing support facilities, where practical.
Standard LH-3. Issue leases, permits, rights-of-way, and easements to avoid adverse effects on aquatic resources and to avoid effects that would be inconsistent with or prevent attainment of RMOs. Where the authority to do so was retained, adjust existing leases, permits, rights-of-way, and easements to eliminate effects that would retard or prevent attainment of the RMOs or adversely affect aquatic resources. If adjustments are not effective, eliminate the activity. Where the authority to adjust was not retained, negotiate to make changes in existing leases, permits, rights-of-way, and easements to eliminate effects that would prevent attainment of the RMOs or adversely affect aquatic resources. Priority for modifying easements would be based on the current and potential adverse	**Standard LH-1S.** Authorizations for all new and existing special uses, including, but not limited to water diversion or transmission facilities (e.g., pipelines and ditches), energy transmission lines, roads, hydroelectric, and other surface water development proposals, shall result in the re-establishment, restoration, or mitigation of habitat conditions and ecological processes identified as being essential for the maintenance or improvement of habitat conditions for fish, water and other riparian dependent species and resources. These processes include in-stream flow regimes, physical and biological connectivity, water quality, and integrity and complexity of riparian and aquatic habitat. **Standard WM-1S**. When watershed function[131] desired conditions are being achieved and watersheds are functioning properly[132], projects shall maintain[133] 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 restore[134] or not retard attainment[135] of desired conditions. Short-term[136] adverse effects from project activities may occur when

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

[2] 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).

133 See glossary in the Plan for definitions of “maintain” and “degrade”.

[134] See glossary in the Plan for definitions of “restore”.

[135] See glossary in the Plan for definitions of “retard attainment”.

[136] See glossary in the Plan for definition of “short-term adverse effects” See the Implementation Plan for application of the definition.

effects on aquatic resources and the ecological value of the riparian resources affected.	they support or do not diminish long-term[137] 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}, 1872 Mining law, valid state water right, etc.). In those cases, project effects shall be minimized and not retard attainment of desired conditions for watershed function, to the extent possible within Forest Service authorities. Use ARCS Attachment B to assist in determining compliance with this standard.
Standard LH-4. Use land acquisition, exchange, and conservation easements to meet RMOs and facilitate restoration of fish stocks and other species at risk of extinction.	**Land Ownership DC-2**. Landownership adjustment by purchase, exchange, or other authority simplifies and improves management of the Blue Mountains national forests. Priorities for land acquisition include congressionally designated areas and lands that support known populations of threatened, endangered, proposed, or sensitive species. **Guideline LH-4G.** Land exchanges should avoid the disposition of occupied habitat of threatened, endangered, candidate, proposed, or sensitive species.

137 See glossary in the Plan for definition of “long-term recovery”. See the Implementation Plan for application of the definition.

1995 March 1 NMFS Biological Opinion – Water Conveyance Management 3. Clarified PACFISH (PF) LH-3, stating that implementation of this standard is expected to assure that 1) water conveyance intakes with the potential to trap or impinge listed salmon would meet NMFS' established intake screening criteria before use is approved, and 2) permits would be authorized or re-authorized only if streamflows are adequate to not retard or prevent attainment of RMOs and not adversely affect listed salmon.	**Standard LH-1S.** Authorizations for all new and existing special uses, including, but not limited to water diversion or transmission facilities (e.g., pipelines and ditches), energy transmission lines, roads, hydroelectric, and other surface water development proposals, shall result in the re-establishment, restoration, or mitigation of habitat conditions and ecological processes identified as being essential for the maintenance or improvement of habitat conditions for fish, water and other riparian dependent species and resources. These processes include in-stream flow regimes, physical and biological connectivity, water quality, and integrity and complexity of riparian and aquatic habitat.
1998 June 22 NMFS Biological Opinion 6 - Review floatboating effects to steelhead from commercial and non-commercial recreational boating/floating for adverse effects to steelhead spawning. Where adverse impacts are reducing steelhead productivity, commercial and non-commercial boating/floating should be modified to reduce or eliminate effects. Review all recreational facilities as ongoing federal actions.	**Standard 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 recovery[138] 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.
General Riparian Area Related Direction	
Standard RA-1. Identify and cooperate with Federal, tribal, State, and local governments to secure instream flows needed to maintain riparian resources, channel conditions, and aquatic habitat.	No respective plan component.
Standard RA-2. Trees may be felled in RHCAs when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives.	**Standard RMA-3S.** Trees felled for safety shall be retained onsite unless in excess of what is needed to achieve aquatic and riparian desired conditions. If the desired quantity and size distribution of large wood has been met on site, the wood can be transported to other aquatic and riparian restoration projects.
Standard RA-3. Apply herbicides, pesticides, and other	**Standard RMA-2S.** Herbicides, insecticides, pesticides and other toxicants, and other chemicals shall be

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

toxicants and chemicals in a manner that does not retard or prevent attainment of RMOs and that avoids adverse effects on aquatic resources.	applied only to maintain, protect, or enhance aquatic and riparian resources or to restore native plant communities in a manner that does not harm aquatic or riparian resources. **Standard WM-2S.** All projects shall be implemented in accordance with Best Management Practices, as described in National and Regional Technical Guides.
Standard RA-4. Prohibit storage of fuels and other toxicants within RHCAs. Prohibit refueling within RHCAs unless there are no other alternatives. Refueling sites within RHCAs shall be approved by the Forest Service or Bureau of Land management and have an approved spill containment plan.	**Standard FM-3S.** Portable pump set-ups shall include containment provisions for fuel spills and fuel containers shall have appropriate containment provisions. Vehicles shall be parked in locations that avoid entry of spilled fuel into streams. When drafting, pumps shall be screened at drafting sites to prevent entrainment of aquatic species, screen area shall be sized to prevent impingement on the screens, and shall have one-way valves to prevent back-flow into streams. Use NMFS-approved screening criteria where listed fish or critical habitat are present. **Standard 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. **Guideline FM-11G.** Chemicals or retardant should not be used for suppression or mop-up within riparian areas. **Guideline FM-7G.** Pumping directly from a stream channel should be avoided if chemical products are to be injected directly into the system. When chemicals are used, pumping should be conducted from a fold-a-tank that is located outside the riparian area. **Standard WM-2S.** All projects shall be implemented in accordance with Best Management Practices, as described in National and Regional Technical Guides.
Standard RA-5. Locate water drafting sites to avoid adverse effects on aquatic resources and instream flow and in a manner that does not retard or prevent attainment of RMOs.	**Standard FM-3S.** Portable pump set-ups shall include containment provisions for fuel spills and fuel containers shall have appropriate containment provisions. Vehicles shall be parked in locations that avoid entry of spilled fuel into streams. When drafting, pumps shall be screened at drafting sites to prevent entrainment of aquatic species, screen area shall be sized to prevent impingement on the screens, and shall have one-way valves to prevent back-flow into streams. Use NMFS-approved screening criteria where listed fish or critical habitat are present. **Guideline RMA-4G.** Water drafting sites should be located and managed to minimize adverse effects on

	stream channel stability, sedimentation, and in-stream flows needed to maintain riparian resources, channel conditions, and fish habitat. To prevent the spread of invasive species, water should not be discharged into other water bodies. **Guideline FM-7G.** Pumping directly from a stream channel should be avoided if chemical products are to be injected directly into the system. When chemicals are used, pumping should be conducted from a fold-a-tank that is located outside the riparian area. **Guideline IS-1G.** Avoid cross contamination between streams, reservoirs and lakes from pumps, suction and dipping devices or any other equipment. Avoid dumping water directly from one stream or lake into another. Disinfect water storage and conveyance equipment including sampling equipment, water tenders, pumps, engines and aircraft prior to use on Forest.
1995 March 1 NMFS Biological Opinion – Transport of Toxic Chemicals 2. Transport of Toxic Chemicals – FS should minimize risk of toxic fuel spills during transport through RHCAs by using alternative routes where feasible, and taking all other plausible precautions.	No respective plan component.
1995 March 1 NMFS Biological Opinion – Access to Spawning Habitat and Redds 1. FS should eliminate or adequately restrict access, including livestock, off-road vehicles, anglers, etc., during spawning and incubation periods to prevent harassment. Effectiveness of effort could be maximized by expanding outreach and education programs in cooperation w/ State agencies to promote awareness.	**Standard GM-1S.** Manage livestock grazing to attain aquatic and riparian desired conditions. Where livestock grazing is found to prevent or retard attainment of aquatic and riparian desired conditions, modify grazing practices (such as number of livestock, timing, and physical structures). If adjusting practices is not effective, remove livestock from that area using appropriate administrative authorities and procedures. **Standard GM-6S.** Livestock grazing shall be managed and implemented to avoid trampling federally listed threatened or endangered fish redds.
Watershed and Habitat Restoration Related Direction	
Standard WR-1. Design and implement watershed restoration projects in a manner that promotes the long-term ecological integrity of ecosystems, conserves the genetic integrity of native	**Standard RMA-1S.** Riparian Management Areas include portions of watersheds where aquatic and riparian-dependent resources receive primary management emphasis. When riparian management area desired conditions are functioning properly, projects shall protect or maintain those conditions. When

species, and contributes to attainment of RMOs.	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.[139] Short-term adverse effects from project activities may occur when they support long-term recovery of riparian management area desired conditions.[140] Exceptions to this standard include situations where Forest Service authorities are limited (Alaska National Interest Lands Conservation Act {ANILCA}, 1872 Mining law, valid state water right, etc.). In those cases, project effects towards attainment of riparian management area desired conditions shall be minimized and not retard attainment of desired conditions to the extent possible within Forest Service authorities. Use ARCS Attachment B (e.g. diagnostic indicators and RMA ecological process and function descriptions) to assist in determining compliance with this standard. **Standard WM-2S.** All projects shall be implemented in accordance with Best Management Practices, as described in National and Regional Technical Guides. **Guideline RE-1G**. Watershed restoration projects should be designed to utilize or emulate natural ecological processes to the extent practicable, for meeting and maintaining restoration objectives. **Guideline RE-2G.** Watershed restoration projects should be designed to minimize the need for long-term

139 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).

140 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.

	maintenance. **Standard WM-1S**. When watershed function[141] desired conditions are being achieved and watersheds are functioning properly[142], projects shall maintain[143] 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 restore[144] or not retard attainment[145] of desired conditions. Short-term[146] adverse effects from project activities may occur when they support or do not diminish long-term[147] 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}, 1872 Mining law, valid state water

141 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).

143 See glossary in the Plan for definitions of "maintain" and "degrade".

[144] See glossary in the Plan for definitions of "restore".

[145] See glossary in the Plan for definitions of "retard attainment".

[146] See glossary in the Plan for definition of "short-term adverse effects" See the Implementation Plan for application of the definition.

147 See glossary in the Plan for definition of "long-term recovery". See the Implementation Plan for application of the definition.

	right, etc.). In those cases, project effects shall be minimized and not retard attainment of desired conditions for watershed function, to the extent possible within Forest Service authorities. Use ARCS Attachment 2 to assist in determining compliance with this standard.
Standard WR-2. Cooperate with Federal, State, local, and Tribal agencies, and private landowners to develop watershed-based Coordinated Resource Management Plans (CRMPs) or other cooperative agreements to meet RMOs.	No respective plan component.
Standard WR-3. Do not use planned restoration as a substitute for preventing habitat degradation (i.e. use planned restoration only to mitigate existing problems, not to mitigate the effects of proposed activities).	**Standard 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.
1995 March 1 NMFS Biological Opinion – Restoration 5.e.1 Watershed restoration plans should be developed for priority watersheds within the context of broader area plans (subbasin, Forest, etc.) where possible.	Incorporated into the identification of Key and Priority Watersheds. Discussed in ARCS (Watershed Restoration section).
1995 March 1 NMFS Biological Opinion – Restoration 5.e.2 Special emphasis should be provided to implement multi-agency restoration plans in readily restorable habitat.	Incorporated into the identification of Key and Priority Watersheds. **Standard 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 recovery[148] 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.
1995 March 1 NMFS Biological Opinion – Restoration 5.e.3	No responsive plan component.

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

Direct restoration of RHCAs or stream channels, including but not limited to additions of LWD, should be only be undertaken concurrent with a corresponding change to the management regime responsible for the habitat degradation.	
1995 March 1 NMFS Biological Opinion – Restoration 5.e.4 Priority should be given to watershed restoration actions that will help improve degraded stream reaches adjacent to or connected to remaining reaches of high quality habitat to help restore connectivity and bolster recolonization.	Incorporated into the identification of Key and Priority Watersheds.
1998 June 22 NMFS Biological Opinion 3 - Use Streamlining & Matrix of Pathways & Indicators - All other ongoing actions that may affect steelhead should be assessed via the Level 1 streamlining teams using the matrix	**Standard WM-1S, Standard RMA-1S, and Guideline GM-3G** (described above) required use of the matrix of pathways and indicators when ESA listed fish and their critical habitat are present. Matrix indicators serves as diagnostic criteria to assist in evaluating attainment or progress towards attainment of multiple aquatic and riparian desired conditions and compliance with key standards and guidelines. Forest interdisciplinary team aquatic specialists will also continue to use the matrix of pathways and indicators when evaluating projects when ESA listed steelhead and their designated critical habitat may be affected by the proposed action.
1998 June 22 NMFS Biological Opinion 5 Accelerate Steelhead Habitat Restoration - The FS should work cooperatively with BLM, NMFS, State Agencies, and Tribes to develop priorities and adequately fund restoration.	No respective plan component.
Fisheries and Wildlife Restoration Related Direction	
Standard FW-1. Design and implement fish and wildlife habitat restoration and enhancement actions in a manner that contributes to attainment of the RMOs.	No responsive standard and guideline direction; however, there are 13 Objectives related to meeting desired conditions for watersheds.
Standard FW-2. Design, construct, and operate fish and wildlife interpretive and other user-enhancement facilities in a manner that does not retard or prevent attainment of RMOs or adversely affect aquatic resources. For existing fish and wildlife interpretive and other user-enhanced facilities inside RHCAs, assure that RMOs are met and adverse effects on aquatic resources are avoided. Where RMOs cannot be met or adverse effects on aquatic resources avoided, relocate or close such facilities.	**Guideline RM-1G.** New facilities or infrastructure should not be placed within expected long-term channel migration zones if it has the potential to impact channel or floodplain function. If some facilities must occur in RMAs (e.g., road stream crossings, boat ramps, docks, and interpretive trails), locate and design them to minimize impacts on floodplains and other riparian dependent resource conditions (e.g., within geologically stable areas, avoiding major spawning sites). **Standard KW-1S.** In Key Watersheds or subwatersheds with ESA critical habitat for aquatic species or subwatersheds containing listed aquatic species that are functioning properly there shall be no net increase (1 mile of road-related risk reduction for every new mile of road construction), where they are

	functioning-at-risk, there shall be a net decrease (1.5 miles of road-related risk reduction for every new mile of road construction), and where they are impaired function, there shall be a net decrease (2.0 miles of road-related risk reduction for every new mile of road construction) in system roads that affect hydrologic function. Priority for road-related risk reduction shall be given to roads that pose the greatest relative ecological risks to riparian and aquatic ecosystems. Road-related risk reduction will occur prior to new road construction unless logistical restrictions require post-construction risk reduction. This standard shall apply to the affected subwatershed when new system road construction is proposed in that subwatershed, and shall not be offset by reductions in open-road densities in other subwatersheds.
Standard FW-3. Cooperate with Federal, tribal, and State wildlife management agencies to identify and eliminate wild ungulate impacts that prevent attainment of the RMOs or adversely affect listed anadromous and inland native fish.	No responsive plan component.
Standard FW-4. Cooperate with Federal, tribal, and State wildlife management agencies to identify and eliminate wild adverse effects on native anadromous and inland fish associated with habitat manipulation, fish stocking, fish harvest, and poaching.	No responsive plan component.

Table 1. Current distribution of key (PACFISH) and priority (INFISH) subwatersheds by subbasin for each national forest in relationship to ARCS key and priority watersheds.

National Forest	Subbasin	Subwatersheds Occupied by One or More ESA-listed Species	PACFISH Key Subwatersheds	INFISH Priority Subwatersheds	ARCS Key Watersheds	ARCS Priority Watersheds
Malheur	Middle Fork John Day	29	29	0	0	16
	Upper John Day	47	47	0	16	0
	Upper Malheur	19	0	19	4	10
	Silvies	0	0	20	9	0
	Silver	0	0	14	0	4
	North Fork John Day	4	4	0	0	0
	Harney-Malheur	0	0	4	0	0
	South Fork Crooked River-Beaver Creek	0	0	7	0	0
	Totals	**137**	**80**	**64**	**29**	**30**
Umatilla	Middle Fork John Day	1	1	0	0	0
	North Fork John Day	84	84	0	10	11
	Lower John Day	4	4	0	0	0
	Willow-Columbia	2	2	0	0	0
	Umatilla	15	15	0	6	0
	Walla Walla	10	10	0	4	1
	Tucannon	7	7	0	0	3
	Asotin	6	6	0	5	0
	Lower Grande Ronde	25	25	0	12	0

National Forest	Subbasin	Subwatersheds Occupied by One or More ESA-listed Species	PACFISH Key Subwatersheds	INFISH Priority Subwatersheds	ARCS Key Watersheds	ARCS Priority Watersheds
	Upper Grande Ronde	9	9	0	1	0
	Totals	**163**	**163**	**0**	**38**	**15**
Wallowa-Whitman	Imnaha	29	29	0	20	3
	Lower Grande Ronde	29	29	0	15	0
	Upper Grande Ronde	50	50	0	12	15
	Lower Snake-Asotin	1	1	0	0	0
	North Fork John Day	7	7	0	3	3
	Hells Canyon, Brownlee, Salmon	32	20	12	3	4
	Powder	30	0	30	7	0
	Burnt	0	0	22	11	0
	Wallowa	22	22	0	16	0
	Totals	**172**	**132**	**64**	**87**	**25**

Appendix B. List of Recovery or Conservation Strategies for Bull Trout that are Addressed by the Blue Mountains Forest Plan

List of Recovery or Conservation Strategies for Bull Trout Addressed by the Blue Mountains Forest Plan Revision

Mid-Columbia Recovery Unit
Upper Snake River Recovery Unit
December 15, 2017

Recommended Recovery or Conservation Strategies for Bull Trout that can be addressed by Blue Mountains Forest Plan Revision **Source:** **Bull Trout Recovery Plan – Mid-Columbia Recovery Unit Implementation Plan for Bull Trout (September 2015)** *Per agreement, where there is overlap of strategies or actions, Core Area actions are combined. Some examples from different Core Areas are included to display similarities.*	**How the Blue Mountains Forest Plan Revision addresses these Strategies Actions** **S & G = standards and guidelines** **MA = management areas** **Desired Conditions for Threatened and Endangered Species**
Mid-C RU geographic regions and River Basins applicable: 1) Lower Mid-Columbia (John Day River, Umatilla River, Walla Walla River and Touchet River; 2) Lower Snake (Tucannon River, Asotin Creek, Grande Ronde River, Imnaha River); 3) Middle Snake (Powder River and Pine Creek (Table C-1. Geographic Regions and Associated River Basins Occupied by bull Trout in the Mid-Columbia Recovery Unit.)	After review of actions across all geographic areas there are many similar, threats, themes and actions. In these circumstances the Actions to address threats are combined (Table C-2. Primary Threats to Bull Trout in the Mid-Columbia Recovery Unit.) (Table C-3. Mid-Columbia Recovery Unit Implementation Schedule.).
	Desired Conditions for Threatened and Endangered Species in the Blue Mountains Forest Plan Revision ***Federally Listed Species DC-1*** Critical habitat components (PBFs) are protected and restored to achieve species recovery. ***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-3*** 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. ***Riparian Management Area DC-2*** 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."
1. Actions to Address Habitat Threats	
Riparian Land Management and Restoration **North Fork John Day River Core Area** Restore shade and canopy, riparian cover, and native vegetation in all bull trout spawning, rearing and migration areas. **Umatilla Core Area** Pursue opportunities for shade tree development behind flood control dikes (*i.e.*, outside of the channel). Large trees can contribute shade to the stream channel from behind dikes. **Umatilla Core Area** Protect and, where needed, revegetate riparian zones in areas used by bull trout. **Touchet Core Area** Protect and, where needed, revegetate riparian zones in areas used by bull trout.	***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. ***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.
Reduce sediment delivery from roads **North Fork John Day River Core Area**	**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

Identify and reduce sources of excessive fine sediment delivery. Stabilize roads, crossings, and other sources of sediment delivery; remove and vegetatively restore unneeded roads. **Tucannon Core Area** Identify unstable and problem roads causing fine sediment delivery. Identify sources of fine sediment input from historical road networks on Federal and State lands within bull trout critical habitat areas. **Asotin Core Area** Identify unstable and problem roads causing fine sediment delivery.	native aquatic species and the proper function of their habitat and do not require human intervention or restoration. Scale: watershed or subwatershed. 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. 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.
Road Relocation **Tucannon Core Area** Assess and mitigate roads that are floodplain confining. Based on assessment, relocate roads out of the floodplain or stabilize them. Where roads cannot be relocated; recontour road fill slopes and seed with native vegetation to prevent slumping. Add adequate surface material, if needed, to prevent sediment movement.	***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-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. **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. 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.
Reduce grazing impacts **North Fork John Day River Core Area** Fencing, changes in timing, and the use of riparian pastures, off site watering and salting, and other measures can be used to minimize grazing impacts. **Middle Fork John Day Core Area** Reduce grazing impacts. While recognizing that no livestock grazing would likely achieve recovery of habitat and populations more rapidly, the following measures would allow for livestock grazing occurring while habitat and populations recover at less than a near-natural rate of recovery. Livestock grazing within riparian areas proximate to	***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-3G149 8. Where desired conditions for water quality, aquatic habitat, and riparian vegetation have been attained[150] and riparian vegetation is in late-seral conditions[151], protect or maintain those

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150 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.

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

bull trout critical habitat should be limited to light utilization and minimal bank disturbance. Curtail unauthorized livestock use on USFS property. **Umatilla Core Area** Reduce grazing impacts. Fencing, changes in timing, and the use of riparian pastures, off site watering and salting, and other measures can be used to minimize grazing impacts. **Asotin Core Area** Reduce grazing impacts.	conditions by managing annual livestock grazing use and disturbance as follows [152]: • maintain a minimum of 4-inch residual stubble height [153] of key herbaceous species on the greenline; • utilize no more than 30-45 percent of deep-rooted herbaceous vegetation in the active floodplain[7] and, as needed, in other critical portions of the riparian management area; • limit streambank alteration[8] 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. 9. 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[3], 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 greenline[2]; • follow the criteria for utilization of deep-rooted herbaceous vegetation, streambank alteration, and use of woody species described in (1). 10. 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[3], 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;

152 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.

153 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 percent[2]; 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.
Floodplain Connectivity **North Fork John Day River Core Area** Conduct stream channel and floodplain restoration activities. Review habitat information to identify and prioritize opportunities for channel restoration. Full floodplain (*e.g.*, hillslope toe to hillslope toe) restoration is necessary **Umatilla Core Area** Restore floodplain function and channel complexity (*e.g.*, sinuosity) in areas utilized by bull trout **Walla Walla Core Area** Complete actions identified to improve riparian vegetation, floodplain connectivity, channel complexity and other limiting factors identified in the salmon recovery plan within bull trout FMO and SR habitat.	**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. **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. 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.

	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.
Instream and Floodplain Habitat and Connectivity Restoration **Umatilla Core Area** Improve instream habitat complexity. Restoration activities should focus on: increasing instream habitat complexity, off-channel habitat, and high flow refugia by adding large wood; managing riparian areas for a future supply of large wood, adequate shade, and diverse allochthonous inputs; and reducing fine sediment and water quality impacts from intense land use activity. **Walla Walla Core Area** Restore riparian and floodplain function including channel structure and complexity in areas used by bull trout through the implementation of dike setback, floodplain reconnection, channel reconstruction, and off channel habitat projects. Remove historical levees to improve interaction with floodplain, habitat complexity and water quality. **Touchet Core Area** Complete actions identified to improve riparian vegetation, floodplain connectivity, channel complexity	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. ***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.

Fish Passage **North Fork John Day River Core Area** Install passage structures around diversions and/or remove related migration barriers. Address structures such as log weirs, culverts, and other legacy structures that block juvenile and adult passage to reconnect spawning, rearing and overwinter habitats.	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.
Mining **North Fork John Day River Core Area** Improve degraded instream conditions associated with legacy mining and extraction. Minimize impacts of load, placer and suction dredge mining to bull trout and their habitats. **Powder River Core Area** Assess mine sites for potential negative effects on bull trout and bull trout habitats and rehabilitate sites determined to be problems.	***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 discretional 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 resources[154]." 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.
North Fork John Day River Core Area Provide a reliable source of large hardwood beaver forage and encourage beaver recolonization	***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.
Reduce Recreation Impacts **Tucannon Core Area** Protect riparian and channel habitat at managed and unmanaged campgrounds, trail systems, and recreation sites. Develop riparian and stream channel management plans to protect migration, spawning, and rearing habitat adjacent to trail systems, camping sites, and recreation sites. **Asotin Core Area** Reduce sediment inputs from recreational-based channel damage. Assess damaged areas and reduce sediment input from riparian and streambank alterations caused by motorized and nonmotorized use of access trails	***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.

154 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.

Restore Streambed Function **Tucannon Core Area** Identify and restore aggrading stream channels to restore flow, reduce subsurface flows, and increase channel stability. Conduct stream surveys to identify or better define problems and possible solutions to restore stream channel stability, function, complexity, and bedload sources that lead to reduced surface flow and increased subsurface flow at the confluence of streams.	***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.
2. Actions to Address Demographic Threats	
Thermal Barriers **North Fork John Day River Core Area** Reduce or eliminate thermal barriers by maintaining or improving riparian vegetation communities providing shade to streams. Current juvenile and adult bull trout distribution is impeded by thermal barriers among spawning and rearing habitats **Umatilla Core Area** Implement stream restoration measures to remedy temperature barriers	***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.
Actions to Address Demographic Threats ***Small Population Size*** **Asotin Core Area** Conduct watershed analyses to evaluate past, current, and future bull trout production potential. Conduct watershed analyses to describe the past, current, and future (restored) potential of mainstem reaches and tributary streams to support bull trout 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. 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. ***Watershed*** WM-1S When watershed function[155] desired conditions are being achieved and watersheds are functioning properly[156], projects shall maintain[157] 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 restore[158] or not retard attainment[159] of desired conditions. Short-term[160] adverse effects from project activities may occur when they support or do not diminish long-term[161] recovery of watershed function desired conditions and federally listed species.
Restore Fire to Mimic Disturbance **Asotin Core Area** Investigate use of prescribed fire. Evaluate the use of prescribed fire to mimic natural disturbance to reinvigorate forested watersheds in both core areas. Review fire	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

155 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).

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

[158] See glossary for definitions of “restore”.

[159] See glossary for definitions of “retard attainment”.

[160] See glossary for definition of “short-term adverse effects.”

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

suppression efforts and emphasize continued fire suppression to reduce the risk of catastrophic fire, while not putting bull trout watersheds at risk.	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.

Appendix C: Scientific Basis for Annual Livestock Use and Disturbance Indicator Guideline (GM-3G) in the Blue Mountains Forest Plan.

Purpose

This paper describes the scientific basis for an Annual Livestock Use and Disturbance Indicator Guideline (GM-3G) included in the Proposed Action, which is to revise Forest Plans for the Blue Mountains National Forests. It also briefly describes the reasons for the guideline, its key characteristics, and the process for its development.

Introduction

Guideline GM-3G contains numeric values for annual livestock use and disturbance indicators and a management framework for applying and adapting them based on local resource conditions and trends. These types of indicators and numeric values 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*[162] (USDA FS and USDI BLM 1995e).

This PACFISH implementation guidance is intended to facilitate consistent execution of PACFISH Standards and Guidelines by avoiding adverse grazing effects that retard attainment of aquatic and riparian desired conditions. Specifically, the guidance recommends ways to limit adverse grazing effects to those that do not carry through to the next year, thereby enabling stream and riparian areas to recover at 'near natural' rates. No comparable guidance has been developed for areas operating under the INFISH strategy. However, since that strategy is exceptionally similar to PACFISH, some Forests have used the PACFISH implementation guidelines to implement INFISH.

The GM-3G guideline was developed to: 1) provide more current, consistent, and objective grazing management direction across the entire Blue Mountains based on best available science; and 2) provide greater certainty of implementation to regulatory agencies and the public than provided by existing 'implementation guidance', given the current legal and regulatory context in which the Forest Service is managing grazing (e.g., large areas with threatened, endangered, and sensitive aquatic species, including ESA-listed fish; and large areas with waters listed as impaired under the Clean Water Act).

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162 These recommended guidelines were developed by an interdisciplinary team that included Ron Wiley, Wayne Elmore, and Don Nelson. Ron Wiley and Wayne Elmore went on to become Team Leaders of the National Riparian Service Team. Don Nelson went on to become a Rangeland Management Specialist in the Washington Office.

The Guideline

- ***Key Characteristics***

Key characteristics of the guideline include:

- flexibility, provided by the inherent nature of a guideline and the explicit language in GM-3G;
- a menu of indicators and default ranges of indicator values that are to be applied only when/where appropriate to maintain or move towards desired conditions;
- direction that indicators and values should be prescribed based on site-specific conditions to achieve longer-term goals and objectives;
- clarification that the indicators and values should be adjusted over time based on long-term monitoring;
- a management framework for applying the indicators and values based on assessments of local resource conditions and trends using information and data at multiple scales (e.g., subwatershed, pasture);
- a purpose statement and specific language that allows use of alternative indicators and indicator values, provided the purpose of the guideline is met and best available science is used.

- ***Development Process***

The guideline was developed by an interdisciplinary team composed of, at various times, the following people.

- Regional Office: Brian Staab (Regional Hydrologist), Tom Hilken (Regional Range Program Manager), John Chatel [Regional Threatened, Endangered and Sensitive (TES) Species Program Manager], Scott Woltering (Regional Aquatic TES Biologist), and James Capurso, PhD (Regional Fisheries Biologist)
- Forests: Steve Gibson (Range Program Manager, Deschutes and Ochoco NFs), Maura Laverty (Range Program Manager, Wallowa-Whitman and Umatilla NFs), Tom Friedrichsen (Forest Hydrologist, Malheur NF), and Steve Namitz (Forest Fisheries Biologist, Malheur NF)

To develop the guideline, the team used relevant science and professional judgement to identify relevant annual use indicators that could be included in a Forest plan guideline and appropriate ranges for those values. They then developed a suitable management framework for applying and adapting the indicators and values based consideration of local resource conditions and trends. Team members consulted Brett Roper, PhD (WO-National Stream and Aquatic Ecology Center) and Eric Archer (PACFISH-INFISH Biological Opinion [PIBO] Monitoring Team) at various times throughout the process.

Supporting Science
Some of the key science that supports the guideline includes the following:

- ***Proper use of annual indicators and indicator values***

GM-3G includes four annual use indicators and default numeric ranges of values for these indicators in different situations. The selected indicators include 1) stubble height along the greenline, 2) utilization of deep-rooted herbaceous vegetation in the active floodplain and, as needed, other critical portions of riparian management area, 3) streambank alteration, and 4) use of current year leaders of woody species along streambanks and, as needed, other critical portions of riparian management areas. This use of multiple indicators is supported by many authors, including Bryant *et al.* (2006), Burton *et al.* (2011), and Goss (2013).

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. Importantly, the guideline explicitly specifies that these annual livestock use and disturbance indicators should only be applied to help achieve, over longer timeframes, conditions at site and watershed scales that enable attainment and maintenance of aquatic and riparian desired conditions. They are not long-term management objectives, but a means to achieve them, when properly specified, applied and adapted over time (Bryant *et al.* 2006, Clary and Leininger 2000). Because rangelands, riparian areas, and streams are extremely diverse (Sayre *et al.* 2012, Swanson *et al.* 2015), the guideline explicitly recognizes that not all indicators are appropriate to every situation (Bryant *et al.* 2006, Clary and Leininger 2000). GM-3G thus specifies that only indicators and indicator values appropriate to a particular site should be used. In addition, indicators and associated values are to be selected, prescribed and adjusted based on site-specific conditions (e.g., natural site potential, similarity of existing conditions to desired conditions, ability of the area to resist livestock impacts and to recover once disturbed).

This approach of using default values from current applicable research and factoring in site-specific characteristics to arrive at a reasonable allowable value is consistent with the recommendations of Bryant *et al.* (2006). It is also consistent with the PACFISH implementation guidance, which states that 'Guidelines for developing allotment specific prescriptions can be identified at the programmatic level. However, in general, the prescriptions themselves must be developed to fit on-the-ground conditions within the context of those guidelines.'

- ***Varying intensities of use depending on resource conditions and trends***

Consistent with the conclusions of Clary and Webster (1990), Swanson *et al.* (2015), and other researchers, the GM-3G guideline allows for higher levels of use and disturbance in areas currently in a functional condition than those that are degraded. Lower levels of use and disturbance are also specified when sensitive resources are present (e.g., ESA-listed species, impaired waters) and conditions are not improving. As such, the guideline properly incentivizes resource managers to implement the basic foundations of the BMF ARCS: maintaining properly functioning conditions and restoring conditions in areas that are functioning-at-risk or that have impaired function.

As noted by Platts (1991), any reduced levels of forage use in overused and degraded riparian communities should be short-term, as improved management should result in increased forage production.

- ***Stubble height***

Stubble height is a measure of the height of residual herbaceous vegetation remaining after grazing (Bengeyfield and Svoboda 1998, Burton *et al.* 2011, Clary and Leininger 2000). GM-3G includes stubble height because it is a good indicator for limiting: 1) the effects of grazing on the physiological health of plants, 2) impacts to the ability of the vegetation to provide streambank protection and to filter out and trap sediments from overbank flows, 3) impacts on stream channel morphology and other effects associated with streambank trampling, and/or 4) browse of willows that provide fish with cover, modulate stream temperatures, and contribute leaf detritus and terrestrial insects that expand food sources (Bryant *et al.* 2006, Clary and Leininger 2000, Murphy and Meehan 1991).

In addition, using the PACFISH/INFISH Biological Opinion monitoring data from federal lands in the Columbia Basin, Goss (2013) demonstrated a relationship between grazing intensity and stubble height and between stubble height and long-term stream habitat conditions (e.g., bank angle, % undercut banks, residual pool depth).

The GM-3G guideline specifies a minimum stubble height of 6" when subwatersheds are properly functioning[163], except for sites that have late-seral conditions and that are being managed under a grazing system that supports a late-seral ecological stage. In those situations, 4-6" stubble height value applies. When subwatersheds are functioning-at-risk or have impaired function, a minimum stubble height of 6-8" is specified, except where willow is or should be an important component of the riparian vegetation community and grazing occurs in the late season. In those situations, a minimum stubble height of 8" applies.

These values are comparable to those included in existing PACFISH implementation guidance (*Recommended Livestock Grazing Guidelines*, USDA FS and USDI BLM 1995):

- 4-6" stubble height where ecological status is 'late-seral' and other conditions (e.g., limited bank alteration and woody vegetation utilization) are met.
- at least 6" stubble height where ecological status is 'mid-seral' and other conditions (e.g., limited bank alteration and woody vegetation utilization) are met. Also use early season grazing in areas with sensitive, low to moderate gradient streams.
- at least 6" stubble height and early season grazing where ecological status is 'early-seral' and channels are in 'good' or 'moderate' condition and are relatively insensitive, with

163 Stubble height criteria for GM-3G 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.

moderate to high gradients. In areas with 'early seral' vegetation and 'poor' channel conditions, consider rest.

They are also comparable to guidelines from Forests in the Sierra Nevada. There, 6" stubble height is used for meadows in early seral status, while a 4" value applies in meadows classified as late-seral.

The values of 6" and 6-8" are also consistent with the recommendations of Clary and Webster (1990) who suggested that 6" stubble height or perhaps removal of grazing may be warranted where critical fish habitats, especially for threatened, endangered or sensitive species, occur or where streambanks are erodible. These situations are common on Forests in the Blue Mountains, especially in the areas where stubble height is most useful (i.e., lower gradient streams where herbaceous vegetation plays an important role in stabilizing streambanks). These values are also generally consistent with ESA Recovery and Implementation Plans for Bull Trout in some areas of the Blue Mountains, which include stubble heights of 6-8" or 8-10" in critical habitat, depending on the habitat type and season of grazing (USFWS 2015a-c).

These criteria are further supported by a recent review focused on use of stubble height as a tool for maintaining or improving stream and riparian conditions for cold water biota, specifically salmon and trout (Roper 2016). He concluded a minimum 6" stubble height was an appropriate starting point for protecting most small to medium-size, cold-water salmon and trout streams. He also noted 4" may be more appropriate for some situations, while 8" may be more suitable for others. The GM-3G guideline both defines some specific situations where 4" and 8" are appropriate and allows for use of these and other values in other situations, provided the purposes of the guideline can be met.

The findings of Goss (2013) further supports these values. She demonstrated, for example, that stubble height was related to streambank disturbance and that streambank disturbance begins to increase substantially when stubble heights decrease below 10". Specifically, she found streambank disturbance >20-25% (the GM-3G guideline values for properly functioning conditions) and >15-20% (the GM-3G guideline values for functioning-at-risk or impaired function) occurs more frequently when stubble heights decline below 6-8" and 8", respectively. While these findings are based on stubble heights for all herbaceous vegetation rather than the select species used in some other research and monitoring protocols (e.g., Burton *et al.* 2011), the general patterns observed by Goss (2013) should apply and in many situations and the results should be reasonably comparable. Exceptions include areas where stream channels are degraded and are in the early phases of recovery (B. Roper, personal communication).

These values are also supported by the work of Bengeyfield (2006) and Clary (1999). Specifically, Bengeyfield (2006) found, based on 7-9 years of monitoring, a 4" stubble height did not initiate an upward trend in stream channel morphology at sites on the Beaverhead-Deerlodge National Forest. In contrast, Clary (1999) found that while 5" stubble height (end of season value per Roper 2016, comparable to GM-3G) resulted in improvements in most measured aquatic and riparian conditions in an Idaho meadow after 10 years, 7" stubble height was needed to improve all measured habitat metrics.

The 8” value that applies under specific circumstances (subwatersheds that are functioning-at-risk or that have impaired function, grazing occurs late in the season and willow is important) is supported by the work of Clary and Leininger (2000) and Pelster *et al.* (2004). Specifically, Clary and Leininger (2000) suggested 6-8” stubble heights may be needed to reduce willow browse and 8” was needed for late summer grazing. Pelster *et al.* (2004) came to similar conclusions. They found 25-50% of steer diets were comprised of willow during late-summer and fall grazing at utilization levels similar to those specified in GM-3G. As such, they suggested stubble heights of about 8” were needed to reduce willow consumption in some vegetation communities during these critical periods.

- ***Utilization of deep-rooted herbaceous vegetation***

Utilization measures the percentage of annual herbaceous production removed by grazing and browsing. This indicator is included in GM-3G because it can be used to 1) identify use patterns, 2) help establish cause-and-effect interpretations of range trend data, and 3) aid in adjusting stocking rates when combined with other monitoring data. Moreover, standardized methods are available to evaluate this indicator in a technically sound, reliable and economical manner (USDA and USDI 1999).

For subwatersheds that are functioning properly, GM-3G specifies maximum utilization rates of 30-45% in the active floodplain and, as needed, in other critical portions of the riparian management area. These values generally correspond with ‘moderate’ grazing intensity (Clary and Leininger 2000, Holechek *et al.* 1999). Values of 30-35% are specified for subwatersheds that are functioning-at-risk or have impaired function. These ranges of utilization are considered ‘conservative’ or somewhere between ‘moderate’ to ‘light’ grazing intensity, respectively (Clary and Leininger 2000, Holechek *et al.* 1999). They are comparable to guidelines from some other Regions (e.g., <30-40% on Forests in the Sierra Nevada, depending on seral state).

These ranges of values were informed by the work of multiple researchers. Clary (1995), for example, found utilization rates >30% in riparian meadows can reduce herbage production significantly, while Crider (1955) found root growth stops when 50% of aboveground biomass is removed. In addition, Holechek *et al.* (1999) concluded ‘moderate’ utilization rates of 40-45% may maintain range conditions, while use <30-35% was needed to improve rangeland vegetation. These values were further informed by the findings of Freitas *et al.* (2014) and Kauffman *et al.* (2004). Freitas *et al.* (2014), for example, concluded riparian herbaceous utilization rates of 35%, when combined with other use limitations (e.g., streambank alteration, willow browse), neither degraded nor hampered recovery of meadow plant communities on the Inyo National Forest. In contrast, Kauffman *et al.* (2004), found at a site in the John Day River Basin, utilization rates on the order of (and likely less than) 64% in dry meadows and 42% in wet meadows may affect or hinder recovery of stream channel structure, water quality, and aquatic biota by substantially altering below ground biomass, soil porosity, infiltration rates, and other key ecological processes.

- ***Streambank Alteration***

Streambank alteration is the presence of shearing, trampling, and trailing of streambanks as a direct result from current year ungulate use (Burton *et al.* 2011, Heike *et al.* 2008). This indicator is included in GM-3G because limiting this type of disturbance by livestock is critical to maintaining and restoring riparian areas (Bengeyfield 2006, Goss 2013). Despite some limitations, of all the indicators, it has the closest connection to the effects of grazing on aquatic habitats and species (Interagency Coordinating Subgroup, 2009). Goss (2013) found this indicator to be moderately repeatable. She also found a relationship between grazing intensity and streambank alteration and between streambank alteration and long-term stream conditions (e.g., width-to-depth ratio, bank angle).

The GM-3G guideline specifies a maximum streambank alteration of 20-25% for subwatersheds functioning properly and 15-20% for subwatersheds functioning-at-risk or that having impaired function. These values are generally consistent with those included in recent ESA consultations in the Region (e.g., 15% endpoint indicators for pastures with the most sensitive riparian areas and 20% endpoint indicators for other pastures on the Malheur NF) and with guidelines from other Regions (e.g., <10-20% on Forests in the Sierra Nevada, 10-25% on Caribou-Targhee NF). They are substantially greater than the 5% 'new bank alteration' criterion included in the PACFISH implementation guidance, but that value refers only to bank shearing and is therefore a subset of the disturbance included in the bank alteration component of GM-3G.

These values were informed by Bengeyfield (2006), who 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%. These values correspond to higher levels of alteration using the monitoring methods specified in GM-3G, which is reflected in the allowable alteration values.

These values are further supported by the findings of Goss (2013). She found streambank alteration and stubble height were correlated and the stubble height values in GM-3G were attained much more frequently when alteration values were <20-25%. They are also consistent with the conclusion of the Montana Monitoring Working Group (1998) that streambanks are more likely to slough or erode during peak stream discharge when streambank disturbance exceeds 25%. Lastly, Freitas et al. (2014) found that streambank alteration rates of <10%, when combined with other use limitations (e.g., herbaceous and willow utilization), enabled recovery of meadow plant species richness and diversity on the Inyo National Forest.

- ***Use of current year leaders of woody species***

GM-3G includes estimated use of current year branch growth of trees and shrubs, known as 'woody browse', as an annual use indicator (Heady 1949; Burton et al. 2011). It was included because: 1) it is indicative of grazing intensity, and 2) healthy woody vegetation, together with herbaceous vegetation, contributes nutrients to streams, provides shade, and includes strong root systems that stabilize banks, filter sediment, and slow water during high stream flows (Micheli and Kirchner 2002, Burton et al. 2011).

GM-3G specifies maximum woody browse rates <30-40% along streambanks for subwatersheds functioning properly and 20-30% for subwatersheds functioning-at-risk or having impaired function. These values were informed by the PACFISH implementation guidance (USDA Forest Service 1995), Forest Service vegetation monitoring protocols (Winward 2000), and Recovery and Implementation Plans for Bull Trout in the Blue Mountains (USFWS 2015a-c). Existing PACFISH implementation guidance (USDA and USDI 1995), for example, recommends <30%. Winward (2000) characterized utilization values of 20-40% as 'light' grazing that should avoid reductions in seed production that can occur at 'moderate' (41-60%) use levels as well as reductions in root size and strength that can occur under 'heavy' (61-80%) and 'severe' (81-100%) use rates. USFWS (2015a-c) specifies 0-20% and 21-40% woody browse, depending on habitat type.

Allowable woody browse on Forests in the Sierra Nevada (<20%) are less than those specified in GM-3G. Freitas et al. (2014) found these rates, when combined with other use limitations (e.g., streambank alteration, herbaceous utilization), neither degraded nor hampered recovery of meadow plant communities on the Inyo National Forest. Some other Forests have somewhat higher allowable use guidelines (e.g., 30-50% on Caribou-Targhee NF).

Woody browse is the least reliable indicator included in GM-3G. Hall and Max (1999), for example, found high variability in measurements of livestock use to riparian woody plants. Goss (2013) found similar problems with the repeatability of this indicator, which led to weak relations with other disturbance indicators and insignificant relations to grazing intensity. As such, this indicator should be used with caution. Moreover, it should generally be used in combination with other indicators (e.g., stubble height) to achieve aquatic and riparian resource objectives.

References

Bengeyfield, P. 2006. Managing cows with streams in mind. Rangelands 26:3-6.

Bengeyfield, P., and D. Svoboda. 1998. Determining allowable use levels for livestock movement in riparian areas. Proceedings of the specialty conference on rangeland management and water resources. Vol. 27. 1998.

Bryant, l., W. Burkhardt, T. Burton, W. Clary, R. Henderson, D. Nelson, W. Ririe, K. Saunders, and R. Wiley. 2006. Using stubble height to monitor riparian vegetation. Rangelands 28(1): 23-28.

Burton, T.A., S.J. Smith, and E.R. Cowley. 2011. Riparian area management: Multiple indicator monitoring (MIM) of stream channels and streamside vegetation. Denver, CO, USU: US Department of the Interior, Bureau of Land Management. Technical Reference BLM/OC/ST-10/003+ 1737.

Clary, W. P. 1995. Vegetation and soil responses to grazing simulation on riparian meadows. Journal of Range Management 48: 18-25.

Clary, W.P. 1999. Stream channel and vegetation responses to late spring cattle grazing. Journal of Range Management 52:218-227.

Clary, W.P., and W.C. Leininger. 2000. Stubble height as a tool for management of riparian areas. J. Range Management. 53: 562-573.

Clary, W. P., and B.F. Webster. 1990. Riparian grazing guidelines for the Intermountain Region. Rangelands, 12: 209-212.

Crider, F. J. 1955. Root growth stoppage resulting from defoliation of grass. U. S. Dept. Agr. Tech. Bull. 1102, 23 p.

Freitas, M. R., L.M. Roche, D. Weixelman, and K.W. Tate. 2014. Montane meadow plant community response to livestock grazing. Environmental management, 54(2), 301-308.

Goss, L.M. 2013. Understanding the relationship between livestock disturbance, the protocols used to measure that disturbance, and stream conditions. Masters Thesis, Utah State University. 107pp.

Hall, F. C., and T. Max. 1999. Test of observer variability in measuring riparian shrub twig length. Journal of Range Management 52:633-636.

Heady, H. F. 1949. Methods of determining utilization of range forage. Journal of Range Management 2:53-63.

Heike, J.D., R.C. Henderson, B.B. Roper, and E.K. Archer. 2008. Evaluating livestock grazing use with streambank alteration protocols: challenges and solutions. Rangeland Ecol Manage 61: 647-655.

Holechek, J. L., Gomez, H., Molinar, F., & Galt, D. (1999). Grazing studies: what we've learned. Rangelands, 12-16.

Interagency Coordinating Subgroup. 2009. Blue Mountains Consultation Streamlining Level 2 Elevation of Unresolved Issues.

Kauffman, J.B., A. S. Thorpe, and E. N. Brookshire. 2004. Livestock exclusion and belowground ecosystem responses in riparian meadows of eastern Oregon. Ecological Applications 14.6: 1671-1679.

Micheli, E.R., and J.W. Kirchner. 2002. Effects of wet meadow riparian vegetation on streambank erosion. 2. Measurements of vegetation bank strength and consequences for failure mechanics. Earth Surface Processes and Landforms 27: 687–697.

Montana Monitoring Working Group. 1998. Monitoring for success, ranch planning, upland monitoring, stream channel and riparian area monitoring. State of Montana, Department of Natural Resources and Conservation. Helena, MT.

Murphy, M.L. and W.R. Meehan. 1991. Stream ecosystems. Pages 17-46. *In*: Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19, Bethesda, MD.

National Marine Fisheries Service. 2009. Middle Columbia River Steelhead Distinct Population Segment ESA Recovery Plan. NMFS Northwest Region, Portland, Oregon. 260 pages.

Platts, W. 1991. Livestock grazing. Pages 389-423. *In* W. R. Meehan, editor. Influences of forest and rangeland management on salmonids and their habitats. American Fisheries Society Special Publication 19, Bethesda, MD.

Pelster, A. J., S. Evans, W.C. Leininger, M.J. Trlica, and W.P. Clary. 2004. Steer diets in a montane riparian community. Journal of Range Management. 57: 546-552.

Roper. B.B. 2016. Setting stubble height standards for riparian areas grazed by cattle in areas with Endangered Species Act listed or sensitive salmon and trout species. National Stream and Aquatic Center, USDA Forest Service. 7pp.

Sayre, N.F., B.T. Bestelmeyer, and K.M. Havstad. 'The Range Problem' after a century of rangeland science: new research themes for altered landscapes. Rangeland Ecology & Management 65.6 (2012): 545-552.

Swanson, S.R., S. Wyman, and C. Evans. Practical grazing management to meet riparian objectives. Journal of Rangeland Applications 2 (2015): 1-28.

USDA Forest Service and USDI Bureau of Land Management (USDA and USDI). 1995a. Environmental assessment for the interim strategies for managing anadromous fish-producing watersheds in eastern Oregon and Washington, Idaho, and portions of California (PACFISH). Washington, DC.

USDA Forest Service and USDI Bureau of Land Management (USDA and USDI). 1995b. Decision Notice/Decision Record and Finding of No Significant Impact for the interim strategies for managing anadromous fish-producing watersheds in eastern Oregon and Washington, Idaho, and portions of California (PACFISH). Washington, DC.

USDA Forest Service and USDI Bureau of Land Management (USDA and USDI). 1995c. Environmental assessment for the interim strategies for managing fish-producing watersheds in eastern Oregon and Washington, Idaho, western Montana and portions of Nevada (INFISH).

USDA Forest Service and USDI Bureau of Land Management (USDA and USDI). 1995d. Decision Notice and Finding of No Significant Impact for the interim strategies for managing fish-producing watersheds in eastern Oregon and Washington, Idaho, western Montana and portions of Nevada (INFISH).

USDA Forest Service and USDI Bureau of Land Management (USDA and USDI). 1995e. PACFISH Recommended livestock grazing guidelines.

USDA and USDI. 1999. Utilization studies and residual measurements: Interagency technical reference. BLM/RS/ST-96/004+1730.

United States Fish and Wildlife Service. 2015a. Recovery Plan for the Coterminous United States Population of Bull Trout (Salvelinus confluentus).

United States Fish and Wildlife Service. 2015b. Mid-Columbia Recovery Unit Implementation Plan for Bull Trout (Salvelinus confluentus).

United States Fish and Wildlife Service. 2015c. Upper Snake Recovery Unit Implementation Plan for Bull Trout (Salvelinus confluentus).

Winward, Alma H. 2000. Monitoring the vegetation resources in riparian areas. General Technical Report RMRS GTR-47. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 49 p.

Appendix D: List of Recovery or Conservation Strategies for Gray Wolf that are Addressed by the BMFP.

Gray Wolf – Blue Mountains Forest Plan Revision – (11/21/2017 B.Wales)
Plan components are numbered as shown in Appendix K – the Forest Plan; numbers within ( ) indicate numbers referenced in the Aug. version of the BA.

Within the USFWS LOC for Gray Wolf on the Umatilla NF and Malheur NF, the USFWS lists 4 management activities that have the potential to negatively affect Gray wolves:

1. Den and Rendezvous Site Disturbance

FP 1.3 Desired Condition – Federally listed species (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., primary constituent elements and primary biological features) are protected and restored to achieve species recovery.

FP 1.3 Desired Condition – Federally listed Terrestrial species

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.

FP 1.2 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.

FP 1.2 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.

FP 1.2 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.

FP 1.2 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.

RE-5S *(Standard*) - 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 recovery[164] 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.

SD-6G *(Guideline)* 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-9G *(Guideline)* Do not place 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 (FLS-18S) *(Standard*) 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. (wording edited from Aug. 2017 BA)

2. Presence of roads that contribute to human interactions due to traffic density/volume
FP 2.5 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…

…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

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

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.

FP 2.3.1 - Desired Condition - Rocky Mountain Elk (unnumbered)
…..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 security areas to allow for seasonal movement of elk across their range and to retain elk on NFS lands at all times of the year. ….

RME-1S *(Standard*) 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 *(Guideline)* 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 *(Guideline)* 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.

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

FP 1.2 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.

3. Density and distribution of prey

FP 2.3.1 - Desired Condition - Rocky Mountain Elk (unnumbered)
…..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 security areas to allow for seasonal movement of elk across their range and to retain elk on NFS lands at all times of the year. ….

RME-1S *(Standard*) **-** 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 *(Guideline)* **-** 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 *(Guideline)* - 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.

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

<u>4. Permitted Livestock Grazing</u>

FP 3.3.2 – Desired Condition – Livestock Grazing

Allotments provide forage for grazing livestock, such that local ranching operations can be sustained, while maintaining and/or achieving ecological desired conditions.

SD-7G *(Guideline)* Do not authorize turnout of sick or injured livestock to reduce risk of attracting wolves. .

SD-8G *(Guideline)* Remove or otherwise dispose of livestock carcasses such that the carcass will not attract wolves found in areas such as a salting ground, water source, or holding corral, or other areas of the allotment where they would attract wolves to a potential conflict situation with other livestock. If, due to location of the carcass, this is not possible, work with the appropriate Forest Service staff to develop other remedies.

SD-9G *(Guideline)* Do not place 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.

FLS-16S (FLS-18S) *(Standard*) 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. (wording edited from Aug. 2017 BA)

MA 4B Range Management and Domestic Livestock Grazing

GM-1S *(Standard*) 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 *(Standard*) 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 *(Guideline)* 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.[165] 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 applied[166]. Indicators and indicator values should be adapted over time based on long-term monitoring and evaluation of conditions and trends. Alternative use and disturbance indicators and values, including those in current ESA consultation documents or non-ESA allotment management plans or allotment NEPA decisions, may be used if they are based on best available science and monitoring data and meet the purpose of this guideline.

11. Where desired conditions for water quality, aquatic habitat, and riparian vegetation have been attained[167] and riparian vegetation is in late-seral conditions[168], protect or maintain those conditions by managing annual livestock grazing use and disturbance as follows [169]:
    - maintain a minimum of 4-inch residual stubble height [170] of key herbaceous species on the greenline;

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165 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).

166 Indicator values for specific sites should be determined based on consideration of local conditions including, but not limited to, the degree of departure between existing and desired conditions, the current and desired rate of improvement, site sensitivity to grazing, grazing season, the presence of special status species (e.g., ESA-listed species, Regional Forester's sensitive species) that are sensitive to grazing, whether or not water quality standards and related requirements (e.g., 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.

167 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.

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

169 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.

170 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.

- utilize no more than 30-45 percent of deep-rooted herbaceous vegetation in the active floodplain[7] and, as needed, in other critical portions of the riparian management area;
- limit streambank alteration[8] 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.

12. 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[3], 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 greenline[2];
    - follow the criteria for utilization of deep-rooted herbaceous vegetation, streambank alteration, and use of woody species described in (1).

13. 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[3], enable recovery by managing annual livestock grazing use and disturbance as follows:
    - maintain a minimum of 6-inch residual stubble height of key herbaceous species on the greenline;
    - utilize no more than 30-35 percent of deep-rooted herbaceous vegetation in the active floodplain and, as needed, in other critical portions of the riparian management area;
    - limit streambank alteration to no more than 15-20 percent[2]; 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 *(Guideline)* 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 *(Guideline)* Livestock trailing, watering, loading, and other handling in riparian management areas should be avoided or minimized.

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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.

Appendix E: List of Recovery or Conservation Strategies for Silene Spaldingii that are Addressed by the BMFP.

Silene Spaldingii – Blue Mountains Forest Plan Revision (11/21/2017 B. Wales)
Plan components are numbered as shown in Appendix K – the Forest Plan; numbers within ( ) indicate numbers referenced in the Aug. version of the BA.
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.**
   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.
   Canyon Grasslands physiographic province (5 KCAs)
      Lick Creek/Blue Mountains KCA
         111 acres – Umatilla NF
      Joseph Creek KCA (adjacent to Planning area)
   Blue Mountains Basin physiographic province (4 KCAs)
      Crow Creek KCA
         Approximately 2400 plants – Wallowa-Whitman NF
      Clear Lake Ridge KCA
         1,730 to 3,645 plants – TNC
         an estimated 520 plants – Wallowa-Whitman NF
      Area south of Clear Lake Ridge KCA
         Approximately 50 acres

***FP 1.3 Desired Condition – Federally listed species (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., primary constituent elements and primary biological features) are protected and restored to achieve species recovery.

FP 1.3 Desired Condition –Federally listed 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.

FP 1.2 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.

FP 1.2 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.

FP 1.2 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

***RE-5S** (Standard)*- 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 recovery[171] 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.

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

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).**

FP 1.2 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.

FP 1.2 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.

FP 1.3 Desired Condition – Federally listed species (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., primary constituent elements and primary biological features) are protected and restored to achieve species recovery.

FP 1.3 Desired Condition –Federally listed 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.

FP 1.5 Desired Condition - Invasive Species:

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.

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.

RE-5S *(Standard)* 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 recovery[172] 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.

IS – 3G *(Guideline)* Determine appropriate range of treatments necessary to meet objectives for invasive species and native pests, while minimizing adverse effects of treatments. All methods including prevention, manual, cultural, mechanical, regionally approved chemicals, and biological agents may be considered within all management areas.

IS – 4G *(Guideline)* All activities should be planned and conducted to minimize or prevent the potential spread or establishment of invasive species.

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

FLS-4G 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-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.

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.**

FP 1.3 Desired Condition – Federally listed species (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., primary constituent elements and primary biological features) are protected and restored to achieve species recovery.

FP 1.3 Desired Condition –Federally listed 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.

4. Habitat management plans have been developed and implemented for all key conservation areas.

Forest Plan Objective:

- *Develop and implement habitat management Plans for Spalding's catchfly key conservation areas (within 10 years):*
- *Lick Creek KCA (also called Blue Mtn. Foothills)*
- *Crow Creek KCA,*
- *Clearlake Ridge KCA*
- *Lower Imnaha (HCNRA) KCA*

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**.

FP 1.5 Desired Condition - Invasive Species:
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.

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.

RE-5S *(Standard)* 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 recovery[173] 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.

IS – 3G *(Guideline)* Determine appropriate range of treatments necessary to meet objectives for invasive species and native pests, while minimizing adverse effects of treatments. All methods including prevention, manual, cultural, mechanical, regionally approved chemicals, and biological agents may be considered within all management areas.

IS – 4G *(Guideline)* All activities should be planned and conducted to minimize or prevent the potential spread or establishment of invasive species.

Prescribed burning is conducted, whenever possible, to mimic historical fire regimes within a particular physiographic region in *Silene spaldingii* habitat.

FP 1.2 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.

FP 1.4.1 Desired Condition Wildland (Unplanned) Fire -

Fire adapted and fire resilient landscapes are restored and maintained. Wildland fire (planned and unplanned ignitions) plays a characteristic ecological role in creating forest and rangeland conditions that are resilient to disturbances and climate changes. Table 7 displays the Natural Fire Regimes and their associated desired condition ranges for fire severity and frequency by potential vegetation group. Wildland fire may be suitable on all acres, depending on expected fire effects and resource objectives.

DP – 2G *(Guideline)* Manage unplanned ignitions as appropriate to achieve desired conditions.

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

FM-8G *(Guideline)* Minimum impact suppression tactics (MIST) should be utilized in sensitive areas, such as designated wilderness areas, designated wild and scenic river corridors, research natural areas, botanical areas, riparian management areas, cultural and historic sites, developed recreation areas, special use permit areas that have structures, and historic and recreational trails. MIST techniques should also be used for post fire restoration activities.
FM-6G *(Guideline)* 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.

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 *(FLS-8G*) *(Guideline)* 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.

6. **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.**
   FWS is primarily responsible for this task

7. **A post-delisting monitoring program for the species will be developed and ready for implementation.**

- FWS is primarily responsible for this task

Additional standards and guidelines specify that other potential management activities will avoid adverse effects to this catchfly and other listed species and critical habitat.

LH-4G *(Guideline)* 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 compensatory mitigation to enhance off-site habitats and to support no net loss or, if possible, a net benefit for threatened or endangered species.

FLS-6S *(FLS-6S)* *(Standard)* Timber harvest and associated vegetation management activities shall avoid adverse effects to the occupied habitat of threatened, endangered, proposed, or candidate plant species unless the silvicultural prescription would benefit the species or its habitat.

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-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.

Appendix F: List of Recovery or Conservation Strategies for Wolverine that are Addressed by the BMFP.

Wolverine – Blue Mountains Forest Plan Revision (11/21/2017 – B. Wales)
Plan components are numbered as shown in Appendix K – the Forest Plan; numbers within ( ) indicate numbers referenced in the Aug. version of the BA.

Factor A (per USFWS Species assessment:
https://ecos.fws.gov/docs/candidate/assessments/2011/r6/A0FA_V01.pdf)

(1) Climate change,
(2) human use and disturbance,
(3) dispersed recreational activities,
(4) infrastructure development,
(5) transportation corridors, and
(6) land management.

1. Climate change:
The primary threat to the DPS is from habitat and range loss due to climate warming.

FP 1.13 Desired Condition: Special Plant Habitats - Special plant habitats include mountain mahogany, aspen, cottonwood, sagebrush steppe, and whitebark pine. They provide high quality habitat for associated species. The distribution and abundance of structural stages and vegetation density classes within these special plant habitats are consistent with their natural range of variability and create conditions that are ecologically resilient, sustainable, and compatible with maintaining disturbance processes within the desired conditions. Variations in the mix of structural stages and vegetation density combinations across the landscape allow special plant habitats to respond to potential changes in climate.

FP 1.13.1 Desired Condition – Whitebark Pine (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.

FP 1.3 Desired Condition – Federally listed species (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., primary constituent elements and primary biological features) are protected and restored to achieve species recovery.

FP 1.3 Desired Condition – Federally listed Terrestrial species
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.

FP 1.2 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**.**

FP 1.2 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.

FP 1.2 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.

FP 1.2 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.

FP 1.2 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.

RE-5S *(Standard)* - 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 recovery[174] of listed, and proposed, and candidate species

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

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.

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

2/3/4. Human use and disturbance/ Dispersed recreational activities/ Infrastructure development –
May affect wolverines directly by eliminating habitats, or indirectly, by displacing wolverines from suitable habitats near developments. The latter effect tends to be most detrimental to sensitive wildlife, because the area of displacement may be much larger than the area of direct habitat loss.

The majority of potential wolverine habitat is in Management Areas 1A (Congressionally Designated Wilderness Areas) and 1B (Preliminary Administratively Recommended Wilderness Areas) where most management uses or activities are considered unsuitable.

2.4.1.2 MA 1A Congressionally Designated Wilderness Areas -Desired Condition
Designated wilderness areas exhibit primitive qualities. … 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.

MA1A-17G *(Guideline)* - To maintain wilderness characteristics, all firelines should be restored by actions such as scattering slash piles along and onto firelines, knocking down or burning all slash piles greater than 18 inches tall, pulling back and covering all sod with slash, and placing boulders, logs, and slash on firelines to discourage use and camouflage entrance points. Additionally, all firelines within 100 feet of intercepting trails, roads, or stream crossings should be restored by cutting stumps flush and close to the ground (height of 4 to 5 inches), covering tops with a layer of soil (1 to 2 inches), and chopping and roughening the ends of logs and stumps.

MA1A –20G *(Guideline)* - Closed roads that were opened to provide access to wilderness areas should be closed after the use has concluded to maintain wilderness characteristics

MA1A-21G *(Guideline)* - Wilderness trails used as firelines should be returned to original condition after the use has concluded in order to maintain wilderness characteristics

MA 1B Preliminary Administratively Recommended 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.

FP 3.1 Desired Condition - Facilities and Infrastructure:
Administrative facilities are safe, efficient, cost-effective, and are maintained at a function and use level that meets management needs. Facilities meet all applicable health and safety standards. Impacts to natural resources are minimal. Administrative facilities complement and harmonize with natural settings. The form of structures is derived by the function and from the landscape setting. …

FP 1.2 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.

FP 1.2 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.

RE-5S *(Standard)*- 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 recovery[175] of listed, and proposed, and candidate species

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

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.

FLS-12S – Recreation areas (e.g. ski areas) and other recreational action shall minimize adverse impact to whitebark pine and its habitat.

5. Transportation corridors

…may affect wolverines if located in wolverine habitat or between habitat patches. If located in wolverine habitat, transportation corridors result in direct loss of habitat and possibly displacement of wolverines for some distance. Direct mortality due to collisions with vehicles is also possible.

The majority of potential wolverine habitat is in Management Areas 1A (Congressionally Designated Wilderness Areas) and 1B (Preliminary Administratively Recommended Wilderness Areas) where most management activities, including motor vehicle use, are considered unsuitable.

Transportation corridors provide access to areas otherwise not affected by humans, which exacerbates the effects of human disturbance from a variety of activities. Outside of wolverine habitat, transportation corridors may affect wolverines if they present barriers to movement between habitat patches or result in direct mortality to dispersing wolverines. Because wolverines are capable of making long-distance movements between patches of suitable habitat, transportation corridors located many miles away from wolverine home ranges may affect their ability to disperse or recolonize vacant habitats after local extirpation events.

MA 1A Congressionally Designated Wilderness Areas -Desired Condition
Designated wilderness areas exhibit primitive qualities. … 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.

MA1A –20G *(Guideline)* - Closed roads that were opened to provide access to wilderness areas should be closed after the use has concluded to maintain wilderness characteristics.

MA1A-21G *(Guideline)* - Wilderness trails used as firelines should be returned to original condition after the use has concluded in order to maintain wilderness characteristics.

MA 1B Preliminary Administratively Recommended 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.

MA1B-2G *(Guideline)* – Mechanized (bicycle) use on existing trails and non-motorized travel may occur in recommended wilderness areas.

FP 2.5 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…

…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.

FP 1.2 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.

FP 1.2 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.

FP 2.3.1 - Desired Condition - Rocky Mountain Elk (unnumbered)
…..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 security areas to allow for seasonal movement of elk across their range and to retain elk on NFS lands at all times of the year. ….

RE-5S *(Standard)*- 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 recovery[176] 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.

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

RME-1S *(Standard)* - 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-3G *(Guideline)* - 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). …

6. Land management
The majority of potential wolverine habitat is in Management Areas 1A (Congressionally Designated Wilderness Areas) and 1B (Preliminary Administratively Recommended Wilderness Areas) where most management activities are considered unsuitable.

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

MA 1A Congressionally Designated Wilderness Areas -Desired Condition
Designated wilderness areas exhibit primitive qualities. … 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.

MA1A-17G *(Guideline)*- To maintain wilderness characteristics, all firelines should be restored by actions such as scattering slash piles along and onto firelines, knocking down or burning all slash piles greater than 18 inches tall, pulling back and covering all sod with slash, and placing boulders, logs, and slash on firelines to discourage use and camouflage entrance points. Additionally, all firelines within 100 feet of intercepting trails, roads, or stream crossings should be restored by cutting stumps flush and close to the ground (height of 4 to 5 inches), covering tops with a layer of soil (1 to 2 inches), and chopping and roughening the ends of logs and stumps.

MA1A –20G *(Guideline)* - Closed roads that were opened to provide access to wilderness areas should be closed after the use has concluded to maintain wilderness characteristics.

MA1A-21G *(Guideline)* - Wilderness trails used as firelines should be returned to original condition after the use has concluded in order to maintain wilderness characteristics.

MA 1B Preliminary Administratively Recommended 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.

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

FP 2.5 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…

…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.

FP 1.13 Desired Condition: Special Plant Habitats - Special plant habitats include mountain mahogany, aspen, cottonwood, sagebrush steppe, and whitebark pine. They provide high quality habitat for associated species. The distribution and abundance of structural stages and vegetation density classes within these special plant habitats are consistent with their natural range of variability and create conditions that are ecologically resilient, sustainable, and compatible with maintaining disturbance processes within the desired conditions. Variations in the mix of structural stages and vegetation density combinations across the landscape allow special plant habitats to respond to potential changes in climate.

FP 1.6 Desired Condition - Structural Stages – The distribution and abundance of forested structural stages creates conditions that are ecologically resilient, sustainable, and compatible with natural levels of disturbance.

FP 1.2 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.

FP 1.2 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.

RE-5S *(Standard)* - 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 recovery[177] 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.

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

RME-1S *(Standard)* - 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-3G *(Guideline)* - 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). …

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

Appendix F: List of Recovery or Conservation Strategies for Wolverine that are Addressed by the BMFP.

Wolverine – Blue Mountains Forest Plan Revision (11/21/2017 – B. Wales)
Plan components are numbered as shown in Appendix K – the Forest Plan; numbers within ( ) indicate numbers referenced in the Aug. version of the BA.

Factor A (per USFWS Species assessment: https://ecos.fws.gov/docs/candidate/assessments/2011/r6/A0FA_V01.pdf)

(1) Climate change,
(2) human use and disturbance,
(3) dispersed recreational activities,
(4) infrastructure development,
(5) transportation corridors, and
(6) land management.

1. Climate Change:
The primary threat to the DPS is from habitat and range loss due to climate warming .

FP 1.13 Desired Condition: Special Plant Habitats - Special plant habitats include mountain mahogany, aspen, cottonwood, sagebrush steppe, and whitebark pine. They provide high quality habitat for associated species. The distribution and abundance of structural stages and vegetation density classes within these special plant habitats are consistent with their natural range of variability and create conditions that are ecologically resilient, sustainable, and compatible with maintaining disturbance processes within the desired conditions. Variations in the mix of structural stages and vegetation density combinations across the landscape allow special plant habitats to respond to potential changes in climate.

FP 1.13.1 Desired Condition – Whitebark Pine (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.

FP 1.3 Desired Condition – Federally listed species (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., primary constituent elements and primary biological features) are protected and restored to achieve species recovery.

FP 1.3 Desired Condition – Federally listed Terrestrial species
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.

FP 1.2 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**.**

FP 1.2 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.

FP 1.2 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.

FP 1.2 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.

FP 1.2 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

RE-5S *(Standard)* - 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 recovery[178] of listed, and proposed, and candidate species

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

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.

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

2/3/4. Human use and disturbace/dispersed recreational activities/infrastructure development

May affect wolverines directly by eliminating habitats, or indirectly, by displacing wolverines from suitable habitats near developments. The latter effect tends to be most detrimental to sensitive wildlife, because the area of displacement may be much larger than the area of direct habitat loss.

The majority of potential wolverine habitat is in Management Areas 1A (Congressionally Designated Wilderness Areas) and 1B (Preliminary Administratively Recommended Wilderness Areas) where most management uses or activities are considered unsuitable.

2.4.1.2 MA 1A Congressionally Designated Wilderness Areas -Desired Condition
Designated wilderness areas exhibit primitive qualities. … 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.

MA1A-17G *(Guideline)* - To maintain wilderness characteristics, all firelines should be restored by actions such as scattering slash piles along and onto firelines, knocking down or burning all slash piles greater than 18 inches tall, pulling back and covering all sod with slash, and placing boulders, logs, and slash on firelines to discourage use and camouflage entrance points. Additionally, all firelines within 100 feet of intercepting trails, roads, or stream crossings should be restored by cutting stumps flush and close to the ground (height of 4 to 5 inches), covering

tops with a layer of soil (1 to 2 inches), and chopping and roughening the ends of logs and stumps.
MA1A –20G *(Guideline)* - Closed roads that were opened to provide access to wilderness areas should be closed after the use has concluded to maintain wilderness characteristics

MA1A-21G *(Guideline)* - Wilderness trails used as firelines should be returned to original condition after the use has concluded in order to maintain wilderness characteristics

MA 1B Preliminary Administratively Recommended 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.

FP 3.1 Desired Condition - Facilities and Infrastructure:
Administrative facilities are safe, efficient, cost-effective, and are maintained at a function and use level that meets management needs. Facilities meet all applicable health and safety standards. Impacts to natural resources are minimal. Administrative facilities complement and harmonize with natural settings. The form of structures is derived by the function and from the landscape setting. …

FP 1.2 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.

FP 1.2 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.

RE-5S *(Standard)*- 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 recovery[179] of listed, and proposed, and candidate species

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

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.

FLS-12S ***(FLS-14S)*** *(Standard)* – Recreation areas (e.g. ski areas) and other recreational action shall minimize adverse impact to whitebark pine and its habitat.

5. Transportation corridors

…may affect wolverines if located in wolverine habitat or between habitat patches. If located in wolverine habitat, transportation corridors result in direct loss of habitat and possibly displacement of wolverines for some distance. Direct mortality due to collisions with vehicles is also possible.

The majority of potential wolverine habitat is in Management Areas 1A (Congressionally Designated Wilderness Areas) and 1B (Preliminary Administratively Recommended Wilderness Areas) where most management activities, including motor vehicle use, are considered unsuitable.

Transportation corridors provide access to areas otherwise not affected by humans, which exacerbates the effects of human disturbance from a variety of activities. Outside of wolverine habitat, transportation corridors may affect wolverines if they present barriers to movement between habitat patches or result in direct mortality to dispersing wolverines. Because wolverines are capable of making long-distance movements between patches of suitable habitat, transportation corridors located many miles away from wolverine home ranges may affect their ability to disperse or recolonize vacant habitats after local extirpation events.

MA 1A Congressionally Designated Wilderness Areas -Desired Condition

Designated wilderness areas exhibit primitive qualities. … 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.

MA1A –20G *(Guideline)* - Closed roads that were opened to provide access to wilderness areas should be closed after the use has concluded to maintain wilderness characteristics

MA1A-21G *(Guideline)* - Wilderness trails used as firelines should be returned to original condition after the use has concluded in order to maintain wilderness characteristics

MA 1B Preliminary Administratively Recommended 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.

MA1B-2G *(Guideline)* – Mechanized (bicycle) use on existing trails and non-motorized travel may occur in recommended wilderness areas.

FP 2.5 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…
…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.

FP 1.2 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.

FP 1.2 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.

FP 2.3.1 - Desired Condition - Rocky Mountain Elk (unnumbered)
…..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 security areas to allow for seasonal movement of elk across their range and to retain elk on NFS lands at all times of the year. ….

RE-5S *(Standard)*- 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 recovery[180] 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.

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

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

RME-1S *(Standard)* - 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-3G *(Guideline)* - 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). …

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

6. Land Management

The majority of potential wolverine habitat is in Management Areas 1A (Congressionally Designated Wilderness Areas) and 1B (Preliminary Administratively Recommended Wilderness Areas) where most management activities are considered unsuitable.

MA 1A Congressionally Designated Wilderness Areas -Desired Condition
Designated wilderness areas exhibit primitive qualities. … 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.

MA1A-17G *(Guideline)*- To maintain wilderness characteristics, all firelines should be restored by actions such as scattering slash piles along and onto firelines, knocking down or burning all slash piles greater than 18 inches tall, pulling back and covering all sod with slash, and placing boulders, logs, and slash on firelines to discourage use and camouflage entrance points. Additionally, all firelines within 100 feet of intercepting trails, roads, or stream crossings should be restored by cutting stumps flush and close to the ground (height of 4 to 5 inches), covering tops with a layer of soil (1 to 2 inches), and chopping and roughening the ends of logs and stumps.

MA1A –20G *(Guideline)* - Closed roads that were opened to provide access to wilderness areas should be closed after the use has concluded to maintain wilderness characteristics

MA1A-21G *(Guideline)* - Wilderness trails used as firelines should be returned to original condition after the use has concluded in order to maintain wilderness characteristics

MA 1B Preliminary Administratively Recommended 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.

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

FP 2.5 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…

…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.

FP 1.13 Desired Condition: Special Plant Habitats - Special plant habitats include mountain mahogany, aspen, cottonwood, sagebrush steppe, and whitebark pine. They provide high quality habitat for associated species. The distribution and abundance of structural stages and vegetation density classes within these special plant habitats are consistent with their natural range of variability and create conditions that are ecologically resilient, sustainable, and compatible with maintaining disturbance processes within the desired conditions. Variations in the mix of structural stages and vegetation density combinations across the landscape allow special plant habitats to respond to potential changes in climate.

FP 1.6 Desired Condition - Structural Stages – The distribution and abundance of forested structural stages creates conditions that are ecologically resilient, sustainable, and compatible with natural levels of disturbance.

FP 1.2 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.

FP 1.2 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.

RE-5S *(Standard)* - 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 recovery[181] 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.

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

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

RME-1S *(Standard)* - 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-3G *(Guideline)* - 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). …

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

Appendix G: List of Recovery or Conservation Strategies for Whitebark Pine that are Addressed by the BMFP.

Whitebark Pine – Blue Mountains Forest Plan Revision (11/21/2017 B. Wales)
List of recovery or conservation strategies for Whitebark Pine that are addressed by the Blue Mountains National Forest Revised Land Management Plan

Recommended Recovery or Conservation Strategies for Whitebark Pine that can be addressed by the Blue Mountains Forest Plan
Source: USDA Forest Service. 2008. Whitebark Pine Restoration Strategy for the Pacific Northwest Region 2009-2013. Portland, OR.

Goal - Restore and conserve a network of viable populations of whitebark pine and associated species across the Pacific Northwest.

FP 1.3 Desired Condition – Federally listed species (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., primary constituent elements and primary biological features) are protected and restored to achieve species recovery.

FP 1.3 Desired Condition –Federally listed 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.

FP 1.2 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.

FP 1.2 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.

FP 1.2 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

FP 1.13 Desired Condition: Special Plant Habitats

Special plant habitats include mountain mahogany, aspen, cottonwood, sagebrush steppe, and whitebark pine. They provide high quality habitat for associated species. The distribution and abundance of structural stages and vegetation density classes within these special plant habitats are consistent with their natural range of variability and create conditions that are ecologically resilient, sustainable, and compatible with maintaining disturbance processes within the desired conditions. Variations in the mix of structural stages and vegetation density combinations across the landscape allow special plant habitats to respond to potential changes in climate.

FP 1.13.1 Desired Condition – Whitebark Pine (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

2. 4.1.2 MA 1A Congressionally Designated Wilderness Areas -Desired Condition

Designated wilderness areas exhibit primitive qualities. … 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.

2.4.2.2 MA 1B Preliminary Administratively Recommended 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.

FLS-12S *(FLS14S) (Standard)*– Recreation areas (e.g. ski areas) and other recreational action shall minimize adverse impact to whitebark pine and its habitat.

<u>The Four Threats to Whitebark Pine</u>

1. White pine blister rust: Since its introduction, the pathogen has caused unprecedented decline and mortality of susceptible hosts in Oregon and Washington as well as other parts of the West.

3. Mountain pine beetle: Between 2005 and 2007 an estimated 600,000 whitebark pines were killed by mountain pine beetles in Washington and Oregon.

FP 1.4.2 Desired Condition: Insects and Disease -

Characteristic levels of insect and disease activity contribute to diverse landscape conditions and provide important wildlife habitat components, such as hollow trees, dead wood, and mistletoe brooms. The desired conditions for vegetation structure, stand density, and species composition (displayed in Sections 1.6, 1.7, and 1.8) create stand conditions with low to moderate vulnerability to insects and diseases across the majority of the upland forest potential vegetation groups. These stand conditions result in ecologically resilient forests with composition, structure, and density characteristics that are fully compatible with periodic disturbance occurring at characteristic levels of severity, intensity, size, and spatial distribution.

FP 1.5 Desired Condition - Invasive Species:

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 significantly diminish the ability of the Forests to provide the goods and services communities expect or the habitat that plant and animal community diversity depends upon. New invasive species resulting from changes in plant and animal habitats due to changes in climate occur only at low levels.

FP 1.13.1 Desired Condition – Whitebark Pine (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.

IS-2S – (Standard) An integrated pest management (IPM) approach, including Early Detection and Rapid Response, shall be used to manage pests, such insects, diseases, and invasive or unwanted plants and animals.

IS-3G (Guideline)– Determine appropriate range of treatments necessary to meet objectives for invasive species and native pests, while minimizing adverse effects of treatments. All methods including prevention, manual, cultural, mechanical, regionally approved chemicals and biological agents may be considered within all management areas.

IS–4G (Guideline)– All activities should be planned and conducted to minimize or prevent the potential spread of establishment of invasive species.

3. Fire: Large high-severity fires have the potential to severely reduce or even eliminate cone-bearing whitebark pine across an extensive landscape.

FP 1.4.1 Wildland (Unplanned) Fire - Desired Condition:
Fire adapted and fire resilient landscapes are restored and maintained. Wildland fire (planned and unplanned ignitions) plays a characteristic ecological role in creating forest and rangeland conditions that are resilient to disturbances and climate changes. Table 7 displays the Natural Fire Regimes and their associated desired condition ranges for fire severity and frequency by potential vegetation group. Wildland fire may be suitable on all acres, depending on expected fire effects and resource objectives…

FLS-8G (*FLS-8G) (Guideline)*- 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.

DP – 2G *(Guideline)*- Manage unplanned ignitions as appropriate to achieve desired conditions.
FM-8G *(Guideline)* (in MA 4B) - Minimum impact suppression tactics (MIST) should be utilized in sensitive areas, such as designated wilderness areas, designated wild and scenic river corridors, research natural areas, botanical areas, riparian management areas, cultural and historic sites, developed recreation areas, special use permit areas that have structures, and historic and recreational trails. MIST techniques should also be used for post fire restoration activities.

FM-6G *(Guideline)* (in MA 4B) – 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.

OF-1G *(Guideline)* – Management activities should retain and generally emphasize recruitment of old trees, large trees and legacy trees. Exceptions where individual old, large, or legacy trees may be removed or destroyed include situations where:

- 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.

4. Global 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.

FP 1.3 Desired Condition – Federally listed species (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., primary constituent elements and primary biological features) are protected and restored to achieve species recovery.

FP 1.3 Desired Condition –Federally listed 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.

FP 1.2 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.

FP 1.2 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.

FP 1.2 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

FP 1.13 Desired Condition: Special Plant Habitats
Special plant habitats include mountain mahogany, aspen, cottonwood, sagebrush steppe, and whitebark pine. They provide high quality habitat for associated species. The distribution and abundance of structural stages and vegetation density classes within these special plant habitats are consistent with their natural range of variability and create conditions that are ecologically resilient, sustainable, and compatible with maintaining disturbance processes within the desired conditions. Variations in the mix of structural stages and vegetation density combinations across the landscape allow special plant habitats to respond to potential changes in climate.

FP 1.13.1 Desired Condition – Whitebark Pine (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

FP 1.4.1 Desired Condition Wildland (Unplanned) Fire
Fire adapted and fire resilient landscapes are restored and maintained. Wildland fire (planned and unplanned ignitions) plays a characteristic ecological role in creating forest and rangeland conditions that are resilient to disturbances and climate changes. Table 7 displays the Natural Fire Regimes and their associated desired condition ranges for fire severity and frequency by potential vegetation group. Wildland fire may be suitable on all acres, depending on expected fire effects and resource objective

FP 1.4.2 Desired Condition: Insects and Disease
Characteristic levels of insect and disease activity contribute to diverse landscape conditions and provide important wildlife habitat components, such as hollow trees, dead wood, and mistletoe brooms. The desired conditions for vegetation structure, stand density, and species composition (displayed in Sections 1.6, 1.7, and 1.8) create stand conditions with low to moderate vulnerability to insects and diseases across the majority of the upland forest potential vegetation groups. These stand conditions result in ecologically resilient forests with composition, structure, and density characteristics that are fully compatible with periodic disturbance occurring at characteristic levels of severity, intensity, size, and spatial distribution.

FP 1.5 Desired Condition - Invasive Species
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 significantly diminish the ability of the Forests to provide the goods and services communities expect or the habitat that plant and animal community diversity depends upon. New invasive species resulting from changes in plant and animal habitats due to changes in climate occur only at low levels.

FP 1.6 Desired Condition: Structural Stages – The distribution and abundance of forested structural stages creates conditions that are ecologically resilient, sustainable, and compatible with natural levels of disturbance.

RE-5S ***(****Standard)*- 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 recovery[182] 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.

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