United States Department of Agriculture

Government Camp – Cooper Spur Land Exchange

Draft Environmental Impact Statement

Forest Service Mt. Hood National Forest Zigzag and Hood River Ranger Districts

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Government Camp – Cooper Spur Land Exchange
Draft Environmental Impact Statement
Clackamas and Hood River Counties, Oregon

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Abstract: The Forest Service is preparing an Environmental Impact Statement (EIS) to evaluate the environmental effects of exchanging approximately 109 acres of National Forest System (NFS) lands on the Zigzag Ranger District within the Mt. Hood National Forest for approximately 769 acres of private lands in Hood River County (Land Exchange), pursuant to congressional direction and subject to several legislative conditions, and consistent with its other legal duties and responsibilities. Among other things, the current legislative conditions prescribe the reservation of a wetland conservation and trail easements on the Federal parcels to be exchanged.

The overall purpose of the proposed action is to comply with congressional direction and conditions prescribed in Section 1206(a) and related provisions of the Omnibus Public Land Management Act of March 30, 2009 (Act) (123 Stat. 991, P.L. 111-11). The Act also sets forth two related actions that are triggered into effect upon completion of the Land Exchange, namely the creation of a Crystal Springs Watershed Special Resources Management Unit (approximately 2,859 acres) on the non-Federal parcels, as well as existing NFS lands, and a change in designation of approximately 1,709 acres of NFS lands to wilderness, the effects of both of which are encompassed within the scope of this EIS as connected actions. The analysis in the EIS also accounts for potential revisions to the legislative direction applicable to the Land Exchange contained in the proposed Mount Hood Cooper Spur Land Exchange Clarification Act (H.R. 3826 and Sec. 10006 of S. 2012), which, as of the date of publication of this document, has not been enacted. As such, there is an underlying need to exchange lands between the Mt. Hood National Forest and Mt. Hood Meadows Oregon, LLC, consistent with specific congressional direction and the agency's other legal duties and responsibilities, and subject to particular conditions to the implementation and execution of the Land Exchange, whatever their final form may ultimately be.

This EIS describes the proposed action, a no-action alternative, and two additional alternatives that were considered but not developed or analyzed in detail. While no significant issues that drive alternatives were identified, the EIS discloses the potential effects of achieving the purpose and need objectives on the following resources or in the following categories of effects: forest-type composition; heritage resources; tribal treaty rights; hydrology; wetlands; water rights; soil

productivity; threatened, endangered, and sensitive (TES) species (aquatics, wildlife, and plants); non-native invasive species; recreation; visuals; facilities; and socio-economics.

It is important that reviewers provide their comments at designated time periods and in a way that is useful to the Agency's preparation of the EIS. Therefore, comments need to be provided prior to the close of the comment period and specific written comments should be within the scope of the proposed action, have a direct relationship to the proposed action, and must include supporting reasons for the Responsible Official to consider (36 CFR 218.2). The submission of timely and specific comments can affect whether and the extent to which a reviewer is able to participate in subsequent administrative review or judicial review of the proposed action if and when it is adopted. Comments received in response to this solicitation, including names and addresses of those who comment, will be part of the public record and may be released per request made under the Freedom of Information Act. Comments submitted anonymously will be accepted and considered; however, anonymous comments will not provide the respondent with standing to participate in subsequent administrative or judicial reviews.

Send comments electronically to:	**comments-pacificnorthwest-mthood@fs.fed.us**
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Summary

Pursuant to congressional direction and subject to certain legislative conditions, the Mt. Hood National Forest is proceeding to implement, insofar as it is within its control and authority, the conveyance of approximately 109[1] acres of National Forest System (NFS) lands on the Zigzag Ranger District in exchange for approximately 769 acres of private lands in Hood River County. Among other things, the current legislative conditions attached to the Land Exchange prescribe the reservation of a wetland conservation and trail easements on the Federal parcels to be exchanged. The Act also sets forth two related actions that are triggered into effect upon completion of the Land Exchange, namely the creation of the Crystal Springs Watershed Special Resources Management Unit (approximately 2,859 acres) and a change in designation of approximately 1,709 acres of NFS lands to wilderness, the effects of both of which are encompassed within the scope of this EIS as connected actions.

The two NFS parcels to be exchanged are timbered, mostly undeveloped, and are physically separated by 40 acres that are already in private ownership. The NFS parcels are located on the gentle southwest facing slope of Mt. Hood at the north end of the village of Government Camp in Clackamas County. Elevations range from about 3,760 to 4,120 feet. The Federal parcels have been withdrawn from mineral entry through the Bureau of Land Management's segregation process.

The non-Federal lands that need to be offered in a formal, legally binding manner under the Act in order for the Forest Service to convey the NFS lands described above include approximately 251 acres located within, and 514 acres located outside, of the current NFS administrative boundary in Hood River County. The non-Federal estate is comprised of three diverse property types situated in the vicinity of the Cooper Spur Ski Area on the northeast flank of Mt. Hood. The three types are: the structures and personal property at the Cooper Ski Area; land and all development at the Cooper Spur Mountain Resort; and mostly vacant forest land.

As referenced above, the Forest Service is moving forward with this proposed action to comply with the congressional direction and conditions prescribed in the Omnibus Public Land Management Act of March 30, 2009 (123 Stat. 991, P.L. 111-11), as potentially modified by the proposed Mount Hood Cooper Spur Land Exchange Clarification Act[2]. As such, there is an underlying need to exchange lands between the Mt. Hood National Forest and Mt. Hood Meadows Oregon, LLC, consistent with specific congressional direction and the agency's other legal duties and responsibilities, and subject to particular conditions to the implementation and execution of the Land Exchange, whatever their final form may eventually take.

In order to comply with congressional direction, the proposed action also includes a programmatic amendment to the *Mt. Hood National Forest Land and Resource Management Plan* (1990) in order to assign management direction to the land the Forest Service would acquire pursuant to a finally executed Land Exchange; change the land allocations for the wilderness designation; and create the Crystal Springs Watershed Special Resources Management Unit.

The general public was first notified of the proposal in 2010. Notices of Intent to develop an Environmental Impact Statement were published in the Federal Register in October 2010, and again in

[1] For consistency in the analysis, the numbers used throughout this EIS were generated using spatial data (i.e., Geographical Information Systems). The land description verification (LDV) forms, which were calculated using legal descriptions, are approximately 108 acres for the Government Camp parcels and 764 for the Cooper Spur parcels. Please note that all final acre values will be determined by a licensed surveyor at a future date.

[2] Although the proposed Clarification Act has passed both the U.S. Senate and House of Representatives in separate forms, as of the date of publication of this EIS, it has not been enacted into law, and thus, whether the Forest Service ends up following the proposed legislative amendments it contains depends upon whether and when it ultimately may be.

February 2016. Through the feedback the Forest Service has received during the scoping process, it has determined that the public is primarily interested in the following issues related to the proposed action: the land equalization process; the type of public interest analysis and determination in which the Forest Service intends to engage given that the Land Exchange is congressionally prescribed; future use of the trails within the lands to be conveyed; development of the Crystal Springs Watershed Special Resources Management Unit; addition to the Mt. Hood Wilderness; the ability of the Forest Service to care for the facilities currently on the non-Federal lands that would be acquired; the tram corridor between Timberline and Government Camp; and effects on wildlife, wetlands, treaty rights, cultural resources, and recreation.

No significant issues were identified during review of the scoping process that led the agency to conclude that it needed to develop and analyze in detail wholly separate alternatives to the proposed action, especially in light of the fact that the proposed action is congressionally prescribed in considerable detail. However, the EIS does address and analyze different variations of the proposed action. In addition, the Forest Service considered two alternatives but determined that neither warranted evaluation in detail. They include:

Direct Purchase: Internal administrative guidance calls for the Forest Service to consider a direct-purchase alternative pursuant to Forest Service Handbook 5409.13, Sec. 33.41a, which states, “Land exchange evaluations shall consider a purchase alternative in the National Environmental Policy Act (NEPA) analysis and document the non-Federal party’s position on the United States’ direct purchase of the proposed exchange parcels documented in the administrative record.” Under this alternative, no lands would be exchanged; rather 769 acres of non-Federal land would be purchased from the non-Federal party by the United States. The non-Federal lands included in the proposed action subject to analysis in this EIS, however, cannot be acquired through direct purchase because the landowner is not a willing seller; funds are not available for purchase; and exchange is the prescribed mode of acquisition in the Act.

Deed Restrictions: Consideration of a deed restriction alternative is also ordinarily to be undertaken pursuant to guidance in Forest Service Handbook 5409.13, Sec. 33.41a. The purpose of a deed restriction is to limit use or development of the Federal lands after conveyance as a means of addressing an environmental concern. Deed restrictions controlling future use and development of Federal lands conveyed into non-Federal ownership should be used only when required by law, regulation, or executive order, or when the intended use of the conveyed Federal land would substantially conflict with established management objectives on adjacent Federal lands (FSH 5409.13, Sec. 33.41c). The applicable congressional direction pursuant to which the Forest Service is evaluating the proposed action already includes provisions regarding the reservation of conservation and trail easements, and thus, appropriate restrictions to address environmental and recreational concerns are already included in the proposed action as it has been defined and prescribed by the Congress.

As referenced above, because the Forest Service is proceeding with the proposed action in response to congressional direction, it necessarily is substantially informed and constrained by applicable legislation, in particular the Act prescribing that the agency pursue the Land Exchange and setting forth the parameters within which it is to be carried out and certain preconditions that must be satisfied in so doing. Thus, the Responsible Official will decide whether all of the congressionally imposed conditions in the Act have been satisfied, whether to require any further terms and conditions under the authority of the Act, and whether the proposed action is consistent with all of the other legal duties and management direction that apply to it. In this light, if the Responsible Official finds that all of the congressionally-mandated and any other requisite conditions that she believes are necessary have been satisfied, and that it is consistent with its other legal duties and responsibilities as well, the Forest Service will execute the Land Exchange.

Additionally, the Responsible Official will decide whether or not to amend the Forest Plan as described in the proposed action, or make adjustments based on input that emerges as a result of public comment.

Document Organization

In compliance with the National Environmental Policy Act (NEPA), this environmental impact statement addresses the direct, indirect, and cumulative environmental impacts that may result from implementation of the proposed action under several variations and a no-action alternative.

The information contained in this document will allow the Forest Supervisor to make an informed decision about how best to meet the stated purpose of and need for action. The decision will be documented in a record of decision when the environmental review process is completed.

Chapter 1: This chapter provides an overview of the legal and administrative parameters applicable to the proposed action, and the analysis of effects contained in this EIS, including the purpose of and need for the action on which the analysis focuses. It also documents the public-involvement process the Forest has used to assist it in identifying issues, concerns, and opportunities associated with the proposed action.

Chapter 2: This chapter describes the alternatives considered for meeting the project purpose and need. It includes a description of alternatives considered but not evaluated in detail, and a comparison of alternatives to aid in decision-making.

Chapter 3: This chapter describes the environmental effects of implementing the proposed action and other alternatives. The no action alternative provides a baseline for evaluation and comparison of the other alternatives that follow.

Chapter 4: This chapter provides a list of persons and agencies contacted during the development of this environmental impact statement. Resources are also included in this chapter.

Chapter 5: References

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record that is located at the Forest Supervisor’s Office in Sandy, Oregon.

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Chapter 1 – Purpose of, Need for, and Decision-making Framework underlying Proposed Action

Introduction

The Forest Service has prepared this environmental impact statement in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This environmental impact statement discloses the direct and indirect environmental impacts that would result from different variations of the proposed action and a no-action alternative, as well as the cumulative impacts resulting from those of the Proposed Action when added to any with which they would combine that arise from other past, present, and reasonably foreseeable future actions. The analysis in this EIS also tiers to the 1990 Final Impact Statement for the *Mt. Hood National Forest Land and Resource Management Plan*.

Additional documentation, including more detailed analyses of project area resources, may be found in the project planning record located at the Mt. Hood National Forest Supervisor's Office in Sandy, Oregon.

Background

In 2005, the Board of Commissioners of Hood River County; the Hood River Valley Residents Committee; Mt. Hood Meadows Oregon Limited Partnership, Mt. Hood Meadows Development Corp., Meadows North, LLC, Meadows Utilities, LLC, and North Face Inn (collectively "Mt. Hood Meadows") signed an agreement wherein they would propose a land exchange to the Forest Service. The exchange would consist of the conveyance of 120 acres of land near Government Camp from the Forest Service to Mt. Hood Meadows, and the Forest Service's acquisition of 770 acres of privately owned land in the vicinity of Cooper Spur. The parties to the agreement stated that they hoped this proposal would resolve public concern about development and water quality on the north side of Mt. Hood. The agreement also included a proposal to designate land near the Cooper Spur and Tilly Jane area as wilderness, to place protections on Forest Service land in the Crystal Springs Watershed, and to convey all private interests in the Cooper Spur Ski Area to the Forest Service.

The Congress eventually directed the Forest Service to pursue effectuation of a Land Exchange, certain to certain explicit conditions and criteria, in the Omnibus Public Land Management Act of March 30, 2009 (123 Stat. 991, P.L. 111-11). The Omnibus Act prescribes the land exchange so long as the Forest ensures a series of conditions and legal requirements are satisfied prior to its execution. More specifically, the Omnibus Act directs the Forest Service to convey National Forest System (NFS) lands in Government Camp to Mt. Hood Meadows, if Mt. Hood Meadows offers to convey to the United States certain specified private lands at Cooper Spur, and any buildings, furniture, fixtures, and equipment at the Cooper Spur Mountain Resort and the Cooper Spur Ski Area (Section 1206(a)), subject to several mandatory conditions and compliance with all of the agency's legal obligations applicable to implementing such an exchange. For example, the Omnibus Act requires that the exchange be carried out subject to Section 206 of the Federal Land Policy and Management Act (FLPMA), except as otherwise provided in the Omnibus Act; the Forest Service discusses its interpretation of these and related provisions of these applicable statutory provisions it has been tasked with following below, the upshot of which is that, even though the Congress has provided a considerable amount of detail concerning the process and

substance of the Land Exchange, the agency nevertheless retains a reasonable level of discretion on the crafting of ultimate details regarding its implementation, including with respect to the final mix of lands to be exchanged, depending in part on the outcome of the appraisal being conducted in support of the exchange.

The Federal lands to be conveyed as part of the proposed action are located on the Zigzag Ranger District, and the private lands to be acquired are in Hood River County. The Federal land proposed for conveyance is located to the north of Government Camp Loop Road in Government Camp, Oregon, in T3S, R8E, Sections 13 and 24, and T3S, R8.5E, Section 14 in Clackamas County. The land owned by Mt. Hood Meadows that is proposed for acquisition is located approximately one-half mile to the west of Highway 35 in the vicinity of Cooper Spur Ski Area in T2S, R10E, Sections 6 and 7, T1S, R10E, Sections 30 and 31, and T1S, R9E, Section 36 in Hood River County. Maps of the proposed land exchange are found in figure 1, figure 2, and figure 3. Also, a list of specific parcels is displayed in table 1, as well as depicted in figure 4 and figure 5.

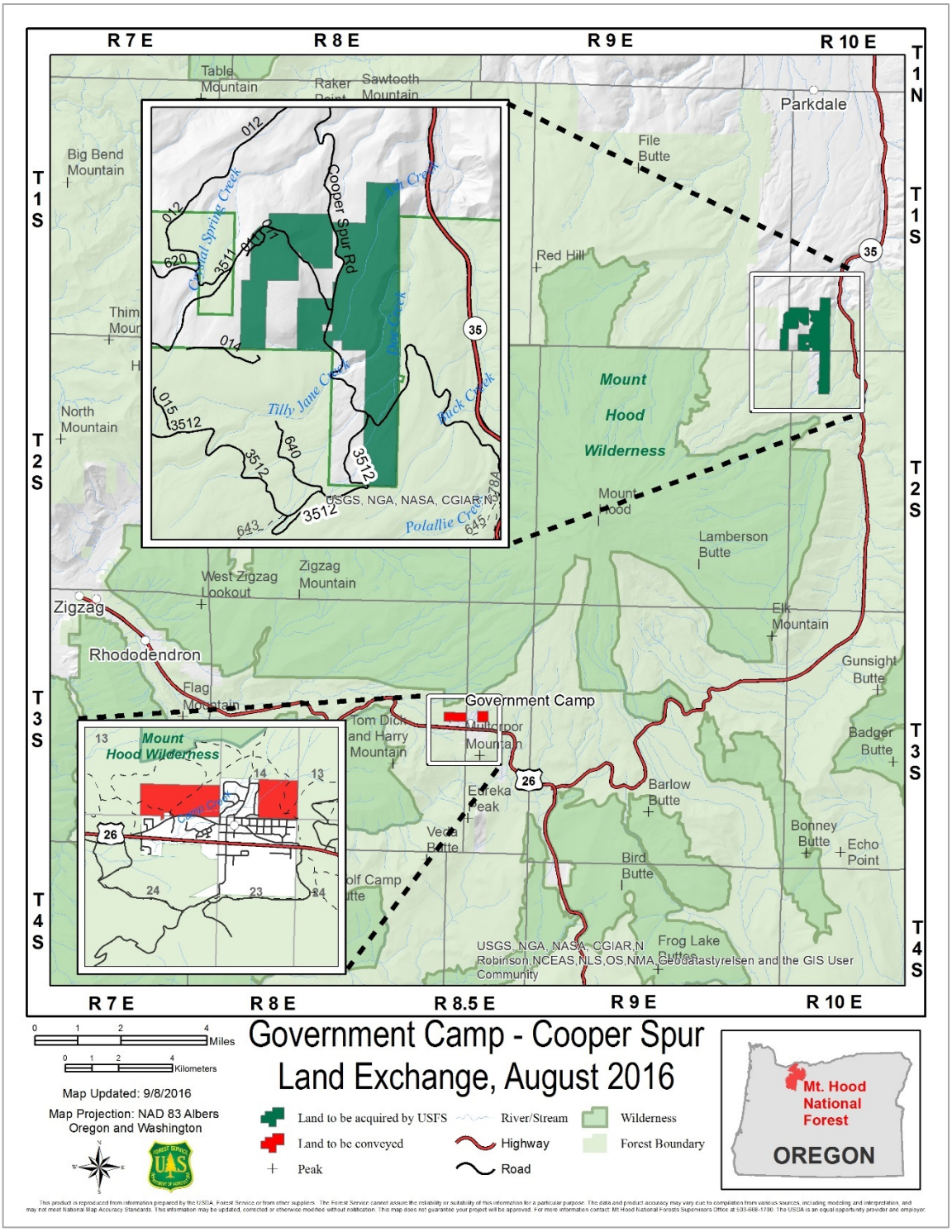

Figure 1. Overview map of the Government Camp – Cooper Spur Land Exchange

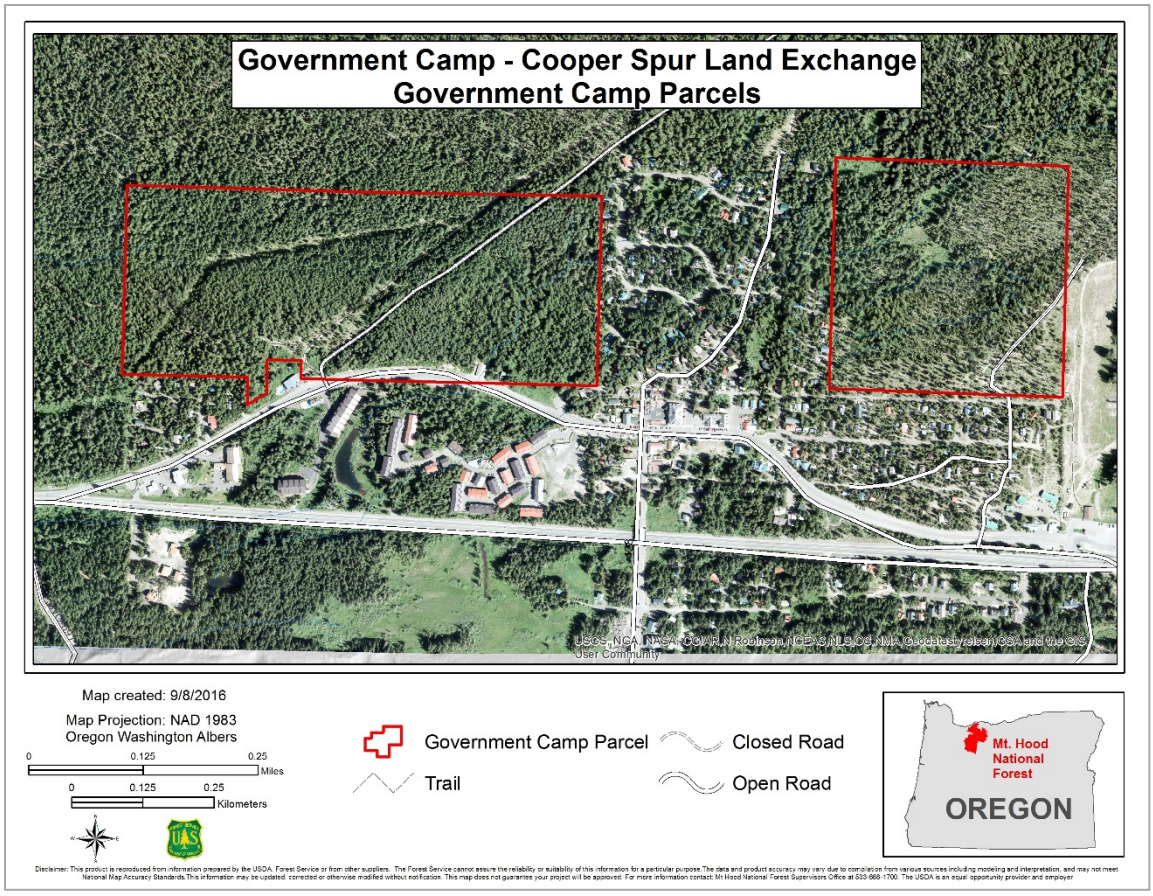

Figure 2. Government Camp parcels

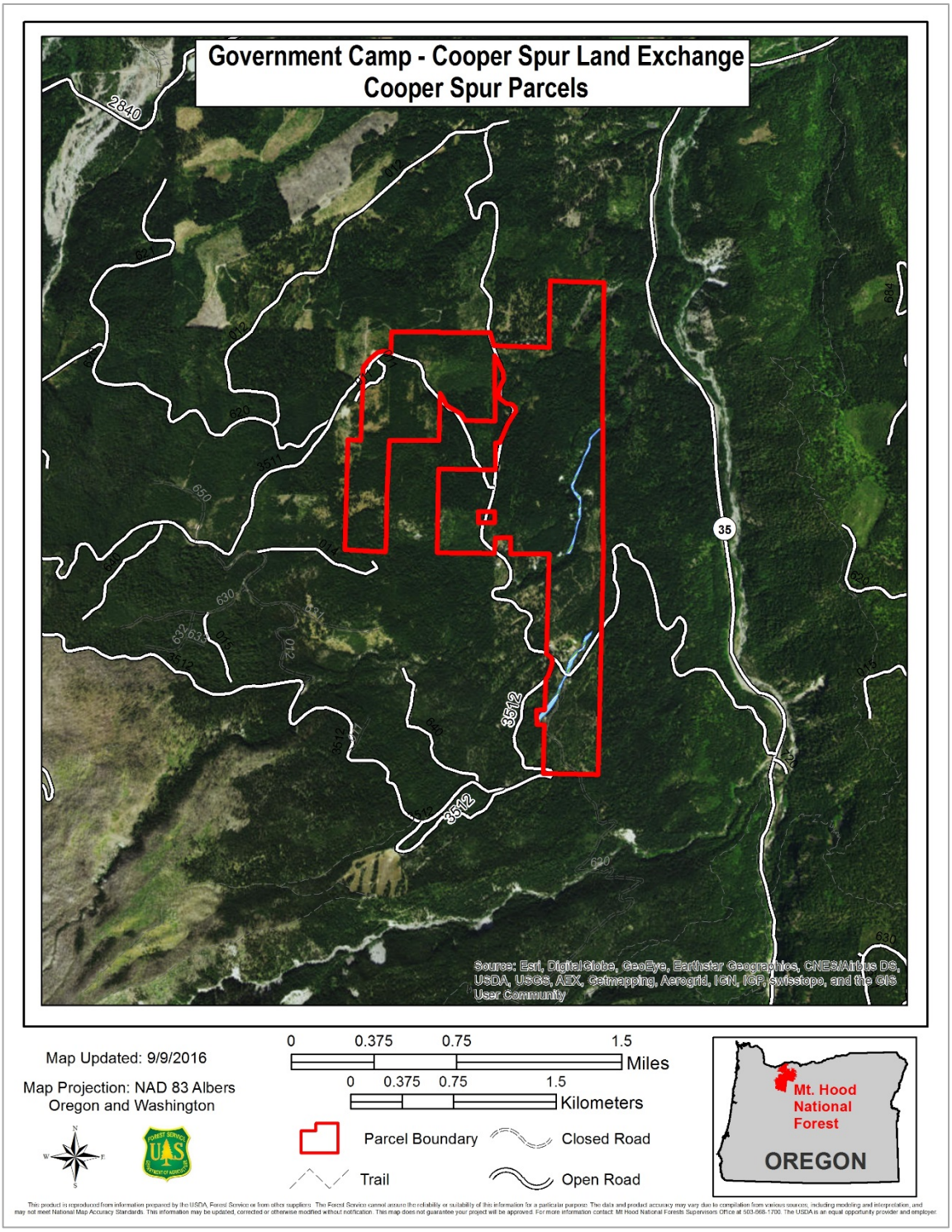

Figure 3. Cooper Spur parcels

Table 1. Parcel name, county tax lot number, acres and legal descriptions of Federal and non-Federal parcels considered in the Government Camp – Cooper Spur Land Exchange. All areas and distances are approximate.

Parcel Name	County Tax Lot Number	Acres	Legal Description
West Parcel (P-1) Federal Land	38E00130	67	GLO 7 & 8-13-3S8E
South Loop Road Parcel (P-2) Federal Land	38E24AB00200	0.5	Pt. Sec. 24-3S8E
East Parcel (P-3) Federal Land	38Q 00130	41	SE ¼ SE ¼ - Sec. 14-3S8 ½ E
Tract 1* Non-Federal Land	01S09E00104	91	Pt. Sec. 36-1S9E
Tracts 2 & 3* Non-Federal Land	01S10E3100501 01S10E3100100	474	Pt. Sec. 31-1S10E
Tracts 4 & 6* Non-Federal Land	02S10E0600102	116	Pt. Sec. 6 & 7-2S10E
Tract 5 Non-Federal Land	02S10E0600103	3	Pt. Sec. 6-2S10E
Track 7 Non-Federal Land	02S10E0600100	39	Pt. Sec. 6-2S10E
Track 8 Non-Federal Land	01S10E3001500	38	Pt. Sec. 30-1S10E

*Tract 1 + Tax Lot 01S10E3100501 = 1 Legal Tax Lot.
*Tracts 2 + 3 = 1 Legal Tax Lot.
*Tracts 4 + 6 = 1 Legal Tax Lot.

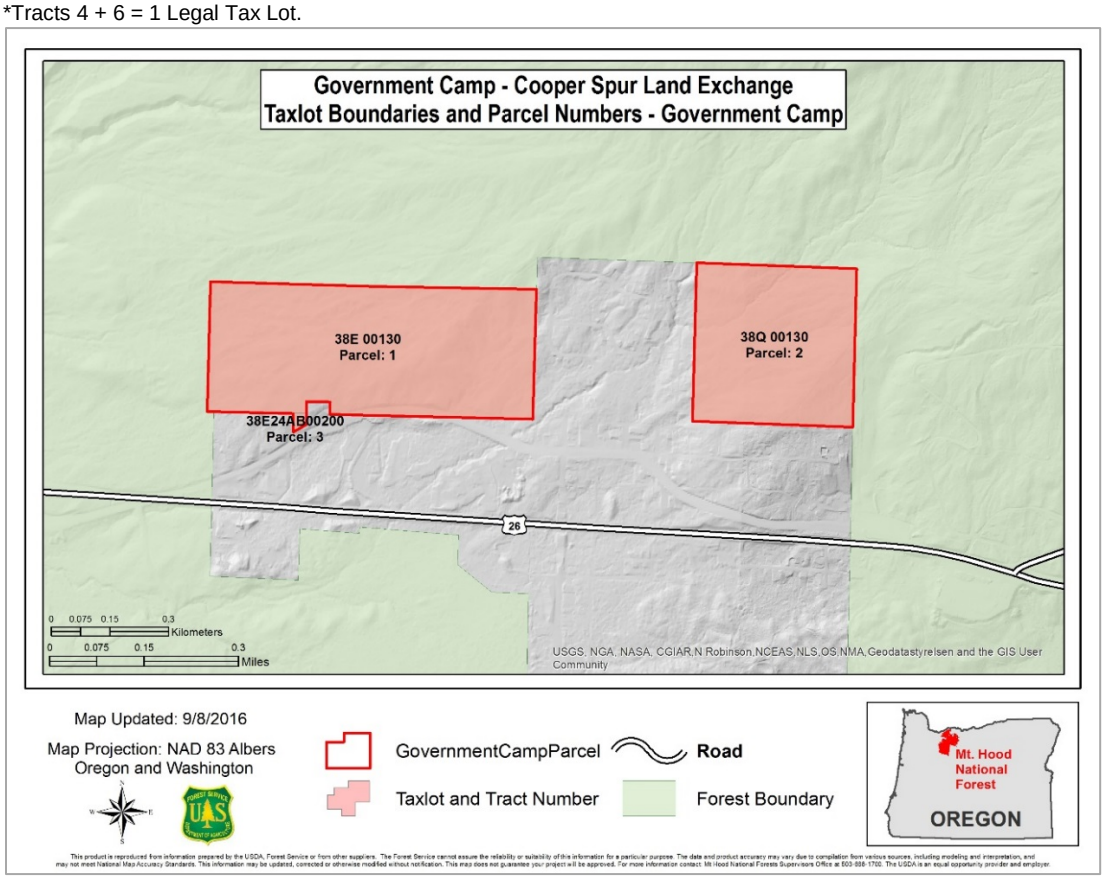

Figure 4. Government Camp tax lots

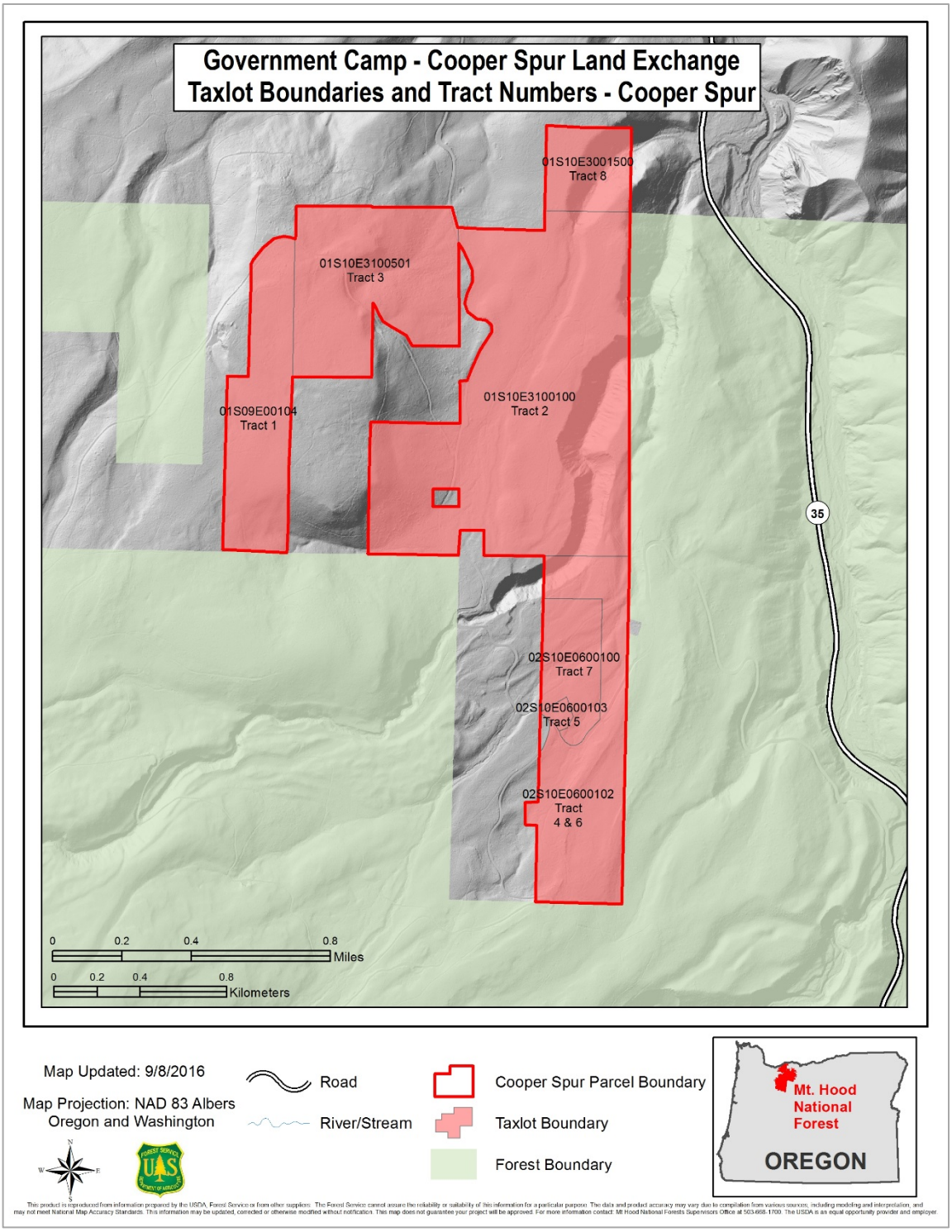

Figure 5. Cooper Spur tax lots

Purpose of and Need for Action

The overall purpose of this project is to comply with the congressional direction and conditions in the Omnibus Public Land Management Act of March 30, 2009 (123 Stat. 991, P.L. 111-11) and any potential amendments that may eventually be enacted to that Act. As such, there is an underlying need to move forward with the exchange of lands between the Mt. Hood National Forest and Mt. Hood Meadows Oregon, LLC, consistent with specific congressional direction and the agency's other legal duties and responsibilities, and subject to particular conditions to the implementation and execution of the Land Exchange, whatever their final form may ultimately take.

In addition to the need to convey NFS lands in exchange for private lands, there is also the need to account for the direction in the Omnibus Act that triggers the congressional designation of approximately 1,709 acres of existing NFS lands to wilderness upon completion of the exchange. Further, the Omnibus Act directs that, upon completion of the exchange, the Crystal Springs Watershed Special Resources Management Unit would be created, which encompasses existing NFS lands as well as the acquired lands totaling approximately 2,859 acres.

The *Mt. Hood National Forest Land and Resource Management Plan* (Forest Plan) (1990), as amended, guides all natural resource management activities and establishes management standards and guidelines for the Forest. It describes resource management practices, levels of resource protection and management, and the availability and suitability of lands for resource management. The Forest Plan also includes goals, objectives and desired future conditions for each of the management areas on the Forest. Also, the Forest Plan sets forth priorities for the disposal and acquisition of NFS lands within the Forest, and in so doing places an emphasis on optimizing land ownership patterns. The Forest Plan does not specifically address the non-Federal acres to be acquired, but typically, per Forest Service regulations, acquired lands take on the land use allocation (LUA) of the NFS lands adjacent to them. As stated in 36 CFR 254.3(f), "Lands acquired by exchange that are located within areas having an administrative designation established through the land management planning process shall automatically become part of the area within which they are located, without further action by the Forest Service."

In this case, the adjacent lands are B2-Scenic Viewshed. The goal for these lands is to provide attractive, visually appealing forest scenery with a wide variety of natural appearing landscape features; and, to utilize vegetation management activities to create and maintain a long term desired landscape character (Forest Plan, page 4-218). The type of management prescribed by Congress in the Omnibus Act, however, is different from the management direction associated with B2 lands. As such, there is a need to programmatically amend the Forest Plan in order to assign LUAs and standards and guidelines (i.e., "management direction") to the newly acquired land, which would become designated as the Crystal Springs Watershed Special Resources Management Unit upon completion of the Land Exchange. There is also a need to amend the Forest Plan in order to change the *existing* management direction for the NFS lands (approximately 2,090 acres) that would become part of the Management Unit. Similarly, the management direction for NFS lands that would be part of the wilderness addition (approximately 1,709 acres) would need to reflect this change in designation.

Further, there is a need to evaluate the existing special use permit at the Cooper Spur Ski Area[3] to address the conversion of approximately 1,012 acres within the existing permit area to

[3] The underlying land at the Cooper Spur Ski Area is federally owned and administered; and is currently operated by Mt. Hood Meadows under a special use permit. In this exchange, the Agency would acquire the infrastructure and

wilderness that are currently designated A11-Winter Recreation Area. The newly acquired Cooper Spur Mountain Resort also needs to be evaluated for the potential development and issuance of a new special use permit.

Proposed Action

In order to comply with the congressional direction related to the Land Exchange, the proposed action includes the conveyance of two parcels totaling approximately 109[4] acres of NFS lands in Clackamas County in exchange for the acquisition of approximately 769 acres of land owned by Mt. Hood Meadows Oregon, LLC, in Hood River County.

The proposed action that was shared with the public in February of 2016 has been further developed to address the potential effects of possible legislative changes outlined in the proposed Mount Hood Cooper Spur Land Exchange Clarification Act, which has passed both the U.S. Senate and House of Representatives in separate forms during the current, 114th Congress (see S. 2069 and H.R. 3826), but has not been enacted into law. The potential modifications most applicable to this analysis involve the direction requiring the Forest Service to reserve wetland conservation and trail easements on the NFS lands to be exchanged. More specifically, the bill would change the requirement for the Forest Service to reserve a wetland conservation easement to an optional condition that may or may not be applied as part of the Land Exchange, per the following language in the proposed Clarification Act: “The Secretary and Mt. Hood Meadows may mutually agree for the Secretary to reserve a conservation easement to protect the identified wetland in accordance with applicable law, subject to the requirements that the conservation easement shall be consistent with the terms of the September 30, 2015 mediation between the Secretary and Mt. Hood Meadows.” Further, the trail easement that was for exclusive use and would be 32 feet in width, as outlined in the Omnibus Act, would change to nonexclusive use and have a narrower width of 24 feet were the Clarification Act to pass in its current form.

The proposed action that was previously shared with the public has also been updated to address comments received from the public and interdisciplinary team regarding the designation of the Crystal Springs Watershed Special Resources Management Unit. The description of the Forest Plan amendment for the creation of the Crystal Springs Watershed Special Resources Management Unit has been more clearly developed. The proposed action is summarized below, however, more specific details describing the proposed action are provided in Chapter 2-Alternatives.

Legal, Regulatory, and Administrative Framework

Management Direction

Mt. Hood Land and Resource Management Plan (Forest Plan)

This EIS is tiered to the Final Environmental Impact Statement (FEIS) for the *Mt. Hood National Forest Land and Resource Management Plan* (hereafter referred to as the Forest Plan) (USDA

personal property at the ski area. The land and property at the Cooper Spur Mountain Resort is currently owned and operated by Mt. Hood Meadows. As part of this exchange, the infrastructure and personal property at the Cooper Spur Mountain Resort, *as well as the lands*, would become property of the Forest Service.

[4] As stated in footnote #1 of the Summary section of this document, the numbers used throughout this environmental impact statement were generated using spatial data (i.e., Geographical Information Systems). The land description verification (LDV) forms, which were calculated using legal descriptions, are approximately 108 acres for the Government Camp parcels and 764 for the Cooper Spur parcels. All final acre values will be determined by a licensed surveyor.

Forest Service 1990), as amended. The Forest Plan guides all natural resource management activities and establishes management standards and guidelines for the Forest. It describes resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management. Additional management direction for the area is also provided in the following Forest Plan amendments:

- The Northwest Forest Plan (NWFP) – Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (USDA and USDI 1994);
- Survey and Manage[5] – Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (US Forest Service et al. 2001); and,
- Invasive Plants – Pacific Northwest Invasive Plant Program Preventing and Managing Invasive Plants Record of Decision (US Forest Service 2005); and Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia Gorge Scenic Area in Oregon (US Forest Service 2008).

Existing Forest Plan Land Use Allocations for the Government Camp Parcels

The majority of the Government Camp parcels to be conveyed is within the A11-Winter Recreation Area land use allocation (figure 6), as described by the Forest Plan on pages 4-190 through 4-191. The goal for these lands is to provide for high-quality winter recreation (and associated summer) opportunities (Forest Plan, page 4-190). This land use allocation provides for the development, administration, occupancy, and use of developed recreation sites and facilities so long as it is consistent with management area direction (Forest Plan, page 4-192).

There is one acre within the Government Camp parcels that is within the A4-Special Interest Area for the Historic Barlow Road land use allocation, as described by the Forest Plan on pages 4-151 through 4-156. The goal for these lands is to protect and, where appropriate, foster public recreational use and enjoyment of important historic, cultural and natural aspects of our national heritage (Forest Plan page 4-151).

The Northwest Forest Plan (NWFP) land use allocations overlap with the land use allocations within the Forest Plan. The NWFP land use allocations included in the Government Camp parcels are Riparian Reserve and Administratively Withdrawn. Riparian Reserve includes areas along rivers, streams, wetlands, ponds, lakes, and unstable or potentially unstable areas where the conservation of aquatic and riparian-dependent terrestrial resources receives primary emphasis. Administratively Withdrawn allocations are identified areas in existing plans, including recreation/visual areas, back country and other areas not scheduled for timber harvest.

[5] Page 22 of the 2001 Survey and Management Record of Decision states that land exchanges are not themselves habitat-disturbing activities and for this reason do not trigger Survey and Manage pre-disturbance surveys. However, the land exchange may alter the mix of opportunities for future management of Survey and Manage species and, therefore, a discussion and disclosure of currently available information and likely impacts to these species is included in chapter 3 of this document.

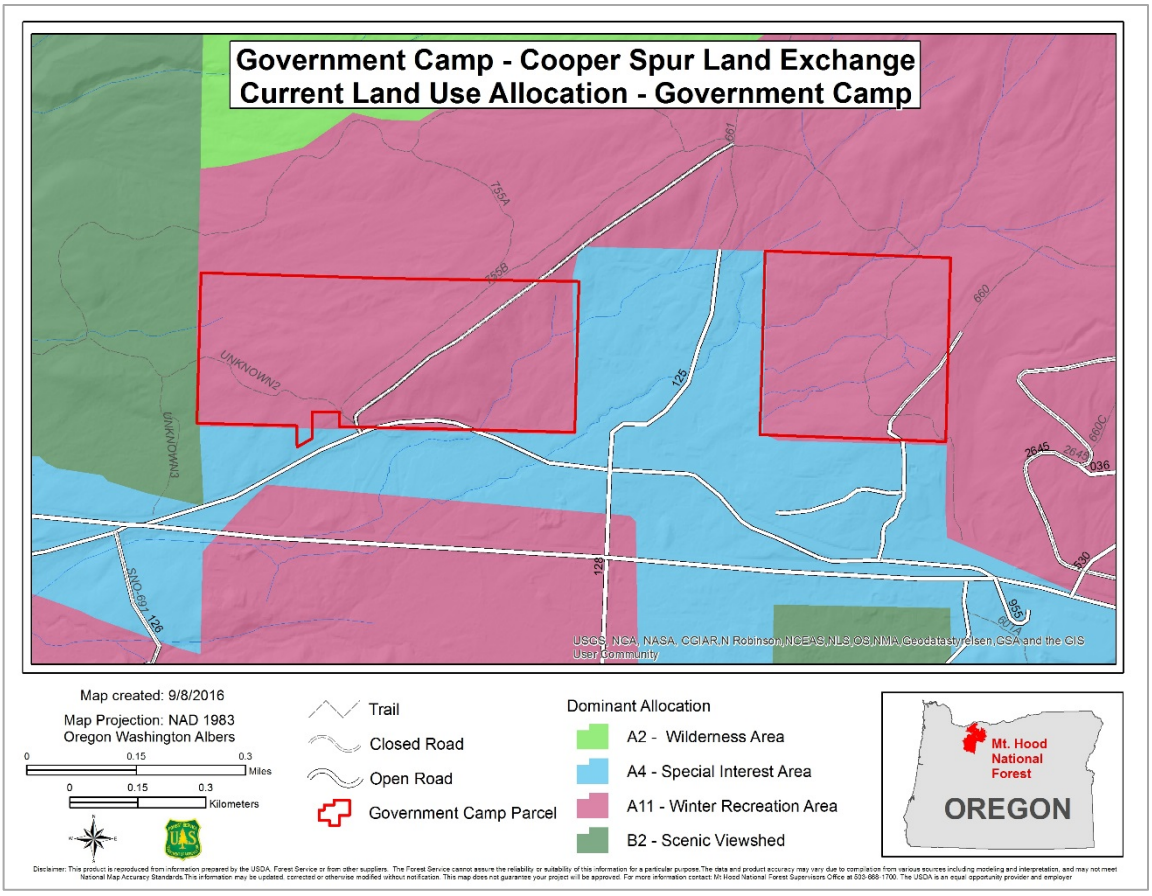

Figure 6. Existing LUAs for Government Camp

Existing Forest Plan Land Use Allocations for the Wilderness Addition and the Crystal Springs Watershed Special Resources Management Unit

The 1,709 acres of NFS lands that would be designated as part of the Mt. Hood Wilderness are currently designated in the Forest Plan as A4-Special Interest Area for the Cloud Cap-Tilly Jane Historic District (492 acres), A11-Winter Recreation Area (1,109 acres), and B2-Scenic Viewshed (108 acres) (figure 7). These acres are also designated as Administratively Withdrawn, Riparian Reserves, and Matrix under the Northwest Forest Plan.

The 2,090 acres of NFS lands that would be designated as part of the Crystal Springs Watershed Special Resources Management Unit are currently designated in the Forest Plan as A4-Special Interest Area for the Cloud Cap-Tilly Jane Historic District (660 acres), A11-Winter Recreation Area (236 acres), B2-Scenic Viewshed (1,160 acres), and C1-Timber Emphasis (34 acres). These acres are also designated as Administratively Withdrawn, Riparian Reserves, and Matrix under the Northwest Forest Plan.

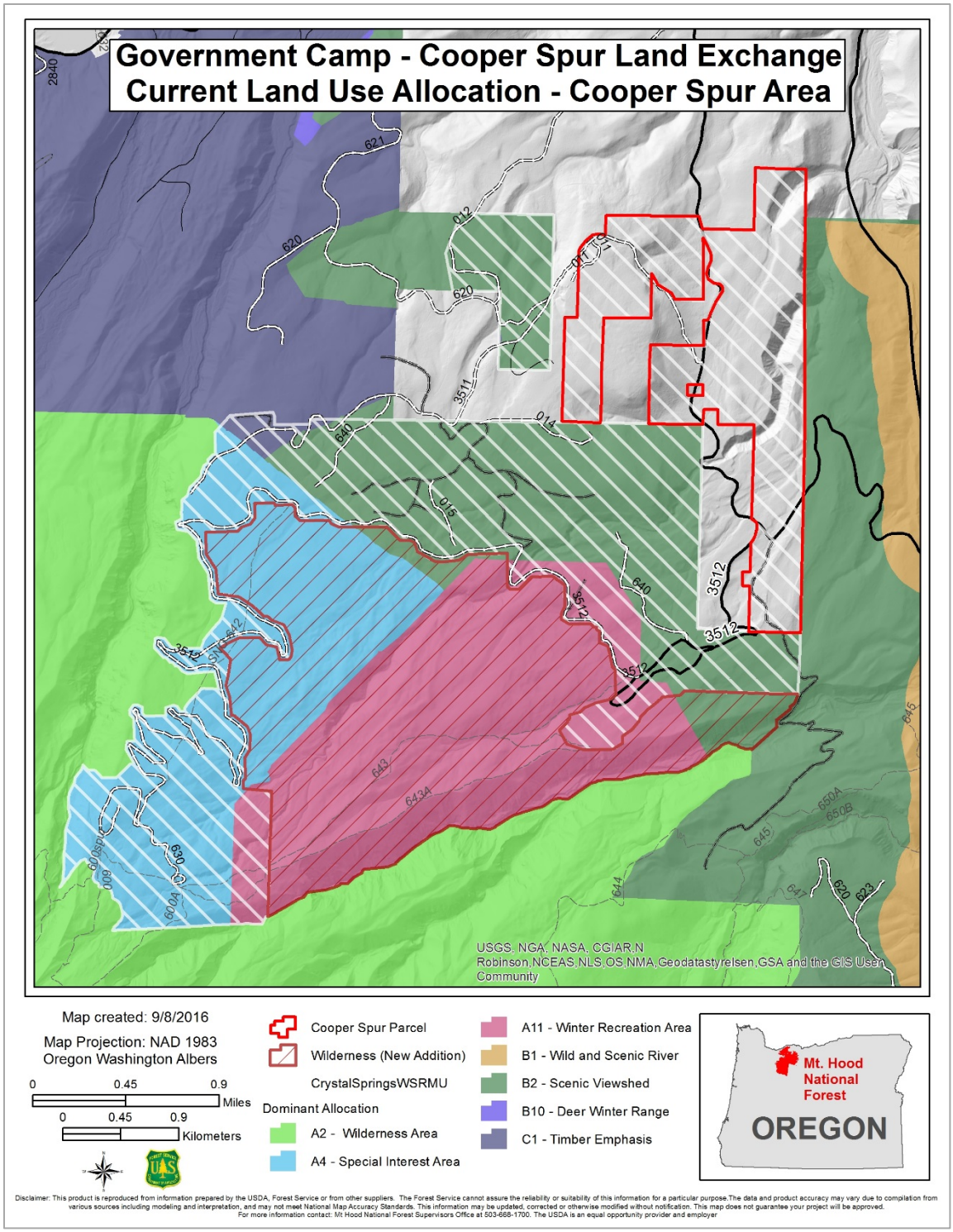

Figure 7. Existing LUAs for Cooper Spur

Best Management Practices

Best management practices (BMPs) are defined as "methods, measures or practices selected by an agency to meet its nonpoint source control needs. BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be

applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters" (EPA Water Quality Standards, Regulation, 40 CFR 130.2). Appendix H of the Forest Plan provides management direction on the BMP implementation process and format for project specific BMP requirements.

According to the Northwest Forest Plan, BMPs would be incorporated into the implementation of the project. BMPs are drawn from General Water Quality Best Management Practices, Pacific Northwest Region (November 1988); Draft Environmental Protection Agency Region 10 Source Water Protection Best Management Practices for USFS, BLM (April 2005); Mt. Hood National Forest Standards and Guidelines, Northwest Forest Plan Standards and Guidelines and The National Best Management Practices for Water Quality Management on National Forest System Lands - Volume 1: National Core BMP Technical Guide (April 2012) and professional judgment.

Land exchanges convey land, interests in land, and the resources associated with them. Of itself, the specific act of conveyance does not have environmental effects. Therefore, the Forest Service Handbook provides direction that states that the NEPA analysis should focus on the future use and management of the lands being conveyed (5409.13, Chapter 30, Section 33.14). For this reason, the NEPA analysis is largely focused on the potential development of the Government Camp parcels. Because no specific development plans have been finalized and/or approved by Clackamas County or any other applicable State permitting authorities, the interdisciplinary team identified a general list of assumptions about the development and use of the Government Camp parcels (see the list of Analysis Assumptions in chapter 3). These assumptions are primarily based on zoning regulations required by Clackamas County.

The U.S. Environmental Protection Agency has delegated the implementation of the National Pollution Discharge Elimination System (NPDES) program to the state of Oregon. The Oregon Department of Environmental Quality (DEQ) administers the NPDES program through Oregon Revised Statute (ORS) 468B and associated Oregon Administrative Rules (OAR). ORS 468B.025 explicitly prohibits the discharge or placement of wastes into waters of the state, prohibits the discharge of waste that causes violations of water quality standards, and prohibits violations of permit conditions. It is the local jurisdiction's goal to comply with all conditions of the NPDES permit. In addition, erosion and sediment control measures must be installed prior to any disturbance. Water Environment Services, which is a department of Clackamas County, is a designated local agent for issuing and administering DEQ permits. Once the Government Camp parcels have been conveyed to Mt. Hood Meadows, it will be the responsibility of Mt. Hood Meadows to ensure its actions implement conservation measures consistent with meeting the requirements for the Clean Water Act.

Since the assumptions made for the development of the Government Camp parcels are not site-specific (i.e., the analysis assumes the amount and type of development, but the specific locations are not known), it is infeasible to apply project-specific BMP requirements, as outlined in Appendix H of the Forest Plan. Also, once the lands have been conveyed to a private entity, the Forest Service will no longer have management authority for these lands. For these reasons, the management direction regarding the BMP implementation process included in Appendix H of the Forest Plan is not applicable to this land exchange.

This proposed action does not call for and would not authorize any ground-disturbing activities for the lands to be acquired, nor is there any way to know with any degree of certainty or specificity just what any such activities in the future might entail; as a result, no effects to water quality are projected to result from the mere acquisition of the Cooper Spur parcels, and thus, there is no need to include project-specific BMPs. In the future, if any ground-disturbing

activities are proposed for the acquired lands, then the corresponding NEPA analysis will include project-specific BMPs as described in Appendix H of the Forest Plan.

Legal Requirements and Guidance for Exchanges involving Federal Land

Numerous acts of Congress provide authority to acquire and dispose of National Forest System land or interests in land. For more information regarding the laws, regulations, and Executive Orders that apply to the land exchange process for the Forest Service, please refer to Forest Service Manual 5400-Landownership, Chapter 5430-Exchanges; Forest Service Handbook 5409.13-Land Acquisition Handbook, Chapter 30-Land Exchange; and Forest Service Handbook 5409.12-Appraisal. Also, the regulations governing the exchange of National Forest System land are at Title 36, Code of Federal Regulations, part 254, subpart A (36 CFR part 254, subpart A).

Reconciling Direction in the Act with the Federal Land Policy and Management Act of 1976

Section 1206(a)(2)(B) of the Act requires that the Land Exchange be carried out subject to Section 206 of the Federal Land Policy and Management Act of October 21, 1976 (90 Stat. 2743; 43 U.S.C. 1715, 1716) (FLPMA), except as otherwise provided in subsection 1206(a) of the Act. This exception puts the Forest Service in the position of needing to determine if, and how, there are any conflicts or textual tension between the direction in Section 206 of FLPMA and that in subsection 1206(a) of the Act. After having carefully considered this issue, the Forest Service has identified two ways in which specific direction in subsection 1206(a) of the Act overrides or at least substantially dilutes the more general direction in Section 206 of FLPMA.

First, a portion of Section 206(a) of FLPMA, 43 U.S.C. is displaced insofar as it limits the authority of the Forest Service to dispose of Federal lands by exchange so situations in which it "determines that the public interest will be well served by making [a particular] exchange" 43 U.S.C. § 1716(a). Here, however, the Congress already has effectively determined that the Land Exchange is in the public interest by directing the Forest Service to carry it out, and has also specifically delineated the conditions to which it is subject. To make the agency's "public interest" determination outlined in Section 206(a) of FLPMA an additional condition to proceeding with the Land Exchange would essentially be to assume that the Congress wanted the Forest Service to "second-guess" its legislative judgment that the Land Exchange is a worthwhile endeavor that will inure to the benefit of the United States, which the Forest Service believes would be an insupportable assumption based on an unreasonable reading of the language in the Act.

At the same time, however, although the Forest Service does not believe the Act would allow it to simply decline to execute the Land Exchange were it to make its own independent determination that the exchange would not well serve the public interest given the foregoing analysis, the Forest Service does believe that it may consider the public interest, as defined in Section 206(a) of FLPMA, in determining *how to implement* the Land Exchange. Indeed, the agency believes that in doing so is the best way to harmonize the Act and Section 206(a) of FLPMA. Thus, for example, the Forest Service retains a reasonable level of discretion as to the final mix of lands to be exchanged, depending in part on the outcome of the appraisal, per the direction to that effect in FLPMA. The agency's interpretation in this regard is also bolstered by Section 1206(a)(2)(C)(ii), which confers on the Forest Service rather open-ended authority to subject the Land Exchange to such terms and conditions as it may require, in addition to the explicit conditions specifically imposed by the Act. For similar reasons, the Forest Service does

not believe that it may exercise the authority that 43 U.S.C. § 1716(d)(3) otherwise would provide for it to simply withdraw from the Land Exchange following any arbitration that may ensue on the appraisal that is being carried out on the parcels involved in the Land Exchange (although it may determine along with Mt. Hood Meadows to modify the Land Exchange "to reflect the findings of the arbitration or any other factors."

In accordance with the foregoing, the Forest Service will include an analysis of factors related to the public interest in the FEIS consistent with its regulations at 36 C.F.R. § 254.3(b)(1). This analysis will be informed by relevant direction in Forest Service Handbook 5409.13, Chapter 30, Section 33.41b, which states:

> The authorized officer has the responsibility to determine if the proposed exchange serves the public interest (36 CFR 254.3 (b)(2)) and supports the direction and guidance in the forest land management plan. Factors that must be considered in a public interest determination for a proposed land exchange are listed in Title 36, Code of Federal Regulations, section 254.3(b)(1) (36 CFR 254.3(b)(1)). The public interest determination must show that the resource values and the public objectives of the non-Federal lands equal or exceed the resource values and the public objectives of the Federal lands and that the intended use of the conveyed Federal land would not substantially conflict with established management objectives on adjacent Federal lands, including Indian trust lands.

Second, the direction in Section 1206(a)(2)(D) of the Act is somewhat at odds with that in Section 206(d)(1) of FLPMA with respect to the time frame for and certain other particulars concerning the selection and execution of the appraisal to be conducted of the lands involved in the Land Exchange. More specifically, that subparagraph of the Act states that, "[a]s soon as practicable after the date of enactment of [the] Act, [the Forest Service and Mt. Hood Meadows] shall select an appraiser to conduct an appraisal of the Federal land and non-Federal land." This provision has been complied with, as the Forest Service solicited bids for the appraisal and determined that [two] of the respondents were qualified, and then conferred with Mt. Hood Meadows before executing a contract for the appraisal to be carried out on June 30, 2016.

Other than as outlined above, the Forest Service intends to follow the legal requirements applicable to exchanges involving Federal land in FLPMA, which amended all exchange authorities that had been in effect prior to its adoption in 1976. For example, FLPMA requires that the value of exchanged lands be equal, but the exchange can be adjusted for any difference in value by cash equalization payments of up to 25 percent of the value of the Federal lands. It also advises the Secretary of Agriculture to reduce the amount of cash payment to as little as possible. Though there are provisions for the waiver of cash equalization payments, the Secretary is specifically excluded from waiving payment of money to the United States. Waiver of payments to the non-Federal party is limited to three percent of the value of the land transferred out of Federal ownership or $15,000, whichever is less.

Additional Direction regarding Manner in which Appraisal will be Conducted

Currently, a qualified, licensed appraiser is appraising the Federal and non-Federal lands. The appraisal will be conducted in compliance with the *Uniform Appraisal Standards for Federal Land Acquisitions.* Forest Service regulations require that values for exchange purposes be determined by appraisal. Forest Service appraisal guidelines and policy are provided in Forest Service Handbook 5409.12.

Because FLPMA requires that the value of exchanged lands be equal, the Forest Service and Mt. Hood Meadows have engaged in preliminary discussions to at least tentatively identify a list of priority parcels for exchange. A letter dated July 5, 2016, provides documentation of the parties' prioritization discussions to the Forest Service's Regional Appraiser to aid in meeting the objectives of the appraisal services and facilitate its timely and effective completion. Those choices[6] are reflected in the appraisal instructions contained in the contract Statement of Work. The appraiser will first appraise all of the Federal and non-Federal property. If the values of the Federal and non-Federal property described in the Act are not equal, the appraiser will refer to the prioritization schedule provided in the assignment instructions for direction regarding priorities for conveyance and will value only those parcels. If equal values are not possible, the *Agreement to Initiate* states that cash payment may be required by either party to equalize exchange values. As stated above, the final mix of lands that will ultimately be exchanged will then necessarily turn at least in part on the outcome of the appraisal, which will be disclosed in the FEIS.

Additional Laws, Regulations, and Agency Guidance

The Forest Service is completing this environmental analysis and decision-making process in accordance with regulations issued under the National Environmental Policy Act of 1969 as well as the Council on Environmental Quality. The agency is also completing this project in accordance with the National Forest Management Act of 1976 and the implementing regulations. Furthermore, the Forest Service is completing this EIS in accordance with the National Historic Preservation Act, Clean Water Act, Endangered Species Act and other applicable laws, policies and regulations.

36 CFR 219 Planning Regulations: Forest Plan Amendment and Objections

A proposed project that includes a programmatic plan amendment is subject to 36 CFR 219, Subparts A and B. As stated in 36 CFR 219.17(b)(3), a plan amendment initiated before May 9, 2012, may be completed in conformance with the provisions of the prior planning regulation. Scoping for this project initially began in 2010; therefore, the Responsible Official has decided to follow the amendment procedures under the 1982 planning regulations. An evaluation of the significance of the proposed Forest Plan amendment is documented throughout chapter 3. The determination of whether the Forest Plan amendment is significant or not significant will be documented in the Record of Decision per agency guidance outlined in Forest Service Manual 1926.5

At 36 CFR 219.17(b)(3), the Responsible Official can choose to allow for an objection rather than an administrative appeal, if following the provision of a prior planning rule. In this instance, the Responsible Official has decided to follow the objection process in 36 CFR 219 subpart B. The objection notice and filing will adhere to the requirements outlined at 36 CFR 219.52-56.

Because this project also includes a project-level decision, the regulations at 36 CFR 218 (Predecisional Administrative Review Process) will also apply.

[6] If the Cooper Spur parcels exceed the value of the Government Camp parcels, then Mt. Hood Meadows would like to retain the following in order of preference: 1) Part of Cooper Spur Mountain Resort (Tax Lots 100 and 103); 2) All of the Cooper Spur Mountain Resort property; and, 3) Tax Lot 100 in 1S 10E 31. If the Government Camp parcels exceed the value of the Cooper Spur parcels, then the Forest Service would like to retain the following in order of preference: 1) western half of Section 14; 2) Government Lot 7; 3) eastern half of Section 14; and, 4) Government Lot 8.

Endangered Species Act

Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA), requires Federal agencies to review actions authorized, funded, or carried out by them, to ensure that such actions are not likely either to jeopardize the continued existence of Federally-listed species or to result in the destruction or adverse modification of listed species' officially designated critical habitat. Such consultation is not required where the action agency, which is the Forest Service for this proposed action, lacks any meaningful discretion to modify the proposed action so as to benefit listed species in a manner otherwise obligated under the ESA. This issue deserves brief discussion in the context of the proposed action being analyzed in this EIS because the Forest Service has been directed to carry it out pursuant to congressional direction. Notwithstanding the fact that the proposed action is a congressionally prescribed Land Exchange, the Forest Service believes that it retains sufficient discretion under the Act such that consultation is at least warranted, if not legally required. For example, as noted above, Section 1206(a)(2)(C)(ii) of the Act authorizes the Forest Service to subject the Land Exchange to any further terms and conditions that it may require, which, presumably could be based on the results of its consultation under the ESA. Therefore, for this project, the Forest Service will consult pursuant to the ESA with the National Marine Fisheries Service and U.S. Fish and Wildlife Service. Consultations will be completed on this project before the Record of Decision is signed by the Responsible Official.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996, requires Federal action agencies to consult with the Secretary of Commerce regarding certain actions. Consultation is required for any action or proposed action authorized, funded, or undertaken by the agency that may adversely affect essential fish habitat (EFH) for species identified by the Federal Fishery Management Plans. For this project, there is no EFH present in the project area.

National Historic Preservation Act of 1966, Executive Order 11593, 36 CFR 800.9 (Protection of Historic Properties)

Section 106 requires documentation of a determination of whether each undertaking would affect historic properties. The Mt. Hood National Forest operates under a programmatic agreement between the Oregon State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation for consultation on project determination. Consultation with SHPO will be completed on this project before the Record of Decision is signed by the Responsible Official.

Clean Water Act

The Clean Water Act of 1977 (CWA) and subsequent amendments established the basic structure of regulating discharges of pollutants into waters of the United States. The Environmental Protection Agency (EPA) has the authority to implement pollution control programs and to set water quality standards for all contaminants in surface waters. The EPA delegated implementation of the CWA to the States; the State of Oregon recognizes the Forest Service as the Designated Management Agency for meeting CWA requirements on National Forest System lands.

Federal Executive Order 11990 (Protection of Wetlands)

This executive order ended the official policy of Federal assistance for wetlands conversion and directed all agencies to minimize wetland impacts in their regulations. Specifically, the Executive Order requires agencies "to avoid to the extent possible the long and short-term

adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative." Depending upon the ultimate congressional direction in effect at the time the Responsible Official issues the Record of Decision for this proposed action, it may include the reservation of a wetland conservation easement on the Government Camp parcels, which would be consistent with the direction in this Executive Order.

Decision Framework

As explained above, this proposed action is necessarily informed and constrained by legislation, in particular the Act prescribing that the Land Exchange be carried out and setting forth the congressional direction and preconditions that must be satisfied in doing so. The Responsible Official will therefore decide whether all of the congressionally imposed conditions in the Act have been satisfied, whether to require any further terms and conditions under the authority of the Act, and whether the proposed action is consistent with all of the other legal duties and management direction that apply to it. If the Responsible Official finds that all of the congressionally-mandated and any other requisite conditions that she believes are necessary have been satisfied, and that it is consistent with its other legal duties and responsibilities, the Forest Service will execute the Land Exchange.

As part of the decision, and consistent with the Forest Service's interpretation of the applicable legal direction for the proposed action, the Responsible Official will address factors related to if and how the proposed land exchange serves the public interest. In doing so, she will look to those factors that are to be considered as part of a public interest determination for a wholly discretionary proposed land exchange in the Code of Federal Regulations, as follows:

To determine that an exchange serves the public interest, the authorized officer must find that—

- The resource values and the public objectives served by the non-Federal lands or interests to be acquired must equal or exceed the resource values and the public objectives served by the Federal lands to be conveyed; and,
- The intended use of the conveyed Federal land will not substantially conflict with established management objectives on adjacent Federal lands, including Indian Trust lands (36 CFR 254.3(b)(2) (2011)).

An analysis of each of these public interest factors in the context of the proposed action will be disclosed in this environmental impact statement. The Responsible Official will include a final public-interest analysis, and explain how it influenced the final decision within the scope of the discretion the agency has to shape that decision as outlined above, in the Record of Decision.

Additionally, the Responsible Official will decide whether or not to amend the Forest Plan as described in the proposed action, or make adjustments to the management direction for the Crystal Springs Watershed Special Resources Management Unit based on input that emerges as a result of public comment.

Public Involvement

The public was first notified of the land exchange proposal in 2010. The project was first published in the Mt. Hood National Forest's Schedule of Proposed Actions in June 2010. A notice of intent to prepare an environmental impact statement was first published in the Federal Register on October 13, 2010. A 45-day comment period was provided. The notice asked for

public comment on the proposal from October 13 through November 27, 2010. Comments were accepted if mailed, hand-delivered, faxed, or e-mailed. Information packages were sent to 158 agencies, individuals, and organizations. A public open house regarding the proposal was held on October 26, 2010, at the University Place Hotel in Portland, Oregon. The Forest Service received input from 25 individuals and organizations in response to the 2010 scoping effort.

The public was most recently notified of the proposal in February 2016. An updated notice of intent to prepare an environmental impact statement was published in the Federal Register on February 16, 2016, initiating another 30-day period for the public to provide input to help inform the Forest Service's scoping process, and asking for such input to be submitted by March 17, 2016. An information package was also posted online and mailed to 300 agencies, individuals, and organizations on February 11, 2016. Scoping input was accepted if mailed, hand-delivered, faxed, or e-mailed. The Forest Service received 18 scoping letters from individuals and organizations. For the most part, commenters expressed similar concerns and interests as in 2010. They were primarily concerned or interested in the following: learning more about the fairness and accuracy of the land appraisal process; the financial ability of the Forest Service to care for and manage the facilities on the private lands that would be acquired pursuant to the Land Exchange; whether the land exchange serves the public interest; the length of time it is taking to complete an environmental impact statement; the connection between this project and the Polallie Cooper Hazardous Fuels Reduction Project as it relates to the Crystal Springs Watershed Special Resources Management Unit; the Forest Plan amendment process and development; changes to summer range habitat for wildlife species; future use of the trails on the Government Camp parcels; the aerial tram corridor between Timberline and Government Camp; treaty rights and cultural resources protection; and wetland protection.

The project has remained on the Schedule of Proposed Actions each quarter since it was first published in 2010. The Forest's website has been updated since the project was initiated with the project description and status, as well as downloadable files such as the scoping letters, Notices of Intent, maps, and other documents. Details regarding the public comments received are described in the Scoping Report, which is posted online and filed in the project record at the Forest Supervisor's Office in Sandy, Oregon.

Scoping comments received, including names and addresses of those who commented, are considered part of the public record for this project, are available for public inspection and will be released if requested under the Freedom of Information Act.

Tribal Consultation

Tribal governments have a special and unique legal and political relationship with the United States government as reflected in the United States Constitution, treaties, statutes, court decisions, executive orders, and memoranda. This relationship imparts a duty on all Federal agencies to consult, coordinate, and communicate with American Indian Tribes on a government-to-government basis.

Indian Tribes can be affected by the policies and actions of the Forest Service in managing the lands and resources under its jurisdiction. Therefore, the Forest Service has a duty to consult with them on matters affecting their interests. The government-to-government relationships will be honored by involving local tribal representatives and soliciting their input regarding the proposed action.

On December 4, 2009, both the Confederated Tribes of Warm Springs (CTWS) and Confederated Tribes of Grand Ronde (CTGR) were sent cultural resources reports for the project. A response was received from the CTWS in the form of a formal letter citing tribal concerns. A draft Memorandum of Agreement (MOA) was developed between the Oregon State Historic Preservation Office, US Forest Service and Mt. Hood Meadows. At this time, no response was provided by CTGR.

In 2016, the CTGR cultural resources staff were provided a copy of the initial cultural resources report. Forest Service staff met informally with cultural resources staff at CTGR to re-introduce the project on April 19, 2016. Comments pertaining to the cultural resources report were received by the Forest Service and documented. On June 17, 2016, Forest Service staff visited the CTWS and discussed the project. CTWS provided the Forest Service with comments relating to treaty rights. On July 11, 2016, both CTWS and CTGR were mailed revised cultural resources reports. CTGR responded with comments and a request for a meeting, which was held on August 3, 2016. Additional coordination with the Tribes will continue before a decision is issued on this project to ensure that Tribal interests are considered

Issues

Using the scoping input from the public, other agencies, and the Tribes, and its own knowledge of and experience with the values and resources within the project area or to be affected by the proposed action, the interdisciplinary team developed a list of issues or resources of interest to address.

Issues serve to highlight effects or unintended consequences that may occur from the proposed action and alternatives, giving opportunities during the analysis to reduce adverse effects or eliminate and compare trade-offs for the decision maker and public. An issue should be phrased as a cause-effect statement relating actions under consideration to effects (FSH 1909.15, 12.4).

Issues are typically separated into two groups: significant and non-significant. The term “significant issue” is only used when referring to significant environmental effects, and in the context of an EIS. Non-significant issues are identified as those: (1) outside the scope of the proposed action; (2) already decided by law, regulation, forest plan, or other higher level decision; (3) irrelevant to the decision to be made; or (4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality NEPA regulations explain this delineation as a process by which the agency is to “…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (1506.3) narrowing the discussion of these issues in the statement to a brief presentation of why they will not have a significant effect on the human environment or providing a reference to their coverage else ware (40 CFR 1501.7(a) (3))”

No significant issues were identified by the IDT during their review of the scoping comments received.

Non-significant Issues

The following resources were evaluated to determine the impacts of the proposed action and to determine consistency with laws, regulations, and policies.

Heritage Resources and Treaty Rights

The Confederated Tribes of Grand Ronde and the Confederated Tribes of Warm Springs would lose access to 109 acres of ceded land for traditional uses through the conveyance of the Government Camp parcels. Since the laws regarding Section 106 do not apply to private entities, the assumption is that the land conveyance would result in an adverse effect to this cultural resource. The potential for mitigation is currently under discussion with the State and Tribal Historic Preservation Offices. Effects will be disclosed through a comparison of how heritage resources would be protected and the availability of traditional use areas. The analysis of mitigation options and disclosure of effects is presented in the Heritage Resources section in chapter 3 of this document.

Threatened, Endangered, and Sensitive Species

The 109 acres of Federal land near Government Camp includes suitable habitat for several threatened, endangered, and sensitive aquatic, wildlife, and plant species. While the land exchange itself would not result in effects to these species or habitat, the future development of the conveyed lands could. Threatened, endangered, and sensitive species and/or their habitat could be directly and indirectly affected as a result of future land development. Since Federal laws pertaining to the protection of these species and their habitat do not apply at all or at least to the same extent to private entities, we reasonably project for purposes of our analysis that there would be adverse findings during the biological evaluation process, although it is not feasible of course to know with any degree of specificity or certainty the scope or depth of any such effects. Nevertheless, adverse effects could result from the loss of habitat in the conveyed parcels as well as indirect impacts to the adjacent Federal lands. Biological evaluations have been prepared for all threatened, endangered, and sensitive species that are present or have habitat within or adjacent to the 109 acres that would be developed as a result of the conveyance. Potential mitigations to offset or reduce any such potentially adverse effects have been evaluated during this process and disclosed in chapter 3, and this analysis is designed in part to assist the Responsible Official in determining if the Land Exchange needs to be subject to any additional terms and conditions beyond those specifically denoted in the applicable legislation prescribing its implementation.

The indirect and cumulative effects to threatened, endangered, and sensitive species and/or habitat as a result of the acquisition of the 769 acres near Cooper Spur, the reassignment of 1,709 acres to wilderness, and the creation of the Crystal Springs Watershed Special Resources Management Unit is also described in chapter 3.

Hydrology, Water Rights, Wetlands and Soil Productivity

The 109 acres of land to be conveyed north of Government Camp is currently fully vegetated by a mature, conifer overstory, and lush understory. Wetlands are interspersed throughout the property, and the headwaters of Camp Creek pass through the northeast portion of the eastern parcel. The assumed future development of the property would include the removal of overstory and understory vegetation, excavation of building sites, roads, and driveways; and the construction of housing, and associated supporting infrastructure. This development and associated conversion of forested land to non-forest would result in soil displacement, an increase of impervious surface, increased peak flows, and a high likelihood of erosion, sedimentation, and wetland loss on the conveyed lands. Aquatic and fish species would be indirectly affected on the adjacent lands by the increased peak flows, sedimentation, and increased water temperatures created on the conveyed lands. The intensity and scale of effects would likely vary over short and long term timeframes. Hydrologic, soil, and aquatic species

evaluations were prepared for the 109 acres that would be developed and the indirect and cumulative effects that would likely occur on the adjacent Federal lands. These evaluations have been conducted based on the following assumptions, in addition to those listed above:

- Effects analysis assumes full build-out of the Government Camp parcels.
- Development on the parcels to be conveyed will be subject to State and County laws, building codes, and zoning regulations.
- Water rights in the name of the Forest Service will be either “canceled” or remain as outstanding to a third party after conveyance. Water rights in the name of a private or municipal identity that have not been in use for five years or more will be ‘cancelled’ or transferred to the Forest Service.
- Wetland easements include locally inventoried wetland delineations plus geomorphic functional contributing areas. The latter was determined using bare earth LiDAR and ArcGIS hydro tools to define stream initiation zones and provincial topographic contributing areas which were then refined based upon field validation.

Potential mitigations to offset or reduce adverse effects have been evaluated during this process and disclosed in chapter 3.

The indirect and cumulative effects on hydrology, aquatics, and soils resulting from the acquisition of 769 acres near Cooper Spur, the re-assignment of 1,709 acres of NFS lands to wilderness, and creation of the Crystal Springs Watershed Special Resources Management Unit will be disclosed in chapter 3 as well.

Recreation and Visuals

The 109 acres of land to be conveyed north of Government Camp is currently fully vegetated by a mature, conifer overstory, and lush understory. Two segments of a non-motorized trail system pass through the parcels. These trails are used for hiking and biking in summer and for Nordic skiing, winter fat biking and snow-shoeing in winter. The assumed future development of the property would include the removal of overstory and understory vegetation, excavation of building sites, roads, and driveways; and the construction of housing, and associated supporting infrastructure.

Under the Omnibus Act, the Forest Service is required to reserve a trail easement on the Federal land that allows non-motorized use by the public of existing trails; roads, utilities, and infrastructure facilities to cross the trails; and improvement or relocation of the trails to accommodate development of the Federal land. Forest Service Trails 755, 755A, and 755B cross the Federal parcels and were included in the easement. This is an exclusive easement that would provide the Forest Service full authority to manage the location and maintenance of the trails per NFS standards. An exclusive easement would enable the Forest Service to retain a 32-foot-wide trail easement, enforce Forest Service regulations, and keep the easement in a fixed location. However, under the Clarification Act the easement size is changed to 24-feet, and is non-exclusive, meaning the landowner holds the authority to change the location of the trails, and to cross the trails at any location they choose with roads, utilities, and other infrastructure (within the conveyed parcels). While retaining a 24-foot-wide, non-exclusive trail easement may be a condition of the conveyance, the Forest Service would have limited ability to manage the trail in the same manner and level as on the adjacent NFS lands because it would not have full authority of the trails. This in turn would affect the public use and enjoyment of the trails.

The County zoning regulations do not require a buffer between the parcels to be conveyed and NFS lands. The visual quality objectives as viewed from the adjacent NFS lands would change with the development of the property.

A recreation and visual analysis has been prepared for the 109 acres that would be developed and the indirect and cumulative effects that would likely occur on the adjacent Federal lands. These evaluations have been conducted based on the following assumptions, in addition to those listed above:

- Lots are 10,890 square feet (1/4 acre).
- Lot coverage (impervious surface) will not exceed 40%.
- Building type is residential.
- Building heights will not exceed 50 feet.
- No buffer (setbacks) along boundaries with NFS land.

Potential mitigations to offset or reduce adverse effects have been evaluated during this process and disclosed in chapter 3.

The indirect and cumulative effects on recreation and visuals resulting from the acquisition of 769 acres near Cooper Spur, the re-assignment of 1,709 acres of NFS lands to wilderness, the Cooper Spur Ski Area Special Use Permit boundary change, the acquisition of the Cooper Spur Mountain Resort, and the creation of the Crystal Springs Watershed Special Resources Management Unit are disclosed in chapter 3 as well.

Facilities at the Cooper Spur Resort and Ski Hill

Depending on the outcome of the appraisal equalization process, the Forest Service may acquire a significant number of structures that comprise the Cooper Spur Ski Area and Mountain Resort. Because of that eventuality, the operating assumption the Forest Service has reasonably adopted for this analysis that it would acquire the structures along with the lands. The following described infrastructure at the ski area is considered in the estate to be conveyed: ski lift system comprised of one double chair, one rope tow and two tube tows; a day lodge, A-frame cabin, first-aid station, four multi-purpose buildings, instructor's hut, and pump house. The resort site consists of 11 different structures, including five log cabins of 1,200 square feet, each with a kitchen area, living room and fireplace, two bedrooms and one bath on the main floor. The resort also includes spas, storage, tennis court, equipment storage and shop, and a single-family residence.

Condition assessments for the facilities to be acquired have been conducted. A number of inadequacies were identified that would need to be addressed before they could be opened for public use. A special use permit would also need to be developed for the future operation of the Cooper Spur Mountain Resort. A prospectus would be sent out for review and response by interested citizens. If there was no interest or the respondent could not prove their ability to maintain the facility to specific standards as outlined in the prospectus, the resort and/or ski area would be decommissioned.

The effects of the Agency acquiring new properties is included in chapter 3. Also, an evaluation of the facilities at the Cooper Spur Ski Area and Cooper Spur Mountain Resort are provided in chapter 3. The scenario of issuance of special use permit(s), as well as decommissioning either or both sites from a facilities standpoint, is in included in chapter 3.

Socio-Economics

Social and economic analyses are conducted by the Forest Service to determine what effects the agency has on local communities and people using natural resources. A social impact is a change in social and cultural conditions that directly or indirectly results from a Forest Service action. Social and economic impacts are closely linked and interdependent. However, social impacts focus on cultural and lifestyle changes that may occur, while economic impacts occur when Forest Service actions directly or indirectly change the employment and/or income in the area.

The indirect and cumulative effects on socio-economics resulting from the acquisition of 769 acres near Cooper Spur, the re-assignment of 1,709 acres of NFS lands to wilderness, the Cooper Spur Ski Area Special Use Permit boundary change, the acquisition of the Cooper Spur Mountain Resort, and the creation of the Crystal Springs Watershed Special Resources Management Unit are disclosed in chapter 3.

Chapter 2 – Alternatives, Including the Proposed Action

Introduction

This chapter describes the alternatives considered for this project, including the proposed action itself. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision-maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative and some of the information is based upon the environmental, social and economic effects of implementing each alternative.

Alternatives Considered in Detail

The Forest Service developed the No Action (Alternative 1) and Proposed Action (Alternative 2) in response to the direction in the Omnibus Act, and in light of the potential revisions to such direction that could ultimately result if the Congress eventually enacts the Clarification Act.

Alternative 1: No Action

Under the no-action alternative, current management plans would continue to guide management of the project area. The land exchange would not be implemented and the purpose and need would not be met. Specifically, the 109 acres north of the village of Government Camp would remain under NFS ownership and continue to be designated in the Forest Plan as A11-Winter Recreation Area, A4-Special Interest Area for the Historic Barlow Road; and it would continue to be designated in the Northwest Forest Plan as Administratively Withdrawn and Riparian Reserves. Also, the 769 acres in the Cooper Spur area would remain under private ownership.

The existing 1,172-acre Cooper Spur Ski Area special use permit area would remain the same. No new special use permit prospectus would be advertised. The current nonexclusive permit expires in 2021, and may be extended an additional 20 years if it is in compliance with the site development schedule in the Master Development Plan. Nonexclusive means the Forest Service reserves the right to use or permit others to use any part of the permitted area for any purpose, provided such use does not materially interfere with the rights and privileges authorized by the permit. The lands and waters within the permit area would remain open to the public for all lawful purposes. The Master Development Plan encompasses the entire winter sports resort envisioned for development in connection with the NFS lands authorized by the permit. The nine structures and ski lifts on the ski hill (located on NFS lands) would remain under private ownership.

The Cooper Spur Mountain Resort, including the land and buildings, would remain under private ownership. No special use permit prospectus would be advertised.

The 1,709 acres to be included as part of the Mt. Hood Wilderness would remain designated in the Forest Plan as A4-Special Interest Area for the Cloud Cap-Tilly Jane Historic District (492 acres), A11-Winter Recreation Area (1,109 acres), and B2-Scenic Viewshed (108 acres). These would also remain designated as Administratively Withdrawn, Riparian Reserves, and Matrix under the Northwest Forest Plan.

The Crystal Springs Watershed Special Resources Management Unit would not be created. The 2,090 acres of NFS lands that are currently designated in the Forest Plan as A4-Special Interest Area for the Cloud Cap-Tilly Jane Historic District (660 acres), A11-Winter Recreation Area (236 acres), B2-Scenic Viewshed (1,160 acres), and C1-Timber Emphasis (34 acres) would continue to be designated as they are now. These would also remain designated as Administratively Withdrawn, Riparian Reserves, and Matrix under the Northwest Forest Plan.

Alternative 2: Proposed Action

As described in chapter 1, the proposed action would exchange approximately 109 acres of NFS lands on the Zigzag Ranger District for approximately 769 acres of private lands in Hood River County. More specifically, the proposed action also includes the following elements:

- Two separate parcels (Sections 13 and 14) located adjacent to Government Camp in Clackamas County, totaling approximately 109 acres of NFS lands, would be conveyed to Mt. Hood Meadows.
- In exchange for the 109 acres of NFS lands adjacent to Government Camp, the Forest Service would acquire approximately 769 acres of land located in Hood River County, which is currently owned by Mt. Hood Meadows.
- For the Government Camp parcels, a wetland conservation easement will or may be reserved to protect functions and values of existing wetlands, and trail easements either 32 or 24 feet in width would be applied to existing non-motorized trails.
- Special use permit(s) would be issued for the operation and maintenance of the Cooper Spur Ski Area and Cooper Spur Mountain Resort. The term of the permit(s) would be for up to 20 years.
- Approximately 1,709 acres of existing NFS lands would become part of the Mt. Hood Wilderness.
- Approximately 2,090 acres of existing NFS lands plus 769 acres of the acquired lands would become designated as the Crystal Springs Watershed Special Resources Management Unit.
- The Forest Plan would be amended to change the land use allocations and standards and guidelines for the wilderness addition as well as the proposed management direction for the Crystal Springs Watershed Special Resources Management Unit. Also, the conveyed lands near Government Camp would be removed from the Forest Plan.

The proposed action that was shared with the public in February of 2016 has been further developed to address the potential effects of possible legislative changes outlined in the proposed Mount Hood Cooper Spur Land Exchange Clarification Act, which has passed both the U.S. Senate and House of Representatives in separate forms during the current, 114th Congress (see S. 2069 and H.R. 3826), but has not been enacted into law. The potential modifications most applicable to this analysis involve the direction requiring the Forest Service to reserve wetland conservation and trail easements on the NFS lands to be exchanged. More specifically, the bill would change the requirement for the Forest Service to reserve a wetland conservation easement to an optional condition that may or may not be applied as part of the Land Exchange, per the following language in the proposed Clarification Act: “The Secretary and Mt. Hood Meadows may mutually agree for the Secretary to reserve a conservation easement to protect the identified wetland in accordance with applicable law, subject to the requirements that the conservation easement shall be consistent with the terms of the September 30, 2015 mediation between the

Secretary and Mt. Hood Meadows." Further, the trail easement that was for exclusive use and would be 32 feet in width, as outlined in the Omnibus Act, would change to nonexclusive use and have a narrower width of 24 feet were the Clarification Act to pass in its current form. In this light, this EIS will address the effects of the different variations of the specific congressional direction relating to the Land Exchange given that it is not known yet what the final substance of that direction will yet be at the time of conveyance.

The proposed action that was previously shared with the public has also been updated to address scoping comments received from the public and the relevant expertise and specialized knowledge of the interdisciplinary team regarding the designation of the Crystal Springs Watershed Special Resources Management Unit. The description of the Forest Plan amendment for the creation of the Crystal Springs Watershed Special Resources Management Unit has been more clearly developed. All of the elements of the proposed action that are outlined above are further described in detail below.

Lands to be Conveyed

The NFS lands to be conveyed comprise two separate parcels reserved from the public domain and reacquired land with reserved public domain status totaling approximately 109 acres located adjacent to Government Camp in Clackamas County. The western parcel is approximately 68 acres; and the eastern parcel is approximately 41 acres. The NFS lands to be exchanged are timbered, mostly undeveloped, parcels of land. The tracts are physically separated by 40 acres private land. The parcels are located on the gentle southwest facing slope of Mt. Hood at the north end of Government Camp. Elevations range from about 3,760 to 4,120 feet. The Federal parcels have been withdrawn from mineral entry through the Bureau of Land Management's segregation process.

Once the Federal parcels are conveyed, the land would be available for development subject to the requirements in the Government Camp Village Revitalization Plan and the Clackamas County Comprehensive Land Use Plan (see http://www.clackamas.us/planning/ for more information). The Clackamas County Comprehensive Land Use Plan states that development of parcels in Government Camp formerly owned by the Forest Service must comply with the provisions of the county plans, which includes visual resource policies, such as limiting building height to fifty feet and integrating development with the natural environment. County land use policy in "distinctive resource areas," such as Government Camp, also directs the landowner to minimize adverse effects to vegetation, fisheries, and wildlife.

Section 13

The westerly parcel in Section 13 lies mostly north of Government Camp Loop Road and is accessed from a street on the east end. A creek traverses from northeast to southwest at the southeast comer of the property. The area around the creek is predominately wetlands. There are two parallel cuts through the timber for the Skyway Trail, a former gondola tram that ran from Thunderhead Condominiums to Timberline Lodge. A transmission line also cuts through the timber from the southwest to the northeast. Wally's Trail leads from the southern terminus of the Skyway Trail to the northwest comer of the parcel. The Forest has issued numerous special use permits for a water storage tank and water lines, transmission lines, trails, and a telephone line. These permits would be converted into easements at the conclusion of the exchange. Mt. Hood Meadows has negotiated long-term leases to allow the Mt. Hood Ski Patrol Building and the Hoodland Fire District #74 Fire Station to remain in use on these lands.

Section 14

The easterly parcel in Section 14 lies at the north end of Government Camp with subdivision development to the south and west and with a Summit Ski Area run to the east. Access is provided by East Lige Lane that lies on the southern border of the parcel. The Crosstown Trail enters the property at the southeast comer and exits at the midpoint of the northern border. The Forest has issued special use permits for a water tank and water lines, electric and power lines. These permits would be converted to easements upon execution of the exchange. Although no water rights would be conveyed or reserved, the status report states there are three water rights issued to private parties, with at least one associated with this parcel.

Easements

The Omnibus Act includes a provision to the Government Camp parcels that the Forest Service and Mt. Hood Meadows shall agree for the Secretary to reserve a conservation easement to protect identified wetlands (Section 1206(a)(2)(G)). More specifically, the Omnibus Act required the Forest Service to reserve a conservation easement on the Federal land to protect existing wetland, as identified by the Oregon Department of State Lands that allows equivalent wetland mitigation measures to compensate for minor wetland encroachments necessary for the orderly development of that land following the exchange. In September 2015, the Forest Service and Mt. Hood Meadows arrived at mutually acceptable terms of a conservation easement encompassing approximately 31 acres (see figure 8). The wetland easements were based on locally inventoried wetland delineations combined with the geomorphic functional contributing areas.

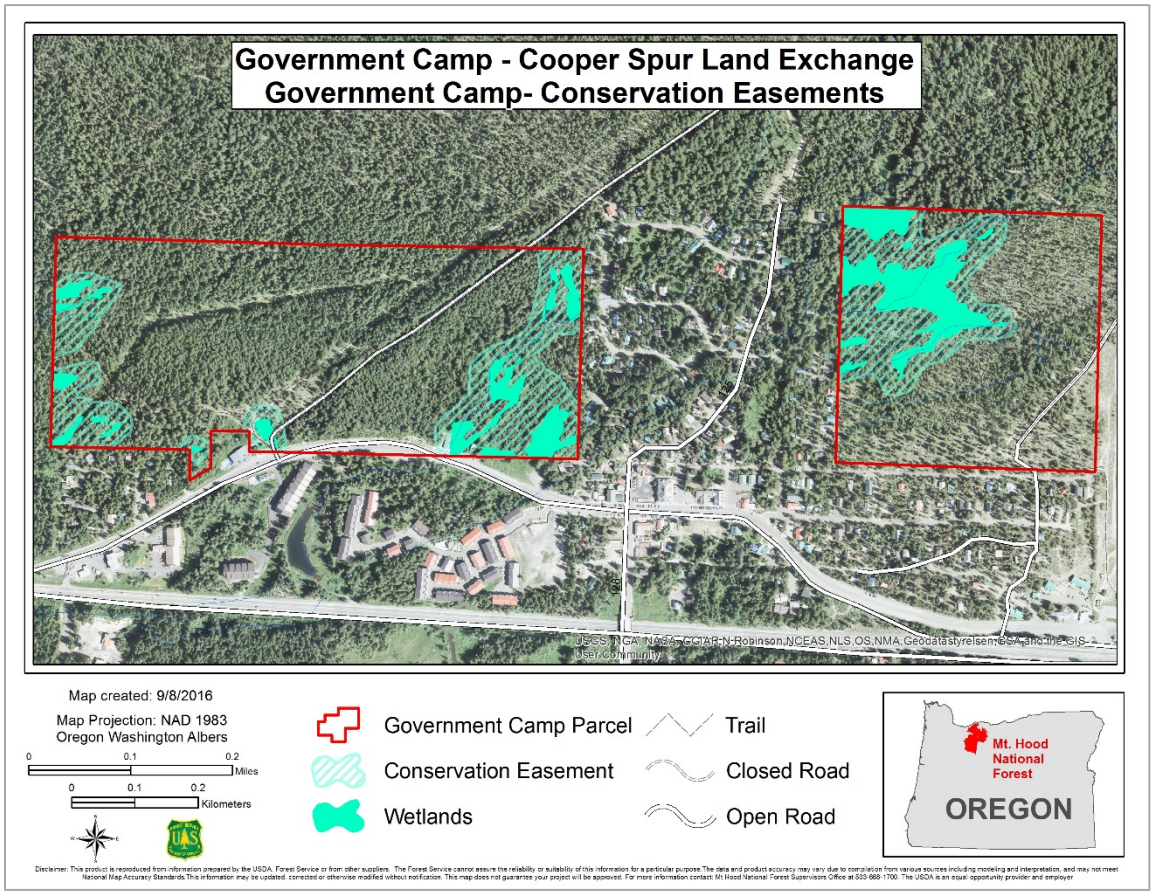

Figure 8. Agreed-upon wetland conservation easements per the Omnibus Act

In regard to the wetland conservation easement, the following direction is stated in the proposed Clarification Act:

Prior to the exchange of the Federal and non-Federal land—

(i) the Secretary and Mt. Hood Meadows may mutually agree for the Secretary to reserve a conservation easement to protect the identified wetland in accordance with applicable law, subject to the requirements that—

(I) the conservation easement shall be consistent with the terms of the September 30, 2015, mediation between the Secretary and Mt. Hood Meadows; and

(II) in order to take effect, the conservation easement shall be finalized not later than 120 days after the date of enactment of the Mount Hood Cooper Spur Land Exchange Clarification Act.

Since the reservation of a wetland conservation easement could be changed from being a mandatory condition to the Land Exchange in the Omnibus Act (i.e., "shall reserve") to a "may mutually agree"-upon condition in the proposed Clarification Act, the proposed action includes an analysis of the effects of both having the wetland conservation easement reserved as a condition to the Land Exchange under the mutually acceptable terms reached in September 2015, and of not having it included as a condition, in the event the Congress ultimately enacts the proposed Clarification Act. Rather, the acres could be reduced from 31 acres to nine acres of wetland protection, which represents the approximate acres of wetlands delineated by Terra Science, Inc.[7] in 2006 (see figure 9). Also, since the Clarification Act has not been enacted, there is uncertainty as to what would be agreed upon within the 120 days after the date of enactment. In order to provide the Responsible Official with a range of conservation easement opportunities that would be consistent with legislation, the proposed action includes the least and greatest potential protections to the existing wetlands in the Government Camp parcels. In addition, the Forest Service wishes to advise that it could still revise the mutually acceptable terms of the wetlands conservation easement reached in September 2015, if it were to conclude that any revisions are necessary to comply with the direction in the Omnibus Act following its review of environmental effects in this EIS, as it has previously acknowledged. If the agency were to make any such revisions, however, it has further indicated its intent to work cooperatively with Mt. Hood Meadows Oregon to resolve any resultant issues that could ensue.

[7] In September 2006, Terra Science, Inc. prepared a report for Mt. Hood Meadows titled, "Wetland Delineation Report for Upper Camp Creek Area, Government Camp, Clackamas County, Oregon." The Forest Service obtained the GIS dataset from Terra Science in order to spatially calculate and depict the wetland acres.

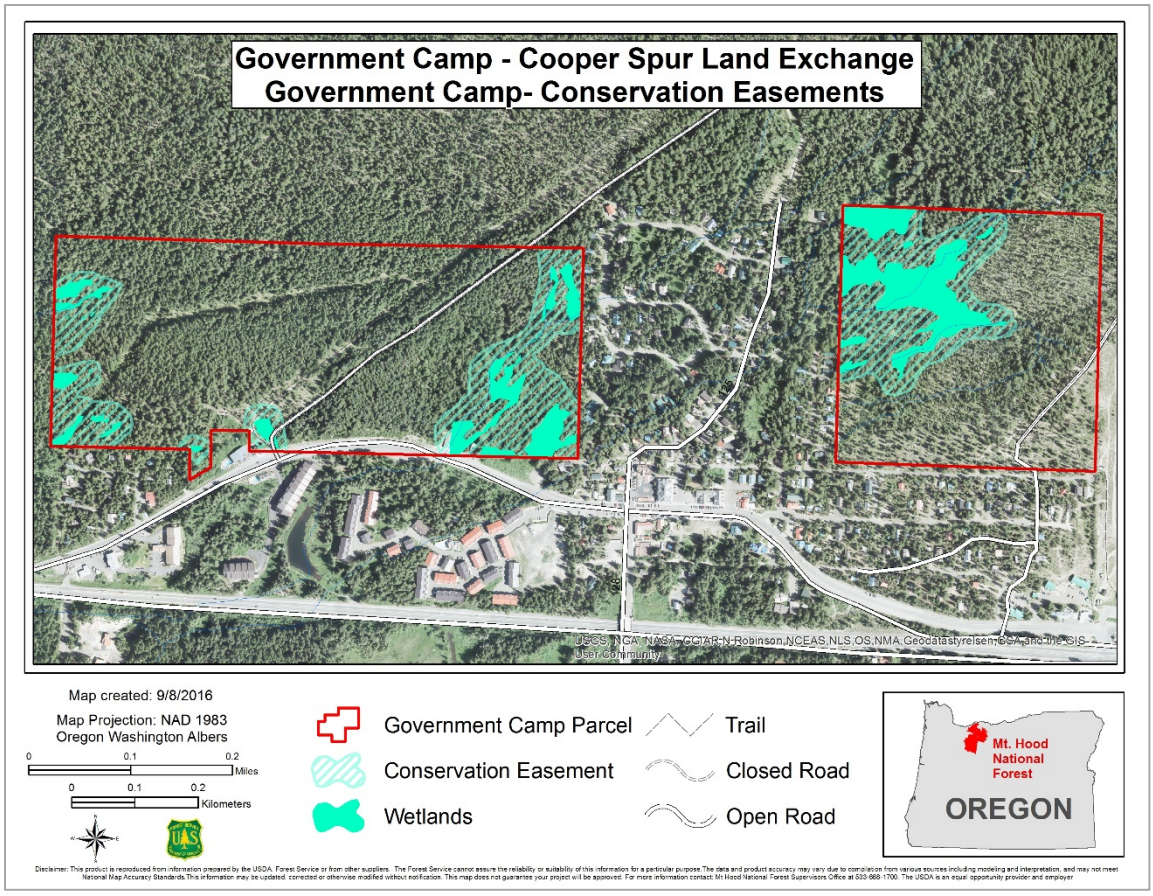

Figure 9. Wetland boundaries delineated using Terra Science's GIS dataset

Under the Omnibus Act, as a condition of the conveyance of the Federal land, the Forest Service is also directed to reserve a trail easement for existing Forest Service Trails 755, 755A, and 755B on the Government Camp parcels that allows for: (1) non-motorized use by the public of existing trails; (2) roads, utilities, and infrastructure facilities to cross the trails; and (3) improvement or relocation of the trails to accommodate development of the Federal land. The width of the trail easement from the center of the trail would be 32 feet (see figure 10). However, the proposed Clarification Act would alter this direction somewhat to require the Forest Service to reserve a 24-foot wide, non-exclusive trail easement at the existing trail locations (Forest Service Trails 755, 755A, and 755B) that retains for the United States existing rights to construct, reconstruct, maintain, and permit non-motorized use by the public subject to the right of the owner of the Federal land to cross the trails with roads, utilities, and infrastructure facilities; and to improve or relocate the trails to accommodate development of the land following the exchange. Since there is uncertainty about which trail easement could be required at the time this NEPA analysis is completed, the proposed action includes an analysis of the effects of both trail easement conditions.

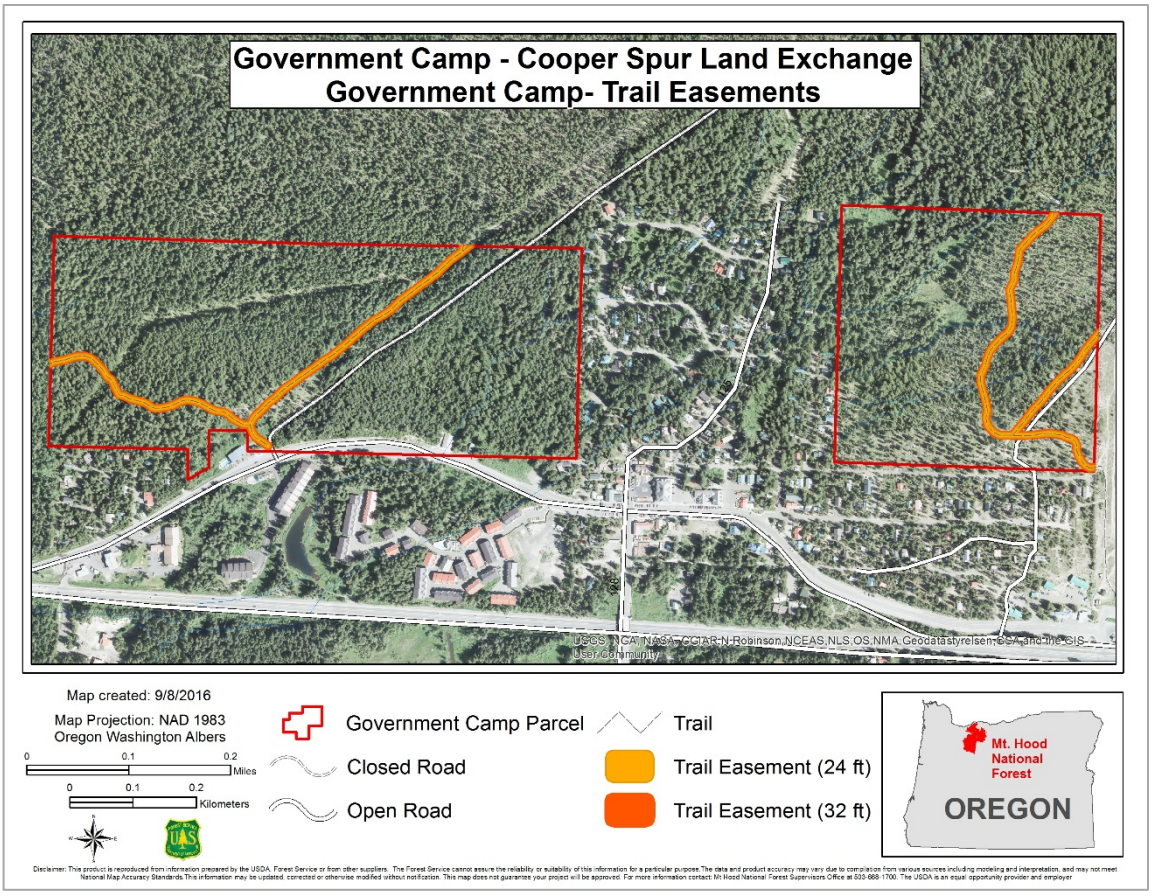

Figure 10. Trail easements on Government Camp parcels

Lands and Infrastructure to be Acquired

The Omnibus Act identifies approximately 769 acres located in Hood River County as the non-Federal estate. Approximately 514 acres are located outside the current NFS administrative boundary. The non-Federal estate is comprised of three diverse property types situated in the vicinity of the Cooper Spur Ski Area on the northeast flank of Mt. Hood. The three types are: (1) the structures and personal property at the Cooper Ski Area; (2) land and all development at the Cooper Spur Mountain Resort; and, (3) mostly vacant forest land.

Infrastructure Acquired at the Cooper Spur Ski Area

The Cooper Spur Ski Area is located at a base elevation of 4,000 feet and summit elevation of 4,350 feet, which provides 350 feet of vertical drop. Although 1,172 acres of National Forest are under permit, the effective developed and skiable area is about 50 to 60 acres. The lift system is comprised of one double chair, one rope tow and two tube tows. There are ten runs with 40 percent rated easiest, 40 percent rated more difficult, and 20 percent rated most difficult.

As the underlying land at the ski area is already federally owned and administered, only the following described infrastructure, besides the aforementioned lifts, is considered in the estate to be conveyed: a day lodge, A-frame cabin, first-aid station, four multi-purpose buildings, instructor's hut, and pump house. The day lodge is the primary building with kitchen and dining area on the main floor, additional seating area in a loft, and lift ticket/equipment rental in the

lower daylight level. Restrooms are housed in one of the multi-purpose buildings. In addition, there is a private well water system, irrigation system, and septic system.

The special use permit area would be reduced from 1,172 acres to about 129 acres (see figure 11). Approximately 1,012 acres of the existing permit area would become part of the Mt. Hood Wilderness.

Cooper Spur Mountain Resort

The Cooper Spur Mountain Resort is located about two miles east of the Cooper Spur Ski Area at the intersection of Cooper Spur and Cloud Cap Roads. The resort site consists of 11 different structures. The registration desk portion of the restaurant building and the Homestead Cabin were built in 1942. The restaurant addition and all other structures were added in 1985–1986. Also, there are five log cabins of 1,200 square feet, each with a kitchen area, living room and fireplace, two bedrooms and one bath on the main floor. The resort also includes spas, storage, tennis court, equipment storage and shop, and a single-family residence.

In addition to the cabins and restaurant, there are several septic tanks that lead to a single leach field northeast of the improvements. A well with well house and another small building are located on Tax Lot 401. Another recently installed well is located on Tax Lot 102.

Special Use Permit(s) for the Cooper Spur Ski Area and Cooper Spur Mountain Resort

The proposed action involves the transfer of ownership of facilities associated with Cooper Spur Ski Area and Cooper Spur Mountain Resort. Based on the Forest Service's preliminary analysis, it has determined that it is not in the public interest for the U.S. Government to operate these facilities; therefore, the Forest will look for opportunities to issue special use permit(s) for these areas and potential operation of these facilities. Thus, the proposed action includes authorizing the issuance of special use permit(s) for the operation and maintenance of the Cooper Spur Ski Area and Cooper Spur Mountain Resort. The term of the permit(s) would be for up to 20 years. The permitted areas would include 129 acres and is depicted in figure 11. The specific uses and activities would be determined through a prospectus process. The special use permit prospectus would have evaluation criteria to screen for such things as: services to the public, uses consistent with the management of the area, financial/technical feasibility, fee return to the government/maintenance of facilities, and activities that enhance nature-based outdoor recreation experiences. For government-owned facilities, the criteria would require a viable business plan that could generate fees that would off-set the expected deferred maintenance costs of the facilities.

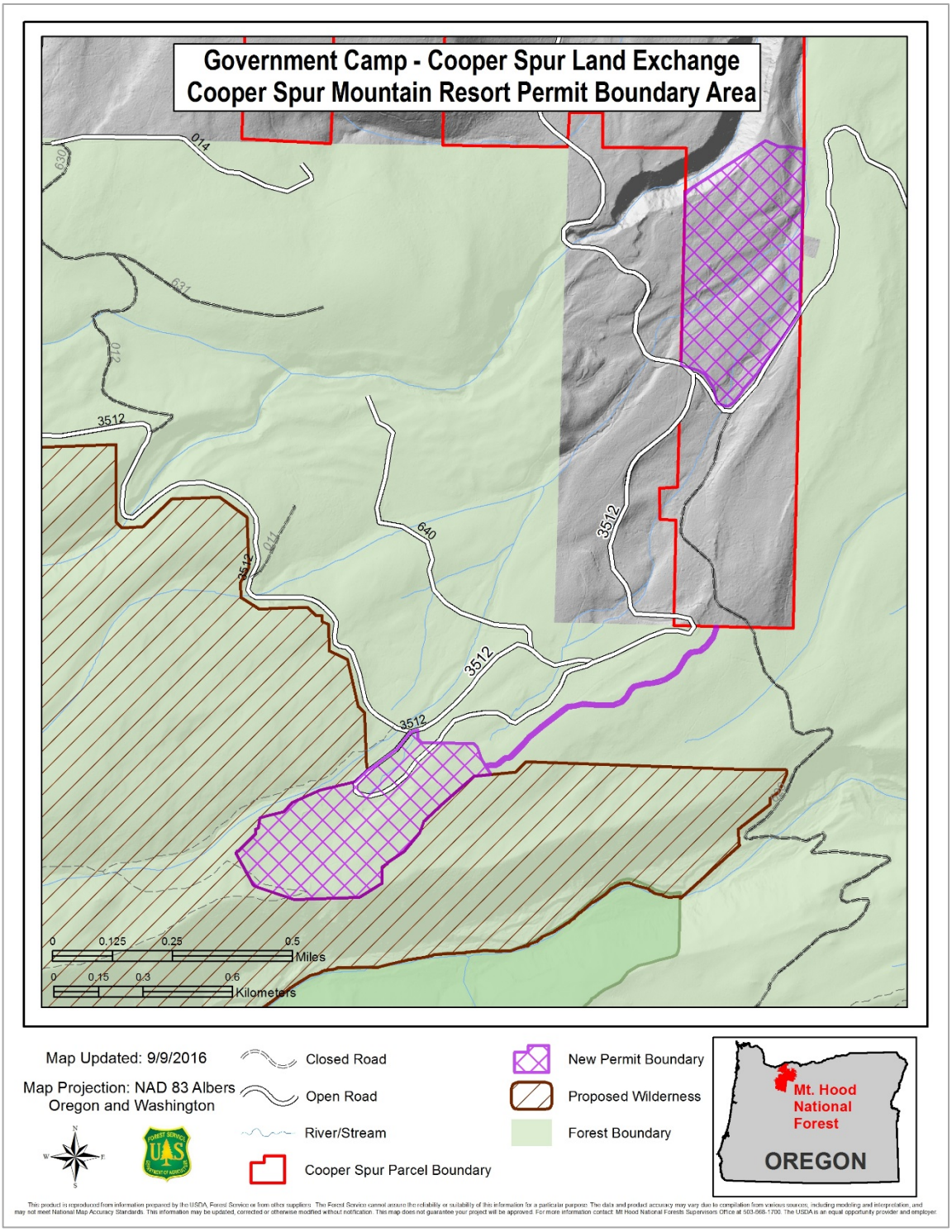

Figure 11. Proposed Cooper Spur Ski Area and Cooper Spur Mountain Resort permit boundary area

The permit holder(s) would be responsible for the full operations and maintenance of the facilities and permit area(s) as per terms and conditions and operation plans under special use permit. The permit holder(s) would be required to pay the U.S. Government a percentage of gross receipts, or other approved fee structures approved under special uses policy, dependent upon the use and activities.

If through the prospectus process for operation of these government-owned facilities, there are no viable business proposals submitted, the Forest Service may then consider conveyance of the facilities (not including the underlying lands). There would be another special use permit prospectus to solicit proposals for viable business operation, including purchase or transfer of the excess facilities.

If the Forest Service retains ownership of the facilities, the permits would be issued under the Granger-Thye Act (G-T) authority. This authority allows for permit fees to be off-set by performing “landlord maintenance” and replace worn out facilities, such as toilets, water systems, and other infrastructure and improvements. More substantial ground-disturbing activities that may be needed for future management would be analyzed separately as the projects are planned.

If the Forest Service transfers ownership of the facilities, then other authorities would be used to authorize the special use permit(s). These authorities could be the Act of March 4, 1915, Ski Area Permit Act of 1986, or the Organic Act of 1897. These authorities cover uses where the facilities are not owned by the U.S. Government.

Special use permit(s) would be monitored by a Forest Service permit administrator for compliance with Operating Plan(s) and permit terms.

The proposed action is an administrative change that does not involve construction of new facilities or infrastructure. All of the sites currently exist, and management would continue with existing policies and regulations. Site improvements would be authorized with separate NEPA analysis. However, if there is no interest expressed for operation and maintenance of the Cooper Spur Ski Area and Cooper Spur Mountain Resort, then these facilities would be decommissioned, pending available funds.

Vacant Forest Land

The remaining property contains a mixture of pre-merchantable plantations covering about 60 percent of the area, with the balance in second-growth timber stands. The plantations range from approximately 10 to over 25 years old—composed of mixed species including both planted and naturally regenerated Douglas-fir, ponderosa pine, white fir, western hemlock, western white pine, and lodgepole pine. Timber stands contain merchantable trees dominated by Douglas-fir and white fir mixed with trace amounts of western red cedar, western white pine and western hemlock.

Mt. Hood Forest Plan Land Use Allocations and Amendment

The Omnibus Act also provides that, upon completion of the land exchange, additional lands would be considered part of the Mt. Hood Wilderness and that the Crystal Springs Watershed Special Resource Management Unit would be created. Section 1202(2)(c) directs that approximately 1,709 acres depicted on the Mt. Hood Wilderness Tilly Jane map shall be incorporated in, and considered to be a part of, the Mt. Hood Wilderness, as designated under the Wilderness Act (16 U.S.C.1132(a)). The Omnibus Act states that the purposes of the Crystal

Springs Watershed Special Resource Management Unit are to ensure the protection of the quality and quantity of the Crystal Springs watershed as a clean drinking water source for the residents of Hood River County, Oregon; and, to allow visitors to enjoy the special scenic, natural, cultural, and wildlife values of the Crystal Springs watershed (Section 1205(a)).

In order to comply with the direction included in the Omnibus Act, the proposed action includes a programmatic amendment to the Forest Plan in order to assign land use allocations to the newly acquired land, change the land use allocations for the wilderness addition and the Crystal Springs Watershed Special Resource Management Unit, and add standards and guidelines for the Crystal Springs Watershed Special Resource Management Unit. Also, the conveyed lands at Government Camp lands would be removed from the Forest Plan, as amended.

Under the Forest Plan, the land use allocation of the NFS lands to be conveyed is primarily A11-Winter Recreation Area. There is one acre of A4-Special Interest Area. The Northwest Forest Plan land use allocations included in the Government Camp parcels are Riparian Reserve and Administratively Withdrawn. Once the land has been exchanged into private ownership, the Forest Plan's management direction would no longer apply. Thus, the Forest Plan would be amended to remove these lands from the agency's management.

The 1,709 acres of NFS lands that would be designated as part of the Mt. Hood Wilderness are currently designated in the Forest Plan as A4-Special Interest Area for the Cloud Cap-Tilly Jane Historic District (492 acres), A11-Winter Recreation Area (1,109 acres), and B2-Scenic Viewshed (108 acres) (see figure 7 in chapter 1). In order to comply with the legislation, the Forest Plan would be amended to change the 1,709 acres to A2-Wilderness (figure 12). The goal of A2 lands is to promote, perpetuate and preserve the wilderness character of the land; protect watersheds and wildlife habitat; preserve scenic and historic resources; and promote scientific research, primitive recreation, solitude, physical and mental challenge, and inspiration (Forest Plan, page 4-136). All of the standards and guidelines found on pages 4-138 to 4-144 of the Forest Plan would apply to these lands. These acres are also designated as Administratively Withdrawn, Riparian Reserves, and Matrix under the Northwest Forest Plan. Per congressional direction, these lands would change to Congressionally Reserved.

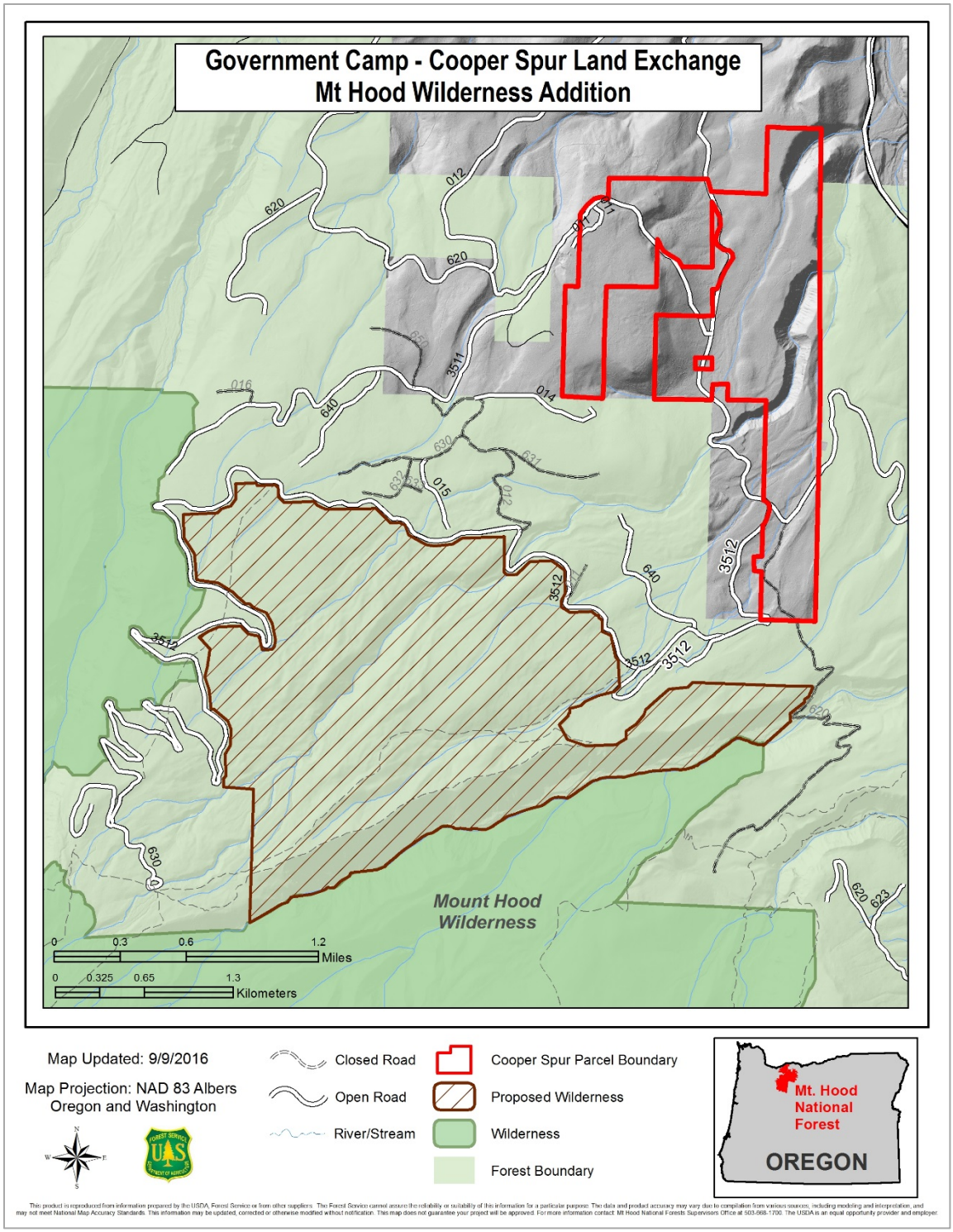

Figure 12. Mt. Hood Wilderness addition

The 2,090 acres of NFS lands that would be designated as part of the Crystal Springs Watershed Special Resources Management Unit are currently designated in the Forest Plan as A4-Special Interest Area for the Cloud Cap-Tilly Jane Historic District (660 acres), A11-Winter Recreation Area (236 acres), B2-Scenic Viewshed (1,160 acres), and C1-Timber Emphasis (34 acres). These

acres are also designated as Administratively Withdrawn, Riparian Reserves, and Matrix under the Northwest Forest Plan. The Forest Plan would be amended to change these acres to A14-Crystal Springs Watershed Special Resources Management Unit, which is further described in the section below. Under the Northwest Forest Plan, these lands would be changed to Administratively Withdrawn and Riparian Reserves.

The Forest Plan amendment would also designate the 769 acres of acquired lands as A14-Crystal Springs Watershed Special Resources Management Unit, which is further described below.

A14-Crystal Springs Watershed Special Resources Management Unit

The Crystal Springs Watershed Special Resources Management Unit would become A14 upon execution of the land exchange. A14 is a newly developed land use allocation proposed in this project. The following description of A14 is proposed to fully comply with the management direction for the Crystal Springs Watershed Special Resources Management Unit pursuant to the Omnibus Act. This proposed amendment to create the management direction for A14 lands would only apply to the lands within the Crystal Springs Watershed Special Resource Management Unit (figure 13). The following *existing* land use allocations would no longer apply to the area within the Management Unit: A4-Special Interest Area for the Cloud Cap-Tilly Jane Historic District; A11-Winter Recreation Area; B2-Scenic Viewshed; and C1-Timber Emphasis.

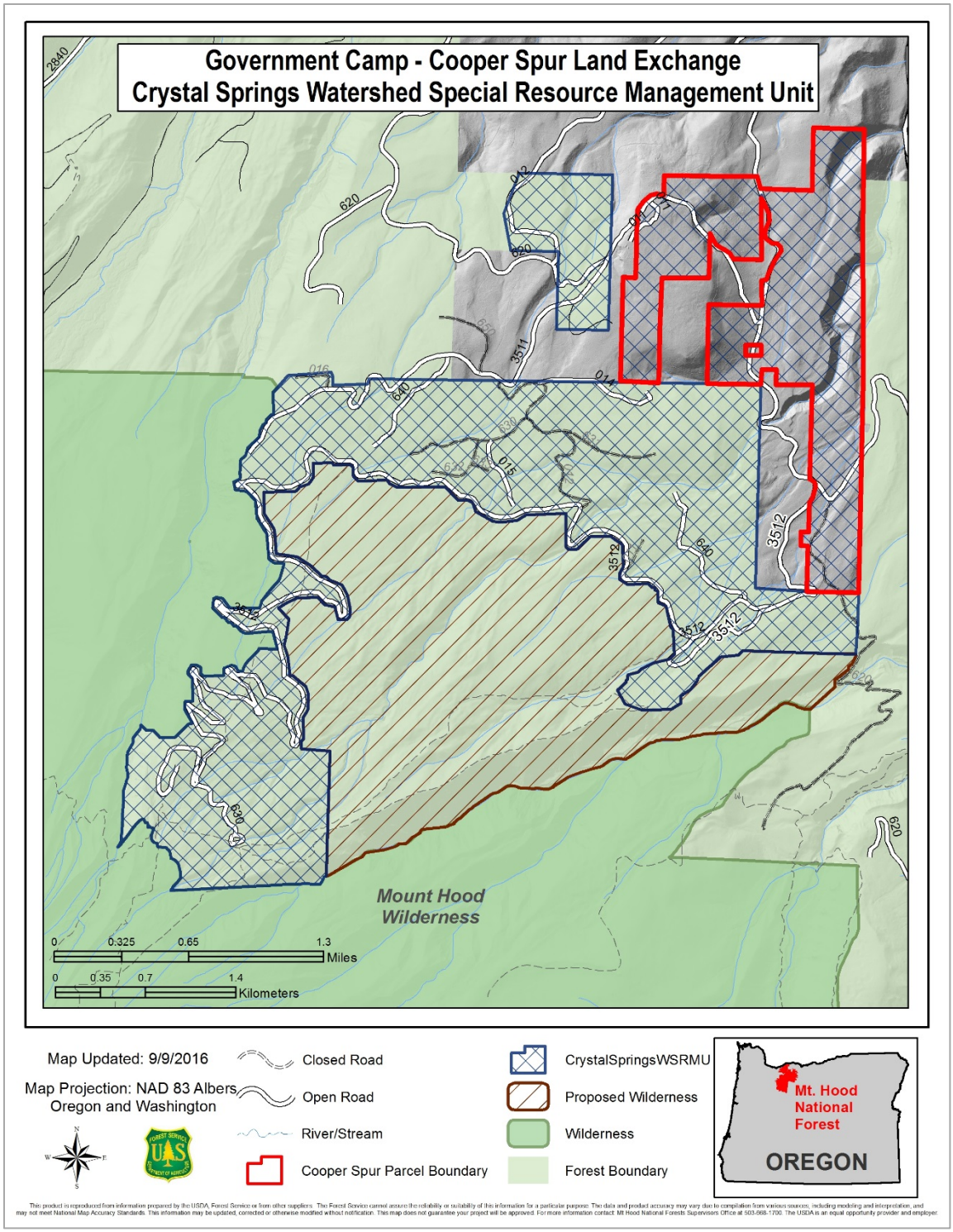

Figure 13. Proposed Crystal Springs Watershed Special Resources Management Unit

The following language below would be added to the Forest Plan for the management direction for A14-Crystal Springs Watershed Special Resources Management Unit.

Goal

As established per the Omnibus Public Land Management Act (Public Law 111-11, March 30, 2009), the purposes of the Crystal Springs Watershed Special Resources Management Unit (herein referred to as the "Management Unit") are to (A) ensure the protection of the quality and quantity of the Crystal Springs watershed as a clean drinking water source for the residents of Hood River County, Oregon; and (B) to allow visitors to enjoy the special scenic, natural, cultural, and wildlife values of the Crystal Springs watershed (PL 111-11, Section 1205(a)(2)).

Location

The designation of the Management Unit applies specifically to the portion of the Crystal Springs watershed in Hood River County, Oregon as depicted on a map dated June 2006 (see PL 111-11, Section 1205(a)(1)(A)). Also, a map of the Management Unit is provided above. The Management Unit does not include any National Forest System land that is designated as wilderness by Section 1202 of the 2009 Omnibus Public Land Management Act (PL 111-11, Section 1205(a)(1)(B)). Further, the withdrawal of location, entry, and patent under the mining laws does not apply to the parcel of land generally depicted as ''HES 151'' on the map (PL 111-11, Section 1205(a)(1)(C)(ii)).

There are no other management areas representing Management Requirements that overlap the A14 Management Area boundaries. All forestwide standards and guidelines apply; however, A14 prescriptions predominate over other Forest Plan prescriptions.

Desired Future Condition

Major Characteristics

- Provides consistently excellent water quality (e.g., clarity, temperature and chemistry).
- No more than 25 percent of the Management Unit will be in a hydrologically disturbed condition at any time.
- Excellent fish spawning and rearing habitat, high quality waterfowl breeding, nesting and resting habitat, wildlife cover, and diverse plant communities.
- A variety of tree sizes exist, representing a healthy, resilient landscape.
- Each area is uniquely formed by natural forces and historic human achievement.
- Each area is unique by itself and presents its own special set of values and experiences.
- Maintain and improve opportunities for visitors to experience the natural landscape and the historic human environment. These opportunities are also encouraged and managed appropriately.
- Opportunities for environmental and cultural/historic education and interpretation are emphasized.
- Area has special characteristics, such as: massive lava flows, glacial cirque basins, high elevation meadows and forests, hot springs, outstanding views of majestic mountains, old growth forests, unique plant communities, unique combinations of

geology, ecology, and hydrology, interpretive trails and visitor points and/or historic buildings and travel routes.

- No new National Forest System roads are constructed.
- The transportation system is managed to preserve the integrity of the natural and historic environments.

Sensory Perceptions

- Expansive vistas.
- General feeling of "closeness" to nature.
- Solitude and tranquility.
- Sense of curiosity, discovery and inspirational.
- Physically challenging.
- Sense of kinship and sharing with individuals who hold similar values.
- Sights, sounds and smells associated with humans are evident but subordinate to the experience.
- Presence or evidence of a variety of wildlife, plants and animals.

Standards and Guidelines

A. Dispersed Recreation and Developed Recreation

1. New developed recreation sites, or expansions to existing sites, may occur provided watershed (i.e., water, soil, and fish) values are protected.
2. The development of new or expansion of existing recreation sites, facilities and trails (hiking and cross-country skiing) may occur, but should avoid or protect sensitive watershed lands.
3. Developments or expansions should avoid special aquatic and terrestrial habitats (e.g., side channels, ponds, and wetlands).
4. Where existing developments (e.g., recreation sites and trails) are not consistent with riparian and/or watershed values, modification or rehabilitation of the site or facility may occur.
5. Dispersed recreation and natural resource management interpretation should be encouraged, but should be discouraged within 100 feet of waterways. Whenever damage occurs to riparian resources, the damaged site shall be restored.

B. Visual Resource Management

1. Management activities within the cultural landscape of the Cloud Cap – Tilly Jane National Historic District (see map below) shall meet a visual quality objective (VQO) of retention in the foreground and partial retention in the middleground and background distance zones, as seen from open roads, high recreational use areas, and water bodies.
    a. Foreground retention for the Cloud Cap Road within the National Historic District is applied to lands visible for distances up to 0.5 miles from the road and public areas, and means the following:
        i. Vegetation is composed primarily of multi-age, multi-species stands with diverse understory of natural plant associations (where biologically feasible).

ii. Numerous large diameter, old trees are a major component of the stands (where biologically feasible).
iii. Small, natural appearing openings provide diversity and a sense of depth.
iv. The ground is generally free of unnatural forms and patterns of debris or litter.
v. Seasonal changes in vegetation color and texture are emphasized.

b. Middleground and background partial retention is applied to lands visible for distances from 0.5 to 5 miles from the Cloud Cap Road and public areas within the National Historic District, and means the following:
   i. Natural appearing forest landscape, with little evidence of human alteration.
   ii. Dominant visual impression is mostly continuous tree canopies, with diversity in occasional natural appearing openings.
   iii. Mosaic of species and age classes add texture and color contrast in natural patterns.
   iv. Management activities repeat form, line, color, and texture common to the characteristic landscape.

2. Management activities outside of the cultural landscape of the Cloud Cap – Tilly Jane National Historic District (see map below) shall achieve a VQO of partial retention from open roads.

3. VQOs accepting less visual quality disturbance shall be applied when A14 Management Areas are located within “designated Viewsheds.”

4. See Forestwide Visual Resource Management Standards and Guidelines for VQOs prescribed for trails.

C. Cultural Resources Management

1. The area within the cultural landscape of the Cloud Cap – Tilly Jane National Historic District (see map below) shall meet the Recreation Opportunity Spectrum (ROS) classification of Roaded Natural (FSM 2311.1).

2. Authorized excavation of cultural resource sites shall be conducted in a manner which minimized impacts on watershed values. Ground and vegetation disturbance associated with site excavation should be rehabilitated immediately following completion of activities.

3. Maintenance and preservation of historic structures and features may be conducted.

4. The use of preservation and waterproofing materials and chemicals such as but not limited to fungicides, pesticides, stains, paints and sealers may occur, provided their use follows the appropriate precautions for the handling, storage, and application of the materials.

5. Vegetation management for the restoration and maintenance of the historic vistas at Inspiration Point, at milepost 8.4, and at the Amphitheater shall be permitted.

6. The stands of whitebark pine within the cultural landscape of the Cloud Cap – Tilly Jane National Historic District (see map below) should be retained as much as possible (i.e., pruned, thinned, and fertilized to maintain vigorous growth and prevent disease).

7. See Forestwide Cultural Resources Management Standards and Guidelines.

D. Wildlife and Fisheries

1. Wildlife and fisheries rehabilitation and enhancement projects may be permitted, provided watershed values are protected. Projects shall emphasize improvement or rehabilitation of key and/or sensitive wildlife and fisheries habitat.

E. Range Management

1. Commercial livestock grazing is prohibited.

F. Timber Management

1. Regulated timber harvest shall not occur, other than activities relating to the harvest of merchantable products that are byproducts of activities conducted to further the designated purposes of the Management Unit (see Goals). Watershed impact areas should not exceed "thresholds of concern[8]" (TOC) of 25 percent.
2. Biological and manual methods of vegetation management should be favored in domestic use watersheds.
3. Fuel reduction and forest health management treatments may be conducted to maintain and restore fire-resilient forest structures containing late successional forest structure characterized by large trees and multi-storied canopies, as ecologically appropriate in any of the following areas: within 400 feet of structures on NFS land or on adjacent private land; within 400 feet of the Cooper Spur Road, the Cloud Cap Road, and the Cooper Spur Ski Area Loop Road; and on any other NFS land with priority given to activities that restore previously harvested stands, including the removal of logging slash, smaller diameter material, and ladder fuels.
4. Firewood cutting should be allowed only in specifically designated areas.
5. Activities involving fertilization of vegetation, in municipal or domestic watersheds shall be coordinated with appropriate municipalities or individuals.
6. Timber salvage activities may occur, if needed to ensure the protection of the quality and quantity of the Crystal Springs watershed as a clean drinking water source for the residents of Hood River County, Oregon or to allow visitors to enjoy the special scenic, natural, cultural, and wildlife values of the Crystal Springs watershed.

G. Soil, Water and Air Quality

1. See Forestwide Soil Productivity, Water, Riparian Area, and Air Quality Standards and Guidelines.

H. Minerals Management

1. New minerals exploration and development shall be prohibited.
2. Subject to valid rights in existence on the date of the Omnibus Public Land Management Act (Public Law 111-11, March 30, 2009), the Federal land designated as the Management Unit is withdrawn from all forms of entry, appropriation, or disposal under public land laws; location, entry, and patent under the mining laws; disposition under all laws pertaining to mineral and geothermal leasing or mineral materials. Except for the parcel of land depicted as HES 151.
3. See also Forestwide Minerals Management Standards and Guidelines.

[8] The "threshold of concern" represents the percentage of a watershed that is hydrologically disturbed by management activities at any one time (see Forest Plan p. Four-53).

I. Geology

1. See Forestwide Geology Standards and Guidelines

J. Lands and Special Uses

1. The Secretary may acquire from willing landowners any land located within the area identified on the map included in Section 1205(a)(1)(A) of the Omnibus Act as the "Crystal Springs Zone of Contribution."
2. See also Forestwide Lands Program and Special Uses Standards and Guidelines.

K. Transportation Systems/Facilities; Travel and Access Management

1. New road construction and renovation of existing roads shall only be permitted to provide for public health and safety.
2. Temporary roads may be used to further the Goals (see above) of the Management Unit and should be reclaimed upon use.
3. The Secretary may provide for the closure or gating to the general public of any Forest Service Road within the Management Unit, except for the Cloud Cap Road, which shall be administered in accordance with applicable law.
4. The placement of new fuel storage tanks is prohibited.
5. Road crossings for perennial streams shall be designed to meet aquatic organism passage (AOP) Standards and Guidelines.
6. Drainage systems for roads or parking areas shall incorporate practical features to minimize or eliminate sediment and/or other pollutants from discharging directly into water bodies (i.e. streams, lakes, ponds, reservoirs, and wetlands).
7. Recreational off-road vehicle use (other than over-snow) is prohibited.

L. Fire Prevention and Suppression

1. Fire retardants can be applied to the extent necessary to further the purposes of the Management Unit (see Goal).
2. See Forestwide Forest Protection Standards and Guidelines

M. Wood Residue Management

1. See Forestwide Soil Productivity, Wildlife and Forest Diversity Standards and Guidelines.
2. Prescribed burning may be permitted to enhance watershed resistance to catastrophic wildfire.

N. Integrated Pest Management

1. Biological control measures should be favored. See Forestwide Timber Management Standards and Guidelines regarding integrated pest management.
2. Except to the extent necessary to further the purposes of the Management Unit (see Goal), the application of any toxic chemicals (other than fire retardants), including pesticides, rodenticides, or herbicides shall be prohibited. However, in order to protect the integrity of the natural system of the Management Unit (see Goal), the spread of State-listed noxious weeds and other invasive species of management concern may be prevented through the use of approved herbicides. If the application of herbicides does occur, it shall be coordinated with associated municipalities, groups or individuals.

Summary of the Proposed Action

A summary of the proposed changes to the Forest Plan land use allocation acres are displayed in the following tables. Also, a summary of key elements of the proposed action are displayed below.

Table 2. Acreage of each existing land use allocation that would become A2-Wilderness

Land Use Allocation	Description	Existing Condition Acres
A4	Special Interest Area (Cloud Cap-Tilly Jane Historic District)	492
A11	Winter Recreation Area	1,109
B2	Scenic Viewshed	108
	Total Wilderness Addition	1,709

Table 3. Acreage of each existing land use allocation that would become A14-Crystal Springs Watershed Special Resources Management Unit

Land Use Allocation	Description	Existing Condition Acres
A4	Special Interest Area (Cloud Cap-Tilly Jane Historic District)	660
A11	Winter Recreation Area	236
B2	Scenic Viewshed	1,160
C1	Timber Emphasis	34
n/a	Private lands acquired	769
	Total acres	2,859

Table 4. Proposed action summary

Description of Action	Measure	Value
Lands to be conveyed	Acres	109
Lands to be acquired	Acres	769
Crystal Springs Watershed Special Resources Management Unit	Acres	2,859 (769 from acquired lands; 2,090 from existing NFS lands)
New wilderness addition to the Mt. Hood Wilderness	Acres proposed to be added	1,709
Cooper Spur Ski Area special use permit area	Existing acres	1,012
Cooper Spur Ski Area and Mountain Resort special use permit area	Acres proposed for new special use permit area	129
Facilities	Number of buildings/structures to be acquired	20 structures, ski lift, 3 rope tows, 2 wells, tennis court, spa, several septic tanks, and 2 drain fields

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate reasonable alternatives to a proposed action and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the proposed action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the Omnibus and proposed Clarification Acts or duplicative of the alternatives considered in detail. Two alternatives considered but not fully developed are described below.

Direct Purchase Alternative

Internal administrative guidance calls for the Forest Service to consider a direct purchase alternative as reflected in Forest Service Handbook 5409.13, Sec. 33.41a:

> Land exchange evaluations shall consider a purchase alternative in the National Environmental Policy Act (NEPA) analysis and document the non-Federal party's position on the United States' direct purchase of the proposed exchange parcels documented in the administrative record.

Under such an alternative, no lands would be exchanged; rather 769 acres of non-Federal land would be purchased from the non-Federal Party by the United States.

The Forest Service determined that this alternative was not warranted for consideration in detail in this EIS, however, for several reasons:

1. The non-Federal party is not a willing seller as evidenced by prior court actions between the Hood River Valley Residents Committee (HRVRC) and Mt. Hood Meadows Ski Area, a dispute about proposed development of the non-Federal lands. The parties to the exchange wish to acquire Federal land adjacent to the village of Government Camp. Mt. Hood Meadows wishes to dispose of some of its property to the United States. Mt. Hood Meadows is unwilling to sell their land to the United States. They have entered the exchange with the desire to obtain the Federal parcels. The purchase option would not meet any of the landowner's goals and, therefore, the option to purchase the private parcels is not viable.
2. Funds are not available to purchase the non-Federal lands. The Forest Service has limited funds for acquiring lands. The Trust for Public Land facilitates Federal agency acquisitions of important parcels by negotiating and temporarily holding non-Federal parcels. Funding sources are generated from the Land and Water Conservation Fund (LWCF). Efforts to secure the necessary appropriation would have to compete against other regional and nationwide requests. Given higher priority requests, it is unlikely that the necessary funds would be appropriated due to the competitive nature of the LWCF process.
3. Finally, Section 1206 of the Omnibus Act directs the Forest Service to acquire the non-Federal lands via a specifically delineated Land Exchange. The Omnibus Act supersedes other Federal laws regarding land exchanges, and unequivocally prescribes the mode of acquisition of the non-Federal lands at issue in the Proposed Action. Per FSM 5409.13.31.13:

   "Legislated land exchanges often include provisions that conflict with standard land exchange authorities or with Forest Service land exchange regulations at Title 36, Code of Federal Regulations, part 254, subpart A (36 CFR part 254, subpart A). When a

> legislative exchange contains direction that conflicts with current regulation or policy, the legislation overrides the requirements of regulation and policy."

For the foregoing reasons, the non-Federal lands cannot be acquired through direct purchase, and therefore, it is not a feasible alternative and was eliminated from detailed study.

Deed Restriction Alternative

Consideration of a Deed Restriction alternative is also ordinarily to be undertaken pursuant to administrative guidance in Forest Service Handbook 5409.13, Sec. 33.41a, which states:

> The evaluation should also include other exchange configurations that were considered, including a deed restriction alternative when appropriate (36 CFR 254.3(h) and sec. 32 of this Handbook). (h) Reservations or restrictions in the public interest. In any exchange, the authorized officer shall reserve such rights or retain such interests as are needed to protect the public interest or shall otherwise restrict the use of Federal lands to be exchanged, as appropriate. The use or development of lands conveyed out of Federal ownership are subject to any restrictions imposed by the conveyance documents and all laws, regulations, and zoning authorities of State and local governing bodies.

The purpose of a deed restriction is to limit use or development of the Federal lands after conveyance as a means of addressing an environmental concern. Deed restrictions controlling future use and development of Federal lands conveyed into non-Federal ownership should be used only when required by law, regulation, or executive order, or when the intended use of the conveyed Federal land would substantially conflict with established management objectives on adjacent Federal lands (FSH 5409.13, Sec. 33.41c).

The applicable congressional direction pursuant to which the Forest Service is operating in evaluating this proposed action already includes provisions regarding the reservation of conservation and trail easements, and thus, appropriate restrictions to address environmental and recreational concerns are already included in the proposed action as it has been defined and prescribed by the Congress.

The Forest Service Handbook 5409.13.32.12 addresses the Forest Service's consideration of deed restrictions and reservations, as follows:

> …due to the reduced value of the Federal estate and perpetual obligations that may be imposed on the United States, initiate or agree to a reservation or restriction on the Federal lands only when needed to protect the public interest or to satisfy a requirement of law, such as those concerning wetlands, floodplains, heritage sites, and so forth (36 CFR 254.3(h)). For example, if the highest and best use of the Federal lands is for subdivision development, a deed restriction limiting development to protect a heritage site from ground-disturbing activities could have a negative impact on the value of the Federal land. The costs of deed reservations and restrictions shall be considered in the appraisal and decision processes. When a proposal is accepted by both parties, an Agreement To Initiate an exchange (ATI) (sec. 32.7) is executed that defines the proposal and documents the assignment of responsibilities and costs of each party (36 CFR 254.4). Modifications to the terms and agreements to the ATI must be documented through an amendment.

The proposed action includes the deed restrictions prescribed by the legislation. The Responsible Official has been given reasonable discretion to subject the Land Exchange to additional terms and conditions if she ultimately were to find any are required, but the Forest Service has determined that development of a wholly separate alternative to be considered in detail is not

warranted or necessary under these circumstances, particularly where it is operating under legislative direction that already includes quite specific deed restrictions the Congress considered and found necessary.

Chapter 3 – Affected Environment and Environmental Consequences

Introduction

This chapter presents the relevant resource components of the existing environment. It describes the resources of the area that would be affected by the alternatives. This chapter also discloses the environmental effects of implementing the alternatives. These form the scientific and analytical basis for comparing the alternatives described in chapter 2.

Most specialists used a Geographic Information System (GIS) to calculate the miles and areas affected, or to model habitats. If specialists used models other than GIS, it would be described in their report.

Analysis Assumptions

The following assumptions were identified regarding the future use and management of the conveyed and acquired lands, as an aid in identifying the resources that may be affected by the proposal. All assumptions were based on the best scientific, social, and economic information available at the time of analysis. References to the information from which each assumption is based are provided.

Government Camp: The Federal Lands to be Conveyed

Future development is based on Clackamas County zoning regulations and the existing condition of the private parcel that lies between the two Government Camp parcels. This private parcel is assigned the same zoning criteria as the parcels to be conveyed. The Clackamas County Planning and Zoning Division was contacted for assistance in interpreting the zoning regulations (Project Record). The lands to be conveyed would be zoned primarily as Hoodland Residential (HR), with Open Space Management (GCOSM) buffers along the property lines (see figure 14).

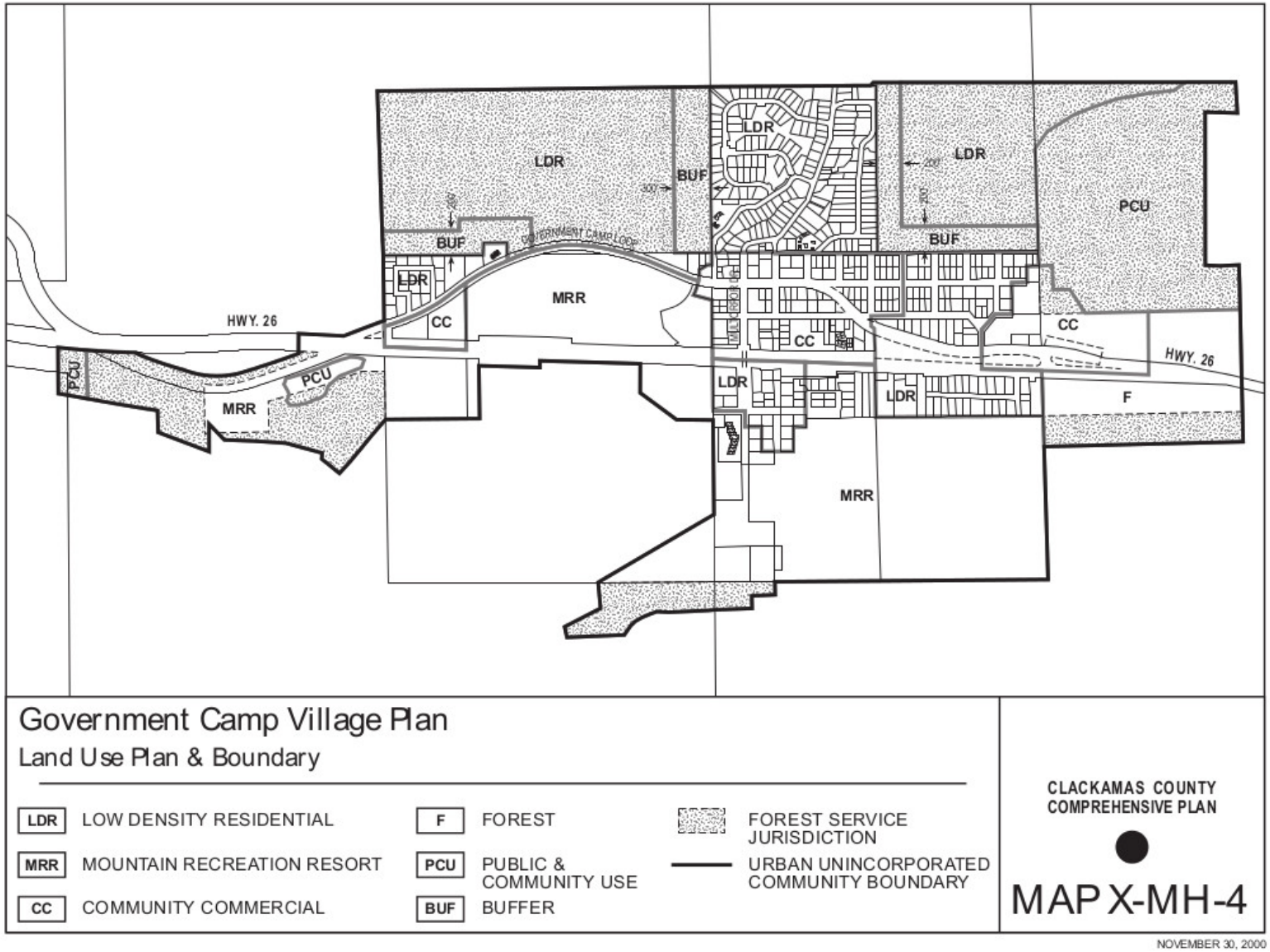

Figure 14. Clackamas County zoning districts and buffers for the parcels to be conveyed

Hoodland Residential (HR) is a single family residential zoning district that would permit development similar to the subdivision between the two parcels to be conveyed. HR is designated as Low Density Residential in the Clackamas County Comprehensive Plan.[9] Section 317.01 of the Clackamas County Zoning and Development Ordinance describes the purpose, applicability, and uses permitted for the HR District. The types of uses that are prohibited are anything not listed as allowable, two-plus family dwellings and commercially related uses or services. Hotels and motels are also not allowed. Section 314.04 describes the applicable dimensional standards and allowed modifications. Minimum yard depth and building separation, and maximum lot coverage and building height are defined. There is no yard depth adjacent to the Mt. Hood National Forest. Maximum building heights are 40 feet, and up to 50 feet to accommodate understructure parking.

Generally, residential development is prohibited in the Floodplain Management District regulated by Section 703, river and stream corridors, wetlands, mass movement areas regulated by Section 1003, and on slopes greater than 25 percent.

The Government Camp Open Space Management District (GCOSM) is intended to preserve and manage the Government Camp Village open space resources for the benefit, health, and welfare of the people. These resources provide the community with recreation, water quality treatment facilities, natural protection areas and pedestrian networks. Section 711 of the Clackamas County Zoning and Development Ordinance describes the purpose, areas of application, uses, buffer areas, dimensional standards, and development standards for the GCOSM. It is oriented toward providing non-motorized recreational, natural, and visually appealing experiences. Residential development is prohibited.

The interdisciplinary team developed the following list of assumptions based on the best available information at the time of their analyses. This list was developed through interpretation of the Clackamas County zoning ordinances, including the potential variances that could be approved at the time of development. It also assumes all required State and Federal laws regarding the protection of streams and wetlands would be followed.

- All acreages and mileages are approximate. For consistency in the analysis, the numbers used throughout this EIS were generated using spatial data (i.e., Geographical Information Systems). All final acre values will be determined by a licensed surveyor at a future date.
- Effects analysis assumes full development of the land.
- Development on the parcels to be conveyed will be subject to State and County laws, building codes, and zoning regulations.
- Size of the west parcel to be conveyed is 68 acres.
- Size of the east parcel to be conveyed is 41 acres.
- The wetland conservation easement would be approximately 31 acres and it includes locally inventoried wetland delineations plus geomorphic functional contributing areas. The latter was determined using bare earth LiDAR and ArcGIS hydro tools to define stream initiation zones and provincial topographic contributing areas which were then refined based upon field validation.

[9] For more information regarding the Clackamas County Comprehensive Plan, please go to: http://www.clackamas.us/planning/comprehensive.html.

- There are nine acres of wetlands, as delineated by the GIS dataset created by Terra Science, Inc. in 2006. Therefore, the acres of wetland protection within the lands to be conveyed ranges from nine to 31 acres.
- 108 acres of parcels to be conveyed is currently Forest Plan LUA A11-Winter Recreation Area.
- One acre of parcels to be conveyed is currently Forest Plan LUA A4-Special Interest Area.
- There would be a non-exclusive trail easement under Clarification Act (definition provided in recreation section).
- There would be an exclusive trail easement under Omnibus Act (definition provided in recreation section).
- There would be a 24-foot trail easement (12 feet from center line) under Clarification Act, which is approximately three acres.
- There would be a 32-foot trail easement (16 feet from center line) under Omnibus Act, which is approximately four acres.
- There would be 65 developable acres after removal of wetlands, acres zoned as buffer and stream conservation areas, and if 15 percent of that area is removed for roads under Clarification Act. This could include approximately 260 lots.
- There would be 54 developable acres after removal of wetlands, acres zoned as buffer, stream conservation areas, and wetland conservation easements, and if 15 percent of that area is removed for roads under the Omnibus Act. This could include approximately 212 lots.
- Lots would be approximately 10,890 square feet (1/4 acre).
- Lot coverage (impervious surface) would not exceed 40 percent.
- The building type would be residential.
- Building heights would not exceed 50 feet.
- There would be no buffer (setbacks) along boundaries with NFS lands (open space zoning).
- The existing Forest would be converted to non-forested lands.
- The 6th field HUC is Zigzag Canyon.
- There is 0.5 mile of stream with fish present.
- There is 0.7 mile of stream with fish absent.
- There is 0.5 mile of perennial stream.
- There is 0.7 mile of intermittent stream.
- The intermittent stream buffer width would be 50 feet from the streambank.
- The perennial stream buffer width would be 70 feet from streambank.
- There are 58 acres of Riparian Reserves as based on the Northwest Forest Plan definition.

Cooper Spur: The Private Lands to be Acquired

- Special use permits would be issued for the management of the Cooper Spur Ski Area and Cooper Spur Mountain Resort.
- The proposed permitted area for both the Cooper Spur Ski Area and Cooper Spur Mountain Resort would be approximately 129 acres.
- If there is no interest/response to the special use permit prospectus', or adequate proof of the ability to successfully manage and operate the facilities is not provided, then the facilities would be decommissioned
- There are eight acres of existing wetlands.
- The 6th field HUC is the Middle East Fork Hood River.
- There are three miles of perennial streams.
- There is 0.3 mile of intermittent stream.
- There are approximately 166 acres of Riparian Reserves on the lands to be acquired based the Northwest Forest Plan definition.

Past, Present, and Reasonably Foreseeable Actions

The interdisciplinary team considered the effects of past actions as part of the existing condition. The current conditions are the sum total of past actions. The Council on Environmental Quality recognizes "agencies can conduct an adequate cumulative effects analysis by focusing on current aggregate effects of past actions without delving into the historical details of individual past actions" (Council on Environmental Quality 2005). Innumerable actions over the last century and beyond have shaped the Mt. Hood National Forest land base. Attempting to isolate and catalog these individual actions and their effects would be nearly impossible. By looking at current conditions, the effects of past human actions and natural events, regardless of which event contributed to those effects are captured.

Courts have interpreted a "reasonably foreseeable future action" as one that has been proposed and is in the planning stages. To analyze the cumulative effects of present and reasonably foreseeable future actions, each resource specialist considered the projects listed in table 5. They identified the ones expected to cause effects to their resource, at the same time and in the same place as effects from the proposed action.

Table 5. Past, present, and reasonably foreseeable actions considered for cumulative effects

Government Camp Parcels
Mirror Lake Trailhead Relocation Project
Oregon Department of Transportation (ODOT) Highway 26 Safety Widening Project
Ongoing ODOT road maintenance, including snowplowing on NFS lands, Government Camp, and Highway 26
Timberline, Skibowl and Summit Ski Areas' winter recreation activities, operation and maintenance
Timberline, Skibowl and Summit Ski Areas' summer recreation activities, operation and maintenance (such as bike parks, race events and concerts)
Skibowl Ski Area Snowmaking Infrastructure Improvements Project (water withdrawal from Camp Creek)
Portland General Electric (PGE) powerline right-of-way maintenance
Clackamas County waterline/infrastructure maintenance
Ongoing Forest Service trail use and maintenance (winter and summer uses) for the Glade, Alpine, Timberline to Town, Mirror Lake, and Government Camp area trails
Timberline Ski Area Mountain Bike Trails and Skills Park Project, including watershed restoration activities
Camp Creek Summer Home Tract
Government Camp Sewer District operations
Government Camp Water District operations
Collins Lake Resort operations
Private water diversions from Camp Creek and Little Zigzag
Mazama Lodge Parking Area Expansion Project
Operation and maintenance of Kiwanis Camp
Operation and maintenance of Lady Creek Water System
Cooper Spur Parcels
Past timber harvest on NFS lands
Past timber harvest and agricultural activities on private land
Ongoing ODOT road maintenance, sanding, and snowplowing on NFS lands (specifically the 3510 road (Cooper Spur Road) and the 3512 road (Cloud Cap Road)), as well as Highway 35
Forest Service vegetation treatment activities planned or underway (such as the Tilly Jane & Polallie Cooper Hazardous Fuels Reduction and other general pre-commercial treatments)
Gnarl Ridge Fire, including burned area rehabilitation activities
Past aquatic restoration projects, including road decommissioning and East Fork Hood River stream channel improvements projects
Debris flows in the East Fork Hood River from 2000 and 2006
Invasive plant treatments
Cooper Spur Ski Area activities, operation and maintenance
Development of private land (past and current)
Ongoing recreation and trail use and maintenance (winter and summer uses) for the Tilly Jane and Cloud Cap areas
Crystal Springs Water District operations
Timberline Trail - Eliott Crossing Relocation Project
Ongoing or upcoming Forest Service road closures
Wilderness additions from the 2009 Omnibus Act (not including the Mt. Hood Wilderness addition which is included in the proposed action for this project)
Existing Cloud Cap and Tilly Jane special use permits

In regard to addressing any potential cumulative impacts that could arise in connection with the Forest Service's proposed acquisition of the Cooper Spur parcels, it should be first be noted that the proposed action of itself has no direct environmental effects, as it simply comprises a real-estate transaction that would result in a change of ownership of the respective parcels at issue. Nor does the proposed action include or authorize any ground-disturbing activities on the Cooper Spur parcels that would follow transfer of ownership to the Forest Service. In regard to evaluating the effects of past actions that have been carried out on the Cooper Spur parcels or within their immediate vicinity, the Council on Environmental Quality has issued guidance indicating that, "[g]enerally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." We find that there are no factors present that would make reliance on that guidance inadvisable or improper, and so we are relying upon the environmental baseline as the principal basis for our consideration of the effects of past actions in regard to these parcels. In addition, with the exception of the Polallie Cooper Hazardous Fuels Reduction Project, our investigation has found no existing proposals or sufficiently concrete, likely, and/or detailed plans or proposals to engage in any ground-disturbing activities on these parcels or within their immediate vicinity, and so, per NEPA's implementing regulations, we do not have a duty to consider such effects within the scope of our cumulative impact analysis in this EIS.

Even accounting for this specific reasonably foreseeable project, however, because the proposed action would not result in any direct or indirect environmental impacts on the Cooper Spur parcels or within their immediate vicinity, by definition there cannot be any incremental impacts in this context that could add to and/or accumulate with the effects of other past, present, and reasonably foreseeable future actions for purposes of this DEIS. The one primary exception is the addition of the Cooper Spur facilities to the Forest's building inventory – the cumulative impact of adding more structures is discussed in the Facility section below. In addition, any future activities proposed for the Cooper Spur parcels would be considered and reviewed under NEPA; at that time, any effects would be analyzed based on the activities being proposed. In particular, we would note that the Forest Service has prepared and issued in January 2016 a Draft Environmental Assessment for the Polallie Cooper project referenced above, and we will continue to monitor and consider the analysis in that NEPA document to help inform the analysis in this DEIS, even though we have determined, as noted above, that the project will not give rise to any synergistic effects from the proposed action subject to analysis in this DEIS.

Therefore, in light of the foregoing, the majority of the reasonably foreseeable actions evaluated as part of the cumulative effects analyses in this DEIS focus on the likely future uses of the parcels at Government Camp, with respect to which there is a much greater degree of certainty, detail, and understanding of the likely shape and parameters such uses are projected to take.

Specialist Reports

Relevant resource components from each resource specialist's report are highlighted in this chapter. Components include the existing environment which is the baseline environmental condition as described under Alternative 1-No Action, and the anticipated environmental effects of implementing the Proposed Action.

This DEIS incorporates by reference the resource specialists' reports in the Project Record (40 CFR §1502.21). These reports contain the detailed data, executive summaries, regulatory framework, assumptions and methodologies, analyses, conclusions, maps, references, and technical documentation that the resource specialists relied upon to reach their conclusions.

Project Record

As also stated in chapter 1, the Government Camp-Cooper Spur Land Exchange Project Record is referenced in an effort to keep this document brief and concise as per 40 CFR §1502.21. The Project Record contains a variety of documents, including, but not limited to: specialists' reports, literature, supporting documents, and other process-related documents.

Botany

Introduction

This section of the EIS discloses the potential effects of the proposed land exchange on sensitive botanical species (vascular plants, bryophytes, lichens, and fungi) on the Region 6 Regional Forester's Special Status Species List (July 2015), the potential habitat of Survey and Manage botanical species (December 2003 List), ethnobotanical species, and non-native invasive plants. Botanical species, forested plant communities, and non-native invasive plant species that currently occupy the land exchange parcels are described in detail so that the respective terrestrial ecosystem values and services of the Government Camp and Cooper Spur parcels can be compared and evaluated.

Land exchanges are administrative actions carried out under statutes and regulations that require public participation, ESA Section 7 consultation, executive order requirements for wetland protection, and environmental analysis. Land exchanges are not habitat-disturbing activities, as described in the 2001 Survey and Manage ROD standards and guidelines (USDA Forest Service and USDI BLM 2001, p. 22) and as determined by the Pacific Northwest Regional Office (Portland, OR). Therefore, land exchanges do not trigger the need for Survey and Manage pre-disturbance surveys; however, a land exchange may affect the future management of Survey and Manage species; thus, a discussion and disclosure of currently available information and likely impacts to these species are appropriate in the NEPA document.

Physical inventories of Survey and Manage species are not triggered by a land exchange, but if there is existing information that a species could be impacted negatively or positively, then it is appropriate to disclose what that likely impact may be. Types of discussions that may be useful (depending on species) include: information on existing known species' sites, long-term or short-term anticipated gains or losses in potential habitat, changes in the distribution and connectivity of habitat, impacts of potential changes in road density, changes in security habitat, anticipated human disturbance levels, and habitat fragmentation particularly considering whether or not these effects would limit dispersal and may affect species-persistence objectives.

Although not required, surveys for Survey and Manage vascular plants, bryophytes, and lichens were combined with surveys for Region 6 sensitive species. The Botany Specialist Report (Project Record) identifies what Survey and Manage botanical species have potential habitat in the land exchange parcels in order to disclose the impacts that future development or management activities may have on a given species.

The Botany Specialist Report provides additional background information and detail regarding the methodology undertaken to conduct the analysis. It also includes much supporting information regarding the Forest Plan and other laws and regulations related to this resource, including the process and requirements for conducting Biological Evaluations.

Affected Environment

Plant Associations

Lands to be Conveyed

The forest stands in the western and eastern parcels are in the Pacific silver fir zone, which occurs from roughly 3,000 to 5,000 feet (900 to 1,500 meters) in elevation on the western slopes of the Cascade Range from British Columbia south to the southern end of the Willamette National Forest (Hemstrom et al. 1982, McCain and Diaz 2002). The elevation of the Government Camp land exchange parcels ranges from 3,600 to 4,000 feet (1,100 to 1,200 meters). Pacific silver fir is the climax tree species in this zone. "Climax" refers to the tree species that can be expected to dominate a forest over the passage of time (180^{+} years) barring disturbance (e.g., fire, logging, volcanic eruptions, flooding) that would interrupt or alter forest development. The Pacific silver fir zone is wet in winter with deep snow accumulations at upper elevations and relatively dry in summer (Hemstrom et al. 1982).

Annual precipitation ranges from about 70 inches (1,800 mm) in local rain shadows to over 130 inches (3,350 mm) on some high ridges (Hemstrom et al. 1982). Much of this precipitation accumulates as a snowpack 3 to 10 feet (1 to 3 meters) deep that melts from May to July (Hemstrom et al. 1982). At elevations above 5,000 to 5,500 feet (1,500 to 1,670 meters), mountain hemlock is the climax tree species (Hemstrom et al. 1982, Diaz et al. 1997). At upper elevations, the Pacific silver fir zone blends into the mountain hemlock zone (Hemstrom et al. 1982). Some of the eastern parcel may lie in this transition zone between the Pacific silver fir zone and the mountain hemlock zone, despite the elevation of the parcels lying solidly in the Pacific silver fir zone.

Lodgepole pine is a pioneer (early seral) species in the mountain hemlock zone following disturbance (Simpson 2007, Simpson 2014, Diaz et al. 1997). Most lodgepole pine stands on the west side of the Cascade Range are seral and developed following stand-replacement fire or timber harvest (Franklin and Dyrness 1973). Lodgepole pine is present in both parcels but particularly in the eastern parcel. Stand-replacement fire and young infertile soils derived from andesitic lava flows explain the presence of lodgepole pine. Wildfires burned in the upper Zigzag River basin in 1901, during the period from 1908 to 1920, and in 1933–1934 (Zigzag Watershed Analysis, USDA Forest Service 1995). *The Oregonian* newspaper reported a fire occurring in April 1931, in the Mirror Lake area. A fire map in the Zigzag Watershed Analysis displays the Government Camp parcels as having burned once during one of these fire periods (which one is not clear). Mountain hemlock and Pacific silver fir broadly overlap in their ecological distribution in the Oregon Cascades, so that distinguishing between the two series can be difficult (Simpson 2007). In most stands within the mountain hemlock series, when Pacific silver fir is present, it will likely never be excluded, and is essentially a co-dominant even in climax and near-climax stands (Simpson 2007).

A note on the concept of potential natural vegetation (or "climax plant community") is helpful. A potential natural community is the biotic community that presumably would be established and maintained over time under present environment conditions, if all successional sequences were completed without additional human-caused disturbance (Hall 1998). Present environmental conditions include climate change, eroded or damaged soils, and natural disturbances in riverine riparian systems (Hall 1998). Grazing by native fauna and natural disturbances such as droughts, flood, wildfires, wind, insects, and disease are inherent in the development of communities; however, potential natural communities are described *without* disturbance by natural elements,

including fire (Hall 1998). The potential natural communities may include naturalized nonnative species. Thus, a potential natural community is composed of those species the investigator presumes will be most competitive over time (climax) and that will prevent establishment by less competitive (seral) species under existing site conditions and climate, and without human-caused disturbance (Hall 1998).

Pacific silver fir plant associations (Hemstrom et al. 1982, Simpson 2007), in order of likely occurrence in the Government Camp parcels, include the following:

Pacific silver fir/big huckleberry/beargrass (ABAM/VAME/XETE)

Pacific silver fir/Pacific rhododendron/beargrass (ABAM/RHMA3/XETE)

Pacific silver fir/Pacific rhododendron-Alaska huckleberry/western bunchberry (ABAM/RHMA3-VAAL/COCA13)

Pacific silver fir/Alaska huckleberry/western bunchberry (ABAM/VAAL/COCA13)

Pacific silver fir/Alaska huckleberry-salal (ABAM/VAAL-GASH)

Pacific silver fir-western hemlock/Pacific rhododendron-salal (ABAM-TSHE/RHMA3-GASH)

Possible mountain hemlock plant associations (Diaz et al. 1997, Simpson 2007) occurring in the Government Camp parcels include the following:

Mountain hemlock/big huckleberry/beargrass (TSME/VAME/XETE)

Mountain hemlock/big huckleberry/queen’s cup (TSME/VAME/CLUN)

Mountain hemlock/queen’s cup (TSME/CLUN)

Both Simpson (2007) and Diaz et al. (1997) note the presence of lodgepole pine as an early seral species following disturbance for the mountain hemlock plant associations listed above.

Lands to be Acquired

The Cooper Spur parcels occur in what is commonly called the *mixed conifer zone*. Use of this term is recommended advisedly because it has different meanings for various people (Topik et al. 1988). Concerning Cooper Spur it means forests with a diversity of conifer species (Douglas-fir, ponderosa pine, grand fir, lodgepole pine, western hemlock, mountain hemlock, western larch, Engelmann spruce, noble fir, Pacific silver fir, and subalpine fir). The Cooper Spur area is environmentally diverse not only with its diversity of conifer species but in its confluence of forest zones/series (grand fir, mountain hemlock, western hemlock, and Pacific silver fir). Many of the plant communities in the Cooper Spur parcels fit best in the grand fir series. Forests in the grand fir zone include a number of other conifers (notably Douglas-fir and ponderosa pine), but grand fir dominates the regeneration in the understory (Topik et al. 1988). Regeneration in many of the forest stands in the Cooper Spur parcels is dominated by grand fir. The upper elevation limit of the grand fir zone occurs where abundant moisture and cool temperatures allow development of stands dominated by Pacific silver fir, mountain hemlock, or subalpine fir (Topik *et al.* 1988).

Plant associations in the grand fir series for the area include the following:

Grand fir/vine maple/vanilla-leaf (ABGR/ACCI/ACTR)

Grand fir/twinflower (ABGR/LIBO)

Grand fir/oceanspray (ABGR/HODI)

Grand fir/dwarf Oregon grape (ABGR/MANE)

Other plant associations that may occur in the parcels include the following:

Mountain hemlock/queen's cup (TSME/CLUN)

Western hemlock/vanilla-leaf (TSHE/ACTR)

Pacific silver fir/vanilla-leaf (ABAM/ACTR)

The grand fir/vine maple/vanilla-leaf association seems to be the best fit for many of the plant communities in mature forest in the parcels where natural regeneration and plant association indicator species are evident. Determining plant associations (potential natural vegetation or climax plant communities) in plantation (early seral) stands is less straightforward at the present, but it can be assumed that they will more or less follow the same trajectory as they develop over time as neighboring mature stands.

Environmental Consequences

Direct and Indirect Effects

Alternative 1

Under the no-action alternative, approximately 100 acres of forest habitat in the Government Camp parcels (109 acres minus 9 acres of wetlands and stream) would not be lost to land development. There would be no effect on forest habitat, riparian/wetland habitat, native plant communities, or the potential habitat of rare botanical species: sensitive or strategic species on the Region 6 Regional Forester's Special Status Species List (July 2015) or species on the Survey and Manage list (December 2003).

Under the no-action alternative, all or a portion of the 769 acres in the Cooper Spur parcels may remain as they currently are (undeveloped, for the most part, except for the Cooper Spur Mountain Resort), or all or a portion may be developed sometime in the future by the owner depending on Hood River County planning requirements. Although there is no proposal to expand the Cooper Spur Ski Area, under the no-action alternative, the permit area would remain at 1,172 acres. If the Cooper Spur parcels are developed in the future, it would result in a loss of forest habitat, riparian/wetland habitat, native plant communities, and potential habitat for rare botanical species: sensitive or strategic species on the Region 6 Regional Forester's Special Status Species List (July 2015) and species on the Survey and Manage list (December 2003).

The no-action alternative (i.e., with no land exchange occurring) would comply with all Forest Plan standards and guidelines related to forest diversity (FW-148 through FW-169) and threatened, endangered, and sensitive (TES) plants (FW-170 through FW-186) (Forest Plan 1990, pp. 67-70). No action would prevent the loss of 109 acres of upland forest and riparian habitat within the Government Camp parcels in the upper Zigzag watershed and, with it, the loss of potential habitat for sensitive botanical species (vascular plants, bryophytes, lichens, and fungi) on the Region 6 Regional Forester's Special Status Species List (July 2015) and for

botanical species on the Survey and Manage list (December 2003). FW-175 requires that "habitat for threatened, endangered, and sensitive plants and animals shall be protected and/or improved." The no-action alternative would provide for the continued maintenance of populations of existing native plant species within the Government Camp parcels. FW-162 requires that management activities "should provide for the maintenance of viable populations of existing native and desired non-native wildlife, fish (36 CFR 219.19), and plant species (USDA Regulation 9500-4) well distributed throughout their current geographic range within the National Forest System." The no-action alternative would comply with FW-148 by preserving the diversity of plant and animal communities in the Government Camp land exchange parcels: "Management activities shall preserve and enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species" (FW-148). With the no-action alternative, the harvest of special forest products (e.g., beargrass, mushrooms, forest greens, mosses and ferns, and medicinal forest products) in the Government Camp parcels would not be affected (FW-710, FW711, p. 131).

Alternative 2

The action alternative (land exchange) would result in the loss of 109 acres of upland forest and riparian habitat in the Government Camp parcels in the upper Zigzag watershed and, with it, the loss of potential habitat for sensitive botanical species (vascular plants, bryophytes, lichens, and fungi) on the Region 6 Regional Forester's Special Status Species List (July 2015) and for botanical species on the Survey and Manage list (December 2003). FW-175 stipulates that "habitat for threatened, endangered, and sensitive plants and animals shall be protected and/or improved." Although no sensitive or Survey and Manage botanical species were found during botany surveys and there are no known sites recorded for sensitive or Survey and Manage species for the Government Camp parcels in the NRIS TESP database, there is potential habitat for sensitive and Survey and Manage species in the Government Camp parcels that would be lost. Pertaining to FW-162, the land exchange would not provide for the maintenance of populations of existing native plant species within the Government Camp parcel; however, the land exchange is unlikely to affect the maintenance of viable (persistent and interbreeding) populations of existing native plant species well-distributed throughout their current geographic range across the Mt. Hood National Forest and within the National Forest System. FW-162 requires that management activities "should provide for the maintenance of viable populations of existing native and desired non-native wildlife, fish (36 CFR 219.19), and plant species (USDA Regulation 9500-4) well distributed [sic] throughout their current geographic range within the National Forest System." The land exchange would not preserve the diversity of plant and animal communities in the Government Camp land exchange parcels, which would be lost to future development (FW-148). Any future harvest of special forest products (e.g., beargrass, mushrooms, forest greens, mosses and ferns, and medicinal forest products) in the Government Camp parcels would be lost with the land exchange (FW-710, FW711, p. 131).

On the Cooper Spur side of the mountain, all or a portion of the 769 acres in the Cooper Spur parcels would remain as they currently are being managed by Mt. Hood Meadows (undeveloped, for the most part, except for the Cooper Spur Mountain Resort). Any future developments on the Cooper Spur parcels would be decided by Mt. Hood Meadows and dependent on State and County land development requirements. If the Cooper Spur parcels are developed in the future, it would result in a loss of forest habitat, riparian/wetland habitat, native plant communities, and potential habitat for rare botanical species: sensitive or strategic species on the Region 6 Regional Forester's Special Status Species List (July 2015) and species on the Survey and Manage list (December 2003). If the 769 acres of forest habitat is acquired by the Forest Service,

then there would be no commercial developments resulting in greater protections for botanical species. After the Cooper Spur parcels have been acquired by the Forest Service, any future activities proposed by the Forest Service would follow the agency's applicable laws, regulations and polices, and would be analyzed in a future NEPA document.

Ethnobotany

Huckleberry

The transfer of the Government Camp parcels (109 acres) to private ownership and future development would result in the loss of prime huckleberry habitat. Huckleberry species present in the Government Camp parcels include big huckleberry (*Vaccinium membranaceum*), Alaska huckleberry (*V. alaskaense*), oval-leaf huckleberry (*V. ovalifolium*), and red huckleberry (*V. parvifolium*). The east parcel contains more huckleberry plants than the west parcel because of its more open forest habitat (dominated by lodgepole pine), allowing sunlight to reach the forest floor. Numbers of hikers and other recreationists go berry-picking in August in the east parcel because of its proximity to town, located immediately north of 1st Street.

Huckleberry fruits are an important food source for songbirds, geese, gulls, cranes, pigeons, turkeys, and upland game birds (Moerman 1998, USDA-NRCS publication). Many mammals, from black bears to mice, feed on huckleberries. Herbivores graze on the entire plant; it appears to be a favorite browse of deer. Huckleberries and blueberries form a major part of the black bear's diet in late summer and fall. Grouse feast on the leaves and blossoms. The fruits, twigs, and foliage are eaten by foxes, opossums, raccoons, squirrels, deer, elk, pikas, rabbits, and skunks (USDA-NRCS publication).

Huckleberry plants are an important food and medicinal source for Native Americans (Moreman 1998). Berries are eaten fresh, dried and stored for eating later, or boiled and mashed. They are used in a variety of foods: breads, cakes, pancakes, muffins, pies, jams and jellies, puddings, and soup (Moerman 1998). The berries are a source of vitamin C and the quinic acid in the plant's leaves and finely chopped stems and roots are used to treat a number of ailments: gout, rheumatism, arthritis, colds, glycosuria (excess sugar in the urine), hyperglycemia, and diabetes mellitus (Moerman 1998, USDA-NRCS publication). A first fruits ceremony or feast is held by many nations in the Pacific Northwest, including the Columbia Plateau Indians, the Umatilla, the Yakima, the Warm Springs, and the Colville Confederated Tribes (USDA-NRCS publication). Huckleberry feasts are held in July or August, coinciding with the first berry harvest. A thanksgiving ceremony is held at this time, with gratitude expressed through prayer, dancing, and celebration (USDA-NRCS publication).

Beargrass

The land exchange would result in the loss of beargrass populations in the two Government Camp parcels. Beargrass is the dominant herbaceous vegetation (forb) in the two parcels. Beargrass is used medicinally by Native Americans for treating wounds, to stanch bleeding, to wash sores, and to treat breaks and sprains (Moerman 1998). Its leaves are used by Native Americans for basketry, as decorative trim for mats and baskets, and to make or decorate clothing (dresses and belts) (Moerman 1998).

Alaska Yellow Cedar

The land exchange would result in the loss of Alaska yellow cedar trees scattered throughout the two Government Camp parcels. The bark and branch tips of Alaska yellow cedar are used by

Native Americans for a variety of medicinal purposes: as a cover for poultices, to treat arthritis and rheumatism, as a wash for sores and swellings, as a lotion, and to treat general illness (Moerman 1998). Yellow cedar's fiber is used by Native Americans to make clothing, mats, rugs, blankets, and bedding; basketry; bows, adz handles, paddles, boat ribs, and storage containers for canoes; cordage (rope); bowls and ornamental dishes; head-dresses; and sacred items (e.g., totem poles and talking sticks) (Moerman 1998).

Western Red Cedar

The land exchange would result in the loss of western red cedar trees scattered throughout the two Government Camp parcels. The leaves, bark, buds, and/or cones of western red cedar are used by Native Americans to treat a variety of ailments: rheumatism, colds and coughs, bronchitis, tuberculosis, gastrointestinal pain, toothache, kidney problems, diarrhea, venereal disease sores, leprosy; to cauterize sores and swellings; to relieve swelling; and to treat skin problems (Moerman 1998). The tree's fiber is used for basketry; building materials; construction of canoes; furniture; mats, rugs, and bedding; clothing; cordage; ceremonial items; decorations; musical instruments; making tools; containers; fasteners; cleaning agents; and fuel (Moerman 1998).

Invasive Plants

Many of the roads, trail sides, forest openings, and old landings in the Cooper Spur parcels are infested with St. John's wort, spotted knapweed, diffused knapweed, and/or woolly mullein. St. John's wort is the most common and widespread invasive plant in the Cooper Spur parcels and is abundant in disturbed areas. It is not surprising that spotted and diffuse knapweed are present since spotted, diffuse, and meadow knapweed are common and widespread on the Hood River Ranger District (e.g., along Highway 35, in the Lake Branch area, and elsewhere). Forest Service botanists should be consulted for recommendations on controlling St. John's wort and spotted and diffuse knapweed in the acquired parcels. Typically, Hood River County or the Oregon Department of Agriculture are contracted to control knapweeds on the Hood River Ranger District. St. John's wort may be difficult to tackle because it is so abundant and widespread in the Cooper Spur parcels and, indeed, may be beyond control.

Yellow toadflax (also known as butter and eggs) infests a dry riparian meadow located between the unnamed tributary immediately east of the Cooper Spur Mountain Resort and the 3510 road (below the house at the southernmost extent of the 3510 road in section 6). Plants are abundant. Once present, yellow toadflax establishes dense patches that are extremely difficult to control, let alone to eradicate (Fact Sheet – Alberta Invasive Species Council). Brought from Europe over 100 years ago as an ornamental plant, yellow toadflax has escaped and has now become a serious problem in rangeland and mountain meadows all over North America. This perennial plant produces seed, but reproduction is primarily sprouting from its extensive, creeping root system (rhizomes). Two- to three-week-old seedlings can produce creeping roots. The ability of this plant to form large colonies allows it to crowd out other vegetation (Fact Sheet - Alberta Invasive Species Council). Control of this population will fall to the responsibility of the Forest Service staff.

Information on managing invasive plant populations can be obtained from the regional invasive plant FEIS (2005a) and the site-specific invasive plant treatments FEIS for the Mt. Hood National Forest and Columbia River Gorge National Scenic Area (USDA Forest Service 2008).

Survey and Manage

The conveyance of the Government Camp parcels over to private ownership for future development may result in the loss of individuals or the loss of potential habitat for 234 Survey and Manage species (December 2003 list): 192 fungi, 25 lichens, 10 bryophytes, and 7 vascular plants. No Survey and Manage botanical species, however, were found during informal surveys; therefore, it is important to clarify the either/or effect: individuals of a given species may be present in the parcels but were undetected during field surveys; or individuals of a given species may not be present, but the parcels contain potential habitat for some of the species. Thus, the following discussion is focused on the potential habitat for Survey and Manage botanical species on the Government Camp parcels.

Of the 192 fungi on the December 2003 Survey and Manage list, there is potential habitat in the Government Camp parcels for all of them, although it is probably unlikely that there is habitat for *Albatrellus avellaneus* (Category B), which, as far as is known, is primarily a coastal species with a few inland sites. Six of the 192 Survey and Manage fungi have Survey and Manage status in Washington and/or California, but not in Oregon: *Bondarzewia mesenterica* (Category B), *Cantharellus subalbidus* (Category D), *Gomphus floccosus* (Category F), *Gymnopilus punctifolius* (Category B), *Phaeocollybia olivacea* (Category E), and *Ramaria rubripermananens* (Category B).

Of the 30 lichens on the December 2003 list, there is potential habitat in the Government Camp parcels for 25 of them. *Bryoria pseudocapillaris* (Category A), *Bryoria spiralifera* (Category A), and *Pseudocyphellaria perpetua* (Category A) are strictly oceanic/coastal species. *Tholurna dissimilis* (Category B) is a high-elevation alpine-artic lichen that has been found at timberline on Mt. Hood (near Paradise Park) but is unlikely to occur in the Government Camp parcels. It is unlikely that there is potential habitat in the Government Camp parcels for *U. longissima*, which for the most part is restricted to low-elevation riverine and stream corridors. Two species are listed twice because they have different management categories within the Northwest Forest Plan area: *Dendriscocaulon intricatulum* is a Category E species in California and a Category A species in most of western Oregon (except five counties) and in Washington. *Usnea longissima* is a Category A species in California and in three counties in Oregon (Curry, Josephine, and Jackson) and a Category F species in the rest of Oregon and in Washington. *Lobaria oregana* (Category A) only has Survey and Manage status in California. It was not found during field surveys, but probably does occur in the Government Camp parcels.

Of the 15 bryophytes on the December 2003 list, there is potential habitat in the Government Camp parcels for 10 of them. There is only one known site for *Iwatsukiella leucotricha* (Category B) in the Pacific Northwest and that is on Saddle Mountain in the Oregon Coast Range. The only documented site of *Kurzia makinoana* (Category B) in Oregon is from Coos County. *Orthodontium gracile* (Category B) is only known to occur in coastal redwood forests. *Tritomaria exsectiformis* (Category B) and *Tritomaria quinquedentata* (Category B) occur in seeps, springs, and low-gradient streams on the east side of the Cascade Range. *Buxbaumia viridis* (Category E) and *Ptilidium californicum* (Category A) may occur in the Government Camp parcels, but have Survey and Manage status in California only.

Of the 12 vascular plants on the December 2003 list, there is potential habitat in the Government Camp parcels for all but five of them. *Botrychium minganense* (Category A) and *Botrychium montanum* (Category A) occur in forest wetlands on the east side of the Mt. Hood National Forest; though unlikely, they could potentially occur in the Government Camp parcels. *Coptis trifolia* (Category A) occurs along the edges of dry meadows; there are known sites for it on the

east side of the Mt. Hood National Forest, but it is doubtful that there is potential habitat for it in the Government Camp parcels. *Corydalis aquae-gelidae* (Category A) occurs in coldwater streams at low elevations on the west side of the Mt. Hood National Forest. The majority of known sites on the Mt. Hood National Forest are in the Clackamas River and Oak Grove Fork watersheds. *Cypripedium fasciculatum* (Category C) occurs primarily on the east side of the Cascade Range. *Galium kamtschaticum* (Category A) and *Platanthera orbiculata* var. *orbiculata* (Category C) appear to be restricted to northwest Washington, although they may occur in the Bull Run watershed and the Zigzag watershed where the climate is colder and wetter, similar to the climate in northwest Washington. There is potential habitat in the Government Camp parcels for *Arceuthobium tsugense mertensianae* (Category F), but this species has Survey and Manage status in Washington only, and there is potential habitat for *Bensoniella oregana* (Category A), but this species has Survey and Manage status in California only.

In sum, there is potential habitat in the Government Camp parcels for a total of 234 Survey and Manage botanical species (192 fungi, 25 lichens, 10 bryophytes, and 7 vascular plants). The December 2003 Survey and Manage List is provided in Appendix C of the Botany Specialist Report (Project Record).

There is one known site of a Survey and Manage fungus (Category B), *Fayodia bisphaerigera* (= *Fayodia gracilipes*), which is located between the two Government Camp parcels near or along Camp Creek (NRIS TESP database 2016).

Although no Survey and Manage species were found during field review, there could still be individual species present on the Government Camp parcels since there is known habitat to support certain species. More specifically, the conveyance of the Government Camp parcels to private ownership could result in the loss of known habitat of 233 Survey and Manage species (vascular plants, bryophytes, lichens, and fungi). If individuals are present on the Government Camp parcels, then they would be lost once development occurs.

Sensitive Species on the Region 6 (Pacific Northwest) Regional Forester's Special Status Species List

The transfer of the Government Camp parcels over to private ownership for future development may result in either the loss of individuals or the loss of potential habitat for 37 sensitive species on the Region 6 Regional Forester's Special Status Species List (table 6). The Botany Specialist Report (Project Record) includes a table in Appendix D that lists the special status (sensitive and strategic) botanical species documented or suspected on the Mt. Hood National Forest with potential habitat in the Government Camp and Cooper Spur land exchange parcels.

Table 6. Number of Region 6 Sensitive botanical species with potential habitat in the land exchange parcels

Potential Habitat for Region 6 Sensitive Botanical Species	Government Camp Parcels	Cooper Spur Parcels
Vascular Plants	9	13
Bryophytes	7	8
Lichens	4	4
Fungi	17	16
TOTAL	37	41

No vascular plants, bryophytes, or lichens on the Region 6 Regional Forester's Special Status Species List (July 2015) were found in the Government Camp or Cooper Spur land exchange parcels; however, sensitive fungi on the list that may be present in the Government Camp parcels may be affected by the land exchange.

The following 18 sensitive fungi on the Region 6 Regional Forester's Special Status Species List are either documented or suspected on the Mt. Hood National Forest and have a reasonable likelihood of occurring in the Government Camp and Cooper Spur parcels. Unlike surveys for vascular plants, bryophytes, and lichens, surveys for these fungi are not considered practical because their fruitbodies are (a) ephemeral (short-lived); (b) they do not fruit every year; (c) some (*Cystangium*, *Macowanites*, *Rhizopogon*) are hypogeous fungi, only fruiting belowground; and (d) all are difficult to find and identify (except *Pseudorhizina californica*). Therefore, these fungi are simply assumed to be present in the affected area—in this case, the Government Camp and Cooper Spur parcels. A brief discussion is included below for each species. Disposal and future development of the Government Camp parcels may have an impact on individuals or their habitat, but are not expected to lead to a trend toward Federal listing of any of these fungi.

1. *Albatrellus avellaneus* (Suspected)
2. *Bridgeoporus nobilissimus* (Documented)
3. *Choiromyces venosus* (Suspected)
4. *Cortinarius barlowensis* (Documented)
5. *Cystangium* (= *Martellia*) *idahoensis* (Suspected)
6. *Helvella crassitunicata* (Documented)
7. *Macowanites mollis* (Documented)
8. *Mythicomyces corneipes* (Documented)
9. *Phaeocollybia californica* (Documented)
10. *Phaeocollybia oregonensis* (Documented)
11. *Pseudorhizina* (= *Gyromitra*) *californica* (Documented)
12. *Ramaria amyloidea* (Documented)
13. *Rhizopogon alexsmithii* (Documented)
14. *Rhizopogon brunneifibrillosus* (Documented)
15. *Rhizopogon ellipsosporus* (Documented)
16. *Rhizopogon exiguus* (Suspected)
17. *Rhizopogon inquinatus* (Suspected)
18. *Stagnicola perplexa* (Documented)

1. *Albatrellus avellaneus* is primarily a coastal species with most collections of it from within 32 kilometers of the Pacific Coast associated with older Sitka spruce, western hemlock, and Pacific silver fir forest (Species Fact Sheet, Interagency Special Status/Sensitive Species Program). It is documented on the Olympic and Siuslaw National Forests but also inland on the Spokane BLM District. For that reason, it is suspected on the Mt. Hood National Forest and other inland national forests and BLM districts.

2. *Bridgeoporus nobilissimus* is known from several sites on the Zigzag Ranger District (Larch Mountain, Wildcat Mountain, the Bull Run watershed), on the far west side of the Clackamas River Ranger District (Goat Mountain, South Fork Mountain, and in the vicinity of Memaloose Lake and Williams Lake), and on nearby Salem District BLM-administered lands. There are 12 known sites on the Mt. Hood National Forest (NRIS 2010). It is certain that the perennial conks of *B. nobilissimus* are present elsewhere on the Clackamas River and Zigzag Ranger Districts in forests and within road prisms wherever large-diameter noble fir or Pacific silver fir stumps, snags, and live trees are present. Its conks (fruiting bodies) are present year-round, growing at the base of large-diameter noble fir or Pacific silver fir stumps, snags, and, occasionally, live trees—and sometimes out of the ground. It is known from road prisms (FS road 2609 on Wildcat Mountain) and young plantations, where it is typically associated with remnant large-diameter noble or Pacific silver fir stumps or snags, but conks can also grow on small-diameter trees.

Because *Bridgeoporus nobilissimus* conks (sporocarps) are perennial and, therefore, detectable year-round, surveys for this species are practical and required in areas with suitable habitat and hosts for this fungus. *B. nobilissimus* conks typically grow on noble fir and Pacific silver fir stumps, snags, and, occasionally, live trees in low- to mid-elevation forests on the west side of the Cascade Range. The Government Camp parcels contain suitable hosts (noble fir, Pacific silver fir, and western hemlock) for *B. nobilissimus*.

No *B. nobilissimus* conks were found in the Government Camp parcels during field surveys, but the land exchange **may impact** undetected individuals or the habitat of this sensitive fungus on the Region 6 Regional Forester Special Status Species List. *B. nobilissimus* is also a Survey and Manage Category A species on the Survey and Manage list (December 2003). Category A means to manage all known sites.

3. *Choiromyces venosus*, in the true truffle group, forms fruiting bodies beneath the soil surface under Douglas-fir and western hemlock at low elevations. Only two known sites were reported for this species in the Northwest Forest Plan area in 1999 (Castellano *et al.* 1999). No known sites are documented on the Mt. Hood National Forest (NRIS TESP database), but the species is suspected to occur on the Forest.

4. *Cortinarius barlowensis* forms fruiting bodies on the forest floor and is associated with various conifers in the Pinaceae family. Known sites for this species are documented on the Mt. Hood National Forest (NRIS 2012).

5. *Cystangium idahoensis* (syn. ***Martellia idahoensis***) forms fruiting bodies beneath the soil surface and is associated with the roots of Pacific silver fir, subalpine fir, noble fir, Engelmann spruce, and mountain hemlock from 1,200 to 1,650 meters in elevation. No known sites are documented on the Mt. Hood National Forest (NRIS TESP database), but the species is suspected to occur on the Forest.

6. *Helvella crassitunicata* is endemic to Oregon and Washington and grows scattered to gregarious on soil, especially along trails, in montane regions with Pacific silver fir, noble fir,

grand fir, and subalpine fir. There are only two known sites documented on the Mt. Hood National Forest (NRIS TESP database).

7. *Macowanites mollis* is endemic to Oregon and Washington. There is only one known site on the Mt. Hood National Forest (Larch Mountain). This mushroom looks like a disfigured specimen of *Russula* or *Lactarius* and is found in association with the roots of grand fir, Douglas-fir, and western hemlock above 1,000 meters elevation.

8. *Mythicomyces corneipes* is widespread across western North America and northern Europe and was reported on the Mt. Hood National Forest (Castellano *et al.* 2003); however, no known sites are documented on the Mt. Hood National Forest in the NRIS TESP database. This species is in the Cortinariaceae family, is solitary to gregarious in habit, and grows along margins of bogs among mosses or on wet soil under conifers and alder species.

9. *Phaeocollybia californica* is endemic to the Pacific Northwest with 34 sites known from western Washington, western Oregon, and northern California. There is one known site on the Mt. Hood National Forest (Larch Mountain) recorded in the NRIS TESP database. *P. californica* is terrestrial (mycorrhizal), fasciculate (growing in close bundles) to gregarious (growing in arcs) in habit, and occurs in humic soils of moist coniferous (true fir, hemlock, Douglas-fir) forest and mixed (true fir, Pacific madrone, oak, Douglas-fir, and hemlock) coastal and coastal montane forests.

10. *Phaeocollybia oregonensis* is endemic to the Pacific Northwest with 10 sites known from the Oregon Coast Range and the western Cascade Range. There are five known sites documented on the Mt. Hood National Forest (NRIS 2010). This mushroom species is terrestrial (mycorrhizal), occurring solitary to gregarious, and associated with the roots of true fir, western hemlock, and Douglas-fir.

11. *Pseudorhizina californica* (syn. ***Gyromitra californica***) is found from British Columbia south to northern California and east to Colorado, Montana, and Nevada. It is known in Washington, Oregon, and northern California from 35 sites, one of which is on the Mt. Hood National Forest (Hood River Ranger District). *P. californica* grows on well-rotted stumps and logs of conifers or in soil with rotted wood.

12. *Ramaria amyloidea* is endemic to the Pacific Northwest with 16 sites known from western Washington to northern California. There is one known site on the Mt. Hood National Forest (NRIS TESP database). Habitat for the species is soil in coniferous forest.

13. *Rhizopogon alexsmithii* (formerly ***Alpova alexsmithii***), in the false truffle group, forms fruiting bodies beneath the soil surface and is associated with conifer trees in the Pinaceae family, particularly western hemlock and mountain hemlock, from 1,200 to 3,200 meters in elevation. There are only four known sites on the Mt. Hood National Forest (NRIS TESP database).

14. *Rhizopogon brunneifibrillosus* is a very rare false truffle with only one documented site in Region 6: in the former Bear Springs ranger district on the Mt. Hood National Forest (Trappe *et al.* 2009). *R. brunneifibrillosus* has an obligate mycorrhizal association with Douglas-fir.

15. *Rhizopogon ellispsosporus* is a false truffle endemic to Oregon with three reported sites: the Bureau of Land Management Medford District, the Siskiyou National Forest, and the Mt. Hood

National Forest. The species has been found in association with the roots of *Pseudotsuga menziesii* and scattered *Pinus lambertiana* at 850 meters elevation. It fruits in October.

16. *Rhizopogon exiguus* is a false truffle known from seven sites in the Northwest Forest Plan area in Washington and Oregon (Okanogan-Wenatchee, Mt. Baker-Snoqualmie, Rogue River-Siskiyou, and Siuslaw National Forests, and the Medford District BLM). Four of the sites occur in the Douglas-fir series, one in the white fir/grand fir series, one in the western red cedar series, and one in the western hemlock series. The elevation of the sites ranges from near sea level to 3,850 feet (USDA Forest Service Species Fact Sheet - February 2014).

17. *Rhizopogon inquinatus*, a false truffle, is found in association with the roots of Douglas-fir and western hemlock from 500 to 1,400 meters elevation. There are no known sites on the Mt. Hood National Forest although the species is suspected to occur on the Forest. Castellano *et al.* (1999) report two sites on the Willamette National Forest.

18. *Stagnicola perplexa*, in the Cortinariaceae family, grows in groups on rotten wood, occasionally buried deeply enough to appear “rooting” in wet (or recently) dried-up depressions in coniferous forest. One known site is reported for the Mt. Hood National Forest (Middle Fork of the Salmon River) by Castellano et al. (2003); however, no known sites are listed for the Mt. Hood National Forest in the NRIS TESP database.

The transfer of the Government Camp parcels over to private ownership for future development may result in the loss of individuals or the potential habitat of some sensitive species on the Region 6 Regional Forester’s Special Status Species List (July 2015). Table 7 summarizes the effect of the land exchange on sensitive species present or with potential habitat in the Government Camp parcels. Individuals or the habitat of some sensitive species may be impacted (MIIH rating). A no effect/impact rating is given for species whose habitat is not present.

Table 7. Biological evaluation process summary by species (Region 6 Sensitive Species)

Species	Step #1 Prefield Review	Step #2 Field Reconn.	Step #3 Conflict Determination	Step #4 Analysis of Effects	Step #5 Biological Investigation
	Habitat present in the proposed land exchange parcels?	**Species present?**	**Conflict?**	**Important?**	**Needed?**
Vascular Plants					
Agoseris elata	**Yes**	No	MIIH	N/A	N/A
Astragalus tyghensis	No	No	No Impact	N/A	N/A
Boechera atrorubens	No	No	No Impact	N/A	N/A
Botrychium lunaria	**Yes**	No	MIIH	N/A	N/A
Botrychium montanum	**Yes**	No	MIIH	N/A	N/A
Calamagrostis breweri	No	No	No Impact	N/A	N/A
Carex capitata	**Possibly**	No	MIIH	N/A	N/A
Carex comosa	No	No	No Impact	N/A	N/A
Carex diandra	**Yes**	No	MIIH	N/A	N/A
Carex lasiocarpa var. americana	**Possibly**	No	MIIH	N/A	N/A
Carex livida	No	No	No Impact	N/A	N/A
Carex nardina	No	No	No Impact	N/A	N/A
Carex retorsa	**Yes**	No	MIIH	N/A	N/A
Carex vernacula	**Possibly**	No	MIIH	N/A	N/A
Castilleja thompsonii	No	No	No Impact	N/A	N/A
Coptis trifolia	No	No	No Impact	N/A	N/A
Corydalis aquae-gelidae	No	No	No Impact	N/A	N/A
Delphinium nuttallii	**Yes**	No	MIIH	N/A	N/A
Elatine brachysperma	**Yes**	No	MIIH	N/A	N/A
Erigeron howellii	**Yes**	No	MIIH	N/A	N/A
Eucephalus (=Aster) gormanii	No	No	No Impact	N/A	N/A
Fritillaria camschatcensis	No	No	No Impact	N/A	N/A

Species	Step #1 Prefield Review	Step #2 Field Reconn.	Step #3 Conflict Determination	Step #4 Analysis of Effects	Step #5 Biological Investigation
	Habitat present in the proposed land exchange parcels?	**Species present?**	**Conflict?**	**Important?**	**Needed?**
Howellia aquatilis var. *howellii* (FEDERALLY THREATENED SPECIES)	No	No	No Impact	N/A	N/A
Lewisia columbiana var. *columbiana*	No	No	No Impact	N/A	N/A
Lomatium watsonii	No	No	No Impact	N/A	N/A
Lycopodiella inundata	No	No	No Impact	N/A	N/A
Lycopodium complanatum	**Yes**	No	MIIH	N/A	N/A
Ophioglossum pusillum	No	No	No Impact	N/A	N/A
Phlox hendersonii	No	No	No Impact	N/A	N/A
Pinus albicaulis	No	No	No Impact	N/A	N/A
Potentilla villosa	No	No	No Impact	N/A	N/A
Ranunculus triternatus (=*R. reconditus*)	No	No	No Impact	N/A	N/A
Romanzoffia thompsonii	No	No	No Impact	N/A	N/A
Rorippa columbiae	**Yes**	No	MIIH	N/A	N/A
Rotala ramosior	No	No	No Impact	N/A	N/A
Scheuchzeria palustris ssp. *americana*	No	No	No Impact	N/A	N/A
Sisyrinchium sarmentosum	**Possibly**	No	MIIH	N/A	N/A
Streptopus streptopoides	**Yes**	No	MIIH	N/A	N/A
Sullivantia oregana	No	No	No Impact	N/A	N/A
Suksdorfia violacea	**Yes**	No	MIIH	N/A	N/A
Taushia stricklandii	**Possibly**	No	MIIH	N/A	N/A
Utricularia minor	No	No	No Impact	N/A	N/A
Utricularia ochroleuca	No	No	No Impact	N/A	N/A
Wolfia borealis	No	No	No Impact	N/A	N/A
Wolfia columbiana	No	No	No Impact	N/A	N/A

Species	Step #1 Prefield Review	Step #2 Field Reconn.	Step #3 Conflict Determination	Step #4 Analysis of Effects	Step #5 Biological Investigation
	Habitat present in the proposed land exchange parcels?	**Species present?**	**Conflict?**	**Important?**	**Needed?**
Bryophytes					
Anastrophyllum minutum	No	No	No Impact	N/A	N/A
Andreaea schofieldiana	Yes	No	MIIH	N/A	N/A
Anthelia julacea	No	No	No Impact	N/A	N/A
Barbilophozia lycopodioides	No	No	No Impact	N/A	N/A
Blepharostoma arachnoideum	Yes	No	MIIH	N/A	N/A
Brachydontium olympicum	No	No	No Impact	N/A	N/A
Bryum calobryoides	Possibly	No	MIIH	N/A	N/A
Calypogeia sphagnicola	No	No	No Impact	N/A	N/A
Cephaloziella spinigera	No	No	No Impact	N/A	N/A
Conostomum tetragonum	No	No	No Impact	N/A	N/A
Encalypta brevicollis	No	No	No Impact	N/A	N/A
Encalypta brevipes	No	No	No Impact	N/A	N/A
Entosthodon fascicularis	No	No	No Impact	N/A	N/A
Gymnomitrion concinnatum	No	No	No Impact	N/A	N/A
Haplomitrium hookeri	Yes	No	MIIH	N/A	N/A
Harpanthus flotovianus	No	No	No Impact	N/A	N/A
Herbertus aduncus ssp. aduncus	No	No	No Impact	N/A	N/A
Lophozia gillmanii	No	No	No Impact	N/A	N/A
Lophozia laxa	No	No	No Impact	N/A	N/A
Marsupella condensata	No	No	No Impact	N/A	N/A
Marsupella emarginata var. *aquatica*	Yes	No	MIIH	N/A	N/A
Marsupella sparsifolia	No	No	No Impact	N/A	N/A
Nardia japonica	No	No	No Impact	N/A	N/A
Polytrichastrum sexangulare var. *vulcanicum*	No	No	No Impact	N/A	N/A

Species	Step #1 Prefield Review	Step #2 Field Reconn.	Step #3 Conflict Determination	Step #4 Analysis of Effects	Step #5 Biological Investigation
	Habitat present in the proposed land exchange parcels?	**Species present?**	**Conflict?**	**Important?**	**Needed?**
Polytrichum strictum	No	No	No Impact	N/A	N/A
Preissia quadrata	No	No	No Impact	N/A	N/A
Rivulariella gemmipara	Possibly	No	MIIH	N/A	N/A
Scapania obscura	Yes	No	MIIH	N/A	N/A
Schistidium cinclidodonteum	No	No	No Impact	N/A	N/A
Schofieldia monticola	Possibly	No	MIIH	N/A	N/A
Tetraphis geniculata	Yes	No	MIIH	N/A	N/A
Trematodon asanoi (= *T. boasii*)	No	No	No Impact	N/A	N/A
Lichens					
Hypotrachyna riparia	No	No	No Impact	N/A	N/A
Leptogium cyanescens	Yes	No	MIIH	N/A	N/A
Lobaria linita	Yes	No	MIIH	N/A	N/A
Pannaria rubiginella	Unlikely	No	No Impact	N/A	N/A
Pilophorus nigricaulis	Yes	No	MIIH	N/A	N/A
Ramalina pollinaria	Possibly	No	MIIH	N/A	N/A
Stereocaulon spathuliferum	No	No	No Impact	N/A	N/A
Texosporium sancti-jacobi	No	No	No Impact	N/A	N/A
Tholurna dissimilis	No	No	No Impact	N/A	N/A
Fungi					
Albatrellus avellaneus	No	No	No Impact	N/A	N/A
Bridgeoporus nobilissimus	Yes	Assumed Presence	MIIH	Yes	No
Choiromyces venosus	Yes	Assumed Presence	MIIH	N/A	N/A
Cortinarius barlowensis	Yes	Assumed Presence	MIIH	N/A	N/A
Cystangium idahoensis	Yes	Assumed Presence	MIIH	N/A	N/A
Helvella crassitunicata	Yes	Assumed Presence	MIIH	N/A	N/A
Macowanites mollis	Yes	Assumed Presence	MIIH	N/A	N/A
Mythicomyces corneipes	Yes	Assumed Presence	MIIH	N/A	N/A

Species	Step #1 Prefield Review	Step #2 Field Reconn.	Step #3 Conflict Determination	Step #4 Analysis of Effects	Step #5 Biological Investigation
	Habitat present in the proposed land exchange parcels?	**Species present?**	**Conflict?**	**Important?**	**Needed?**
Phaeocollybia californica	Yes	Assumed Presence	MIIH	N/A	N/A
Phaeocollybia oregonensis	Yes	Assumed Presence	MIIH	N/A	N/A
Pseudorhizina (= *Gyromitra*) *californica*	Yes	Assumed Presence	MIIH	N/A	N/A
Ramaria amyloidea	Yes	Assumed Presence	MIIH	N/A	N/A
Rhizopogon alexsmithiii	Yes	Assumed Presence	MIIH	N/A	N/A
Rhizopogon brunneifibrillosus	Yes	Assumed Presence	MIIH	N/A	N/A
Rhizopogon ellipsosporus	Yes	Assumed Presence	MIIH	N/A	N/A
Rhizopogon exiguus	Yes	Assumed Presence	MIIH	N/A	N/A
Rhizopogon inquinatus	Yes	Assumed Presence	MIIH	N/A	N/A
Stagnicola perplexa	Yes	Assumed Presence	MIIH	N/A	N/A

No Impact = A project or activity will have no environmental impacts on the habitat, individuals, a population, or a species because the habitats where these species occur are not within the affected area (the Government Camp land exchange parcels).

MIIH = A project or activity may impact individuals or their habitat, but will not likely contribute to a trend toward Federal listing of the species or a loss of viability to the species.

There is a known site for the sensitive plant *Suksdorfia violacea* immediately east of the Cooper Spur parcels in section 31 (Ash Creek/Tilly Jane Creek). The *S. violacea* site is located on cliffs in the Tilly Jane Creek gorge in the NW ¼ of the NW ¼ of Section 32 on NFS lands. Since there are no ground-disturbing activities proposed at this site for this project, there would be no impacts to this sensitive plant site.

Cumulative Effects

Alternative 1

Since there would be no direct or indirect effects, there would be no cumulative effects.

Alternative 2

The cumulative effect of past, present, and proposed (reasonably foreseeable) activities in the upper Zigzag watershed is the continued loss of forest habitat within the watershed. The Government Camp-Cooper Spur land exchange would result in the loss of 100 acres of forest (a total of 109 acres minus 9 acres of wetland in the two Government Camp parcels) in the watershed to land development. The Timberline Express ski runs constructed in 2006-2007 below Timberline Lodge resulted in the loss of about 80 acres of forest comprised of mature Pacific silver fir and old-growth mountain hemlock (Timberline Express FEIS, USDA Forest Service 2005b; botany surveys 2010-2011). The Mirror Lake Trailhead Relocation project would result in the loss of about 0.5 acre of forest to the construction of a new parking lot west of Skibowl's current parking lot. The ODOT Highway 26 safety widening project has resulted in the loss of about 3 to 5 acres of forest. Additionally, the Timberline downhill mountain bike park (17 miles of trails); Skibowl's mountain bike trail additions (1 to 2 miles); the Mirror Lake trail relocation project (about ¾ to 1 mile); and Mazama Lodge Parking Area Expansion project would contribute further to forest fragmentation in the upper Zigzag watershed. The gradual shrinkage of forest habitat in the upper watershed results in the loss of potential habitat for about 37 sensitive botanical species on the Region 6 Regional Forester's Special Status Species List (July 2015) and about 234 botanical species on the Survey and Manage list (December 2003).

The loss of forest habitat in the Government Camp parcels would be offset by acquisition of 769 acres of forest in the Cooper Spur parcels; however, even though there would be a net gain in forest habitat as a result of this land exchange, there would still be a cumulative effect of further loss of forest on the south side of Mt. Hood in the upper Zigzag watershed, particularly within the Highway 26 corridor. This additive loss of forest habitat on the south side of Mt. Hood would negatively impact resident plants and wildlife in the Upper Zigzag watershed. Although there would be an adverse cumulative impact at the watershed-scale for botanical species, there would not be an adverse cumulative impact at the Forest-scale. This is due to the acquisition of forest lands at Cooper Spur, as well as the fact that the loss of acres at Government Camp, when compared to the overall acres of the Mt. Hood National Forest, is relatively small.

Climate Change

The Council of Environmental Quality (CEQ) recently issued its final guidance for Federal agencies on how to consider the impacts of their actions on climate change in their NEPA reviews (CEQ 2016). This guidance recommends that Federal agencies analyze: (1) a proposed action's effects on greenhouse gas emissions, commensurate with the extent of the effects of the proposed action, and (2) the effects of climate change relevant to a proposed action – particularly how climate change may change an action's environmental effects. This guidance encourages agencies to draw on their experience and expertise to determine the appropriate level (broad,

programmatic or project- or site-specific) and the extent of quantitative or qualitative analysis required to comply with NEPA.

The proposed action, when implemented, would result in approximately 109 acres of land conveyed to private ownership where 101 acres of forest are anticipated to be developed and therefore would no longer be forested. Approximately 769 acres of land would be acquired, 763 acres of which are forested. This results in a net gain of 662 acres of forested land. This addition would be administratively withdrawn from the suitable timber base. Another 249 acres of land that is currently in the suitable timber base, would become administratively withdrawn as a result of the connected actions (addition to wilderness). The end result in an addition of 911 acres of forest that would no longer be eligible for timber harvest. Regardless, this scope and degree of change would be minor relative to the amount of forested land on the Mt. Hood National Forest as a whole (1,015,854 acres). Climate change is a global phenomenon because major greenhouse gasses (GHG) mix well throughout the planet's lower atmosphere (IPCC 2013). Considering emissions of GHG in 2010 was estimated at 49 ± 4.5 gigatonnes globally (IPCC 2014) and 6.9 gigatonnes nationally (US EPA, 2015), a project of this magnitude makes an infinitesimal contribution to overall emissions. Therefore, at the global and national scales, this proposed action's direct and indirect contribution to greenhouse gasses and climate change would be negligible. In addition, because the direct and indirect effects would be negligible, the proposed action's contribution to cumulative effects on global greenhouse gasses and climate change would also be negligible.

Cultural Resources and Treaty Rights

Cultural resources are not directly related to the purpose and need of this project. Concerns identified during scoping included the loss of an eligible historic property and the Mt. Hood National Forest's ability to fulfill treaty rights on the Forest Service parcel of land that would be conveyed to Mt. Hood Meadows, LLC.

Mt. Hood National Forest, including the project area, contains ceded lands for the Confederation Tribes of Warm Springs. As such the tribes have rights to traditional cultural properties on ceded lands. The Confederated Tribes of Grand Ronde also are recognized as having traditional use rights to lands encompassed by Mt. Hood National Forest, including the project area.

Indian Tribes can be affected by the policies and actions of the Forest Service in managing the lands and resources under its jurisdiction. Therefore, the Forest Service has a duty to consult with them on matters affecting their interests, such as the proposed project. Efforts were made to honor the government-to-government relationship by involving local tribal governments and soliciting their input regarding the proposed action.

The legal framework that requires the Forest Service to consider effects on cultural resources, traditional cultural uses, and treaty rights is fairly extensive. For all forest actions, section 106 of the National Historic Preservation Act of 1966 (amended in 1976, 1980, and 1992) is the foundation for all cultural resources management concerns in Federal agencies during the planning and implementation phase. Additional regulations that support and enhance the National Historic Preservation Act are disclosed in chapter 2 of this DEIS and in the Cultural Resources Specialist Report (Project Record).

Affected Environment

Existing Condition

The prehistory and history of the Government Camp and Cooper Spur areas have been documented and compiled in several publications. Those used for this analysis include, Cultural Resource Overview for the Mt. Hood National Forest (Burchard 1991), An Ethnographic Study of the Mt Hood National Forest, Oregon (French 1995), Archaeology of Oregon (2nd Edition) (Aikens 1986), and many other publications. These documents provide adequate detail of ethnographic and historic background for this project-level analysis.

Prehistoric Use

There is little specific information available regarding pre-contact use of the Mt. Hood/Government Camp Area. The Government Camp area has been identified as an important traditional use area for the Molala, Tygh Valley, Wasco and Northern Paiute people during the ethnohistoric period.

Huckleberries were an important traditional food for Northwest Indians, and they were usually picked in quantities and processed for winter use. Aside from huckleberries, Indian people also collected the raw material needed to make baskets while in the mountains. These materials included cedar roots, cedar bark, beargrass, and willow. Strips of cedar bark were peeled from living trees in order to make ridged, folded bark baskets. When coiled berry baskets were filled, bark baskets could be made at the camp to hold the surplus of berries and transport them back to villages. Most ethnographic sources emphasize the importance of the huckleberry grounds south of Mt. Hood were considered shared territory, and were used jointly by neighboring groups on both sides of the Cascades.

Historic Use

The project area is located in an area of extensive historic activity, associated with both the Barlow Road/Oregon Trail and with recreational development at Government Camp. The Barlow Road was initially constructed between 1845 and 1846 as a wagon route across the Cascades, and it was used as an alternate route for pioneers following the Oregon Trail. It passed through the center of the Government Camp area, immediately south of the project area. The Government Camp area received its name after an army wagon train following the Barlow Road reportedly abandoned a number of wagons at the spot in 1849. Recreational development of the area began in the 1880s. The 1884 General Land Office plat for Township 3 South, Range 8½ East does not show any settlers in the Government Camp area, but it does show the “Mt. Hood and Barlow Wagon Road” in Section 23, and the “Trail running N.E. to foot of Mt. Hood” running diagonally across the south ½ of Section 14.

In spite of the elevation, several early homestead claims were filed in what is now Government Camp. General Land Office Survey notes for Township 2 South, Range 8 East (Lacklund 1884:505) indicate that a man named Severs had located a homestead in the NE¼ Section of 24 (immediately south of the project area) in 1884. Oliver C. Yocum reportedly began visiting the Government Camp area as early as 1884, and by 1892 he filed a homestead claim in Section 23. He built a hotel on his claim in 1899, called the Mountain View House (later the Government Camp Hotel). A portion of the easternmost project parcel was within the original homestead claim of Francis C. Little, a founding member of the Mazamas in 1894. His homestead was often

used as a camp during early Mazama outings. He exchanged all but 40 acres of his claim (including the present project area) to the U.S. Government in 1901.

In the early 1900s Oliver Yocum platted parts of his land claim at Government Camp in blocks, and called the plat Pompeii (Grauer 1975). The name Government Camp was well-entrenched by this time, however, and the town eventually acquired that name. Elijah Coalman bought Yocum's hotel in 1910, and it burned in 1933. Everett Sickler and Albert Krieg built the Battle Axe Inn in 1925, and it burned on November 7, 1950. The Rafferty's built and ran a hotel next to the Battle Axe Inn. It changed hands and names (Tyrolean Lodge, Mountain View Inn) over time, before it burned down in 1955.

The Mt. Hood Loop Highway was constructed in 1925. In 1926, the south side of Mt. Hood was declared a "Recreation Area". The Skiway Lift, an aerial tram that connected Government Camp to Timberline Lodge, was built between 1948 and 1951. It crossed the project area. A large building was built at the lower end of the lift in 1949, immediately south of the project area, with a restaurant, rest rooms, and a waiting lounge. The tram was not successful and closed after only a few years in operation. The towers were removed in 1961. The terminal building at the base of the lift was purchased and expanded into a hotel called the Thunderhead Lodge. The Skiway Trail was completed for hikers, bikers, and skiers several years later. This trail, as well as several others including the Crosstown Trail, Maggie's Trail, Lucy's Trail, and the Alpine Loop are modern and continue to be used today.

From modern ethnographic data, the government camp area continues to be an active area of traditional cultural use by both the Confederated Tribes of Warm Springs (CTWS) and Confederated Tribes of Grand Ronde (CTGR). Oral history interviews confirm the very active use of the Government Camp area for traditional use of various resources within the APE.

Cooper Spur Area

The East Fork of Hood River is a perennial tributary to the Hood River, which flows directly into the Columbia River. Glacially fed tributaries to the drainage within the project area include Polallie Creek, Tilly Jane Creek, Doe Creek (tributary to Tilly Jane Creek) and Buck Creek. As a largely glacial stream, the East Fork of Hood River provided a gateway onto the slopes of Mount Hood for both Native Americans and early pioneers.

Relatively few archaeological excavations have been conducted within or near the project area, and little is known about the prehistory of the region. There is some evidence that huckleberries and other plant resources were gathered, along with hunting forays for deer, elk, and other wildlife. Huckleberries remain numerous along the lower slopes of the Cloud Cap-Tilly Jane National Historic District.

Current and past hiking trails likely followed earlier Indian trails. One such trail is the Polallie Ridge Trail with its earliest indications on a 1912 Oregon National Forest map, where it is shown as an intermittent dotted line. The Polallie Ridge Trail most likely followed an earlier Native American trail for summertime exploitation of alpine resources. Another trail on the same map extends east from the East Fork Hood River, steeply ascending the steep west-facing slopes, to continue on to Brooks Meadow. The 1914 General Land Office plat map for Township 2 South, Range 10 East shows the two previous trails as part of the "Trail from Brooks Meadow to Parkdale and Cloudcap Inn." Another early trail is shown heading upstream along the East Fork Hood River as far as Robinhood Creek. By 1916 the trail had extended south to connect to the

Barlow Road. Another early trail is simply labeled “old trail” and travels north along Surveyor’s Ridge from the Brooks Meadow Trail.

In the 1880s, David Cooper, Henry Coe and Oscar Stranahan decided that they should capitalize on the tourism brought to Hood River by the railroad with the construction of a mountain resort. The three started construction on a wagon road up the mountain following Indian trails, but were eventually blocked by brush and wind-blown trees. Aided by a “wild” fire, they eventually finished their toll road and erected a tent camp at Tilly Jane Meadows, named after one of their first visitors, Tilly Jane Ladd. They charged $1.00 for camping and $10.00 for the wagon ride to and from the tent camp. In 1888, Cooper’s company sold their interest to William Ladd, who went on to finance the construction of Cloud Cap Inn in 1889.

The upper portion of the East Fork Hood River remained bypassed by meaningful transportation. The Barlow Wagon Road skirted around the south side of Mount Hood. The wagon road from the valley rest area up to Cloud Cap Inn was the only development through the area until the construction of the Mount Hood Loop Highway in 1925.

The construction of the Mount Hood Loop Highway was an idea largely supported by the tourism and agricultural industries in Hood River and the upper valley. Local residents Homer Rogers and J. O. Hannum participated in the selection of the route for the highway. In addition to operating the Mt. Hood Lodge, Rogers also acquired the Cloud Cap Inn while Hannum constructed the Homestead Inn at the Cooper Spur Junction in 1922 in anticipation of tourism. At that time, the Loop Highway was usually closed due to snow, and the junction was situated at the end of the road. However, neither the Lodge nor the Homestead Inn realized expectations and both establishments were gone by the 1930s. The highway unlocked the previously inaccessible areas along the East Fork of Hood River to automobiles, and expanded opportunities for recreation and timber harvest. Campgrounds along Robinhood Creek and Hood River Meadows were developed and improved through the 1920s.

By this time, Sand Creek had been renamed Polally Creek and the Mount Hood Loop Highway had been completed. According to Oregon Geographic Names (McArthur 2003), the Forest Service began a campaign of replacing mundane or repetitious place names in the 1920s, and Sand Creek was widely used. The spelling later changed to Polallie, which was believed to be Chinook jargon meaning powdery or sandy; however, George Gibb believes that the name derives from the French word poudre and was not originally Chinook or Chehalis.

The construction of the Loop Highway affected the overall philosophy of the Forest Service to incorporate recreation and public access into its management. A new road was constructed to Cloud Cap Inn in 1926, along with construction of the Tilly Jane Guard Station and campground. The Civilian Conservation Corps (CCC) contributed further to the recreational development of the area and may have added stone culverts to the Cloud Cap Road, made improvements to the Tilly Jane Campground, constructed the Tilly Jane Warming Hut, and may have built a campground at the mouth of Polallie Creek. The CCC also constructed another warming shelter in the Cooper Spur area and may have improved a ski trail down from the Tilly Jane Warming Hut.

Downhill skiing lessons were offered at the Mt. Hood Lodge as early as 1913, and Hannum began brushing an area for the sport in the 1920s. In the 1940s, local residents resurrected the area near the Cooper Spur junction for skiing, which is now managed and operated under a special use permit.

Environmental Consequences

Direct and Indirect Effects

Alternative 1

The implementation of this no-action alternative would not result in any earth disturbance or visual effects. The project area would remain at its current existing condition. There would be no effect to heritage resources under Alternative 1, other than the natural process that are already occurring on the landscape. This alternative would allow for the continued use of ceded lands for both the Confederated Tribes of Warm Springs and Confederated Tribes of Grand Ronde.

Alternative 2

Lands to Be Conveyed (Government Camp Parcels)

Cultural Resources

The two National Forest System parcels located within the lands to be conveyed contain three potentially eligible cultural resources: 1) Skiway Trail; 2) Mt. Hood Ski Patrol Building; and 3) Summit Ski Area. On the westerly parcel there is the Skiway Trail, which is potentially eligible as a historic trail. As a result of the proposed action, effects to the Skiway Trail would be a reduced trail easement that could potentially damage the integrity the trail. The smaller the trail easement, the greater there is for potential impacts to this trail. Additionally, indirect effects to the Skiway Trail would be loss of feeling, setting, and association of the resource as the forested landscape around the trail is converted to non-forested lands.

The Mt. Hood Ski Patrol Building is an eligible cultural resource. Any eligible cultural resource on the lands to be conveyed, such as the Mt. Hood Ski Patrol Building, would be considered an adverse effect by the State Historic Preservation Office (SHPO) as a result of change in ownership from Federal to private ownership. More specifically, SHPO considers the change in ownership from Federal to private ownership an adverse effect due to the fact that compliance with Section 106 under the National Historic Preservation Act (NHPA) can no longer be applied. Section 106 review applies only to projects occurring on Federal lands or with Federal funding. For this reason, the land exchange would result in an adverse effect under Section 106 of NHPA for the Mt. Hood Ski Patrol Building. Currently, consultation with SHPO is underway for this property, which will provide a determination of effects.

Immediately adjacent to the easterly parcel there is an eligible historic site and a potentially eligible historic district, Summit Ski Area. A potential effect resulting from this land exchange to the Summit Ski Area could be the loss of setting and feeling on the east boundary of the parcel, which could be considered an adverse effect under Section 106 of NHPA. Currently, consultation with SHPO is underway for this site and historic district, which will provide a determination of effects.

Treaty Rights

The two National Forest System parcels located within Government Camp are identified as ceded lands to the Confederated Tribes of Warm Springs (CTWS) and Confederated Tribes of Grand Ronde (CTGR). The CTWS signed the Treaty with the Tribes of Middle Oregon in 1855. Several tribal groups ceded to the U.S. Government approximately 10 million acres of land south

the Columbia River between the Cascade and Blue Mountain ranges. The groups that became the Confederated Tribes of the Warm Springs Reservation also reserved 578,000 acres south of the Columbia on the Deschutes, Warm Springs, and Metolius rivers for their exclusive use. The treaty also preserved the groups' traditional practices of traveling to various off-reservation sites for fishing, hunting, and gathering. Included within the 10 million acres of land south of the Columbia River was the 109 acres within the Government Camp parcels as well as 769 acres in the Cooper Spur parcels.

The treaty with the Confederated Bands of Kalapuya (1855) is the only ratified treaty with the Kalapuyan groups who are indigenous to the Willamette Valley. The treaty dispossessed the Kalapuyans and their descendants of their aboriginal lands and effectively transferred the Willamette Valley to non-Indians. Between 1851 and 1855, the Kalapuyans faced increasing harassment and encroachment by American settlers. Finally, in January 1855, Superintendent of Indian Affairs Joel Palmer met with Kalapuyans, several bands of the Clackamas Chinook, and northern Molala peoples at Dayton and negotiated another treaty with the Confederated Bands of the Kalapuya, also known as the Bands of Willamette Valley Indians. The details on the exact location of the reservation for the Kalapuyans were left vague, largely due to the tense and often violent nature of settler-Indian relations in western Oregon during the early 1850s (the Rogue River War was then raging in southern Oregon). In order to resolve the problematic issue of where to relocate the state's Native peoples, the original Coast Reservation was created by executive order in 1855. It was intended to be the home for the Coast, Umpqua, and Willamette Valley groups and a majority of the Rogue River peoples. This vast tract, roughly one-third of the Oregon coast, included the area that later became the original Grand Ronde Reservation in 1857. The Kalapuyans, Clackamas, and Mollala of the Willamette Valley were forcibly removed from the Willamette Valley to Grand Ronde Encampment during the winter of 1855-1856.

Although the Federal Government terminated its trust relationship with the Confederated Tribes of the Grand Ronde Indian Reservation in 1954, the ratified treaties with the tribes, including the Kalapuya Treaty of 1855 (also called the Willamette Valley treaty), played an important role in the tribes' successful bid for restoration and community revival in the 1980s. Following the Confederated Tribes' restoration in 1983, treaty obligations were again recognized, allowing for government-to-government negotiations on a variety of issues.

Direct effects include loss of ceded land in the amount of 109 acres to the CTGR and CTWS. Additional direct effects include the increase in access to ceded land for CTWS on the Cooper Spur parcels.

Lands to be Acquired (Cooper Spur)

Cooper Spur Ski Area

The Cooper Spur Ski Area includes approximately 60 acres with one double chair, one rope tow, and two tube tows to make a total of ten ski runs. The "Jump Hill" within the ski area is potentially eligible. In the proposed action, the Forest Service would put the ski area under special use permit, and the site would remain in existing use with no effect to the resource. If the Forest Service does not find a potential candidate for the special use permittee after the transfer, the area would be decommissioned.

Cooper Spur Mountain Resort

The Cooper Spur Mountain Resort consists of 11 different structures from 1942 to 1986. None of the structures in the resort complex are eligible resources and would remain in their existing use. None of the structures are eligible resources and the decommissioning of the Cooper Spur complexes would have no effect to historic resources unless ground disturbance occurs.

Vacant Forest Land

These parcels are a mixture of pre-merchantable plantations and second-growth timber stands. There would be no direct effects to cultural resources under the proposed action, other than the natural process that are already occurring on the landscape. This area is identified as ceded land for CTWS. CTWS would gain 769 acres of ceded land on the east side of Mt. Hood (Cooper Spur parcels). Existing CTWS ceded land that was once under private ownership would change to administration under the Forest Service. This would be a benefit to CTWS, as the Forest Service would fulfill its trust responsibility on these lands as opposed to a private owner who would not be obligated to do so.

A loss of CTWS ceded land in the Government Camp parcels (109 acres) and the addition of ceded land in the Cooper Spur parcels (769), there is a total of 655 acres of increased access to CTWS ceded land.

Connected Actions

The proposed action also provides that upon completion of the land exchange, additional lands would be considered part of the Mt. Hood Wilderness and the Crystal Springs Watershed Special Resources Management Unit would be created. The new addition to the Mt. Hood Wilderness and the creation of the Management Unit would not affect heritage resources since these are administrative actions not resulting in disturbance to cultural resources and historic properties. Further, the proposed Forest Plan amendment to include management direction for A14-Crystal Springs Watershed Special Resources Management Unit provides management direction for the Tilly Jane-Cloud Cap Historic District that is similar to how the historic district is currently being managed. Therefore, there would be no impacts to how cultural resources and historic properties in this area are managed and protected.

Summary of Direct and Indirect Effects

In sum, the effects of the proposed land exchange would be a loss of ceded land for both the CTGR and CTWS. CTGR would lose 109 acres of ceded land based on the lands to be conveyed (Government Camp parcels). Existing CTWS ceded land that was once under private ownership (Cooper Spur) would change to administration under the Forest Service. A loss of CTWS ceded land in the Government Camp parcels (109 acres) and the addition of ceded land 769 acres (Cooper Spur) would result in a total of 655 acres of increased access to CTWS ceded land.

Forest Plan Amendment Effects Summary

A total of 1,109 acres would change from Land Use Allocation designated as Winter Recreation to Wilderness, decreasing potential effects to cultural resources by motorized recreational use. Approximately 769 acres of Cooper Spur acquired lands and 2, 110 acres of existing Federal lands to be included in the Crystal Springs Watershed Special Resources Management Unit. The Crystal Springs Watershed Special Resources Management Unit is designated to focus on the protection of the Crystal Springs Watershed as the primary goal for the land use allocation. Within this new land use allocation is the Cloud Cap-Tilly Jane Historic District, which was

designated a Special Interest Area (because of the historic designation of the district) in the current Mt. Hood National Forest Land and Resource Management Plan. In order to continue the protection and preservation management direction for the future for the Cloud Cap-Tilly Jane Historic District the management guidelines for the Special Interest Area and the Cloud Cap-Tilly Jane Historic District have been incorporated into the new Crystal Springs Watershed Special Resources Management.

Cumulative Effects

The past, present, and reasonably foreseeable projects listed in the table at the beginning of this chapter were considered for their potential to add to the effects of this project on cultural resources, traditional uses, and treaty rights.

Alternative 1

Since no direct or indirect effects would result from this alternative, there can be no cumulative effects.

Alternative 2

Cultural Resources

Of the projects listed in the beginning of this chapter, there are two activities that have the potential to result in a cumulative impact on cultural resources. Specifically, in the westerly parcel of the lands to be conveyed (Government Camp), there is a Portland General Electric transmission line that was constructed with a large right-of-way and there are several Forest Service (non-historic) trails. The construction and management of the transmission line, as well as the trails, have incrementally impacted the integrity of the Skiway Trail. Over time, continued maintenance needs for the transmission line and trails have used the Skiway Trail as an access route. The potential impacts to the Skiway Trail resulting from the land exchange, cumulatively added to the past, present and future impacts associated with maintaining the powerline and trails, could further degrade the integrity of this potentially eligible cultural resource.

The activities related to the transmission line and trails have no effect on the Mt. Hood Ski Patrol Building or the Summit Ski Area; therefore, there would be no cumulative impacts on these two potentially eligible sites. Also, there are no other reasonably foreseeable projects that have the potential to affect any cultural resources within the area of potential effect.

In regards to cultural resources on the Hood River Ranger District, the only activity with potential cumulative impacts are Forest Service vegetation treatment activities planned near the lands to be acquired. However, they would not affect any known cultural resources in the area as the agency has completed Section 106 review related specifically to the projects in this area. Past timber harvest and agricultural activities on private land have occurred within the acquired lands, but did not affect any known cultural resources to the agency. Future vegetation treatment activities on the Hood River Ranger District would be required to comply with Section 106, in which the potentially eligible Cooper Spur Ski Hill would be identified for protection. There are no other direct or indirect effects to cultural resources so cumulative effects were not further assessed.

However, because would not affect any known cultural resources in the area as the agency had conducted Section 106 review related specifically to the project in these areas. Past timber harvest and agricultural activities on private land have occurred within the acquired lands, but did not affect any known cultural resources to the agency. Future vegetation treatment activities

in the area would be required to comply with Section 106 of the National Historic Preservation Act, in which the potentially eligible Cooper Spur Ski Hill would be identified for protection. There are no other direct or indirect effects to cultural resources so cumulative effects were not further assessed.

Traditional Uses and Treaty Rights

There are two projects within the Area of Potential Affect (APE) of the Government Camp parcels that have the potential for cumulative effects to traditional uses and treaty rights: (1) Mirror Lake Trailhead Relocation Project; and (2) Mazama Lodge Parking Area Expansion Project. Both of these projects propose to convert forest land into parking areas. The proposed action, combined with the conversion of the forested lands into parking areas, would be a continuation of a loss of ceded land for the CTWS and CTGR. However, both of projects cover no more than two acres, which is a relatively small percentage of overall ceded lands for both tribes. Since both projects are relatively small in size, in previously disturbed areas, and in or near existing special uses permit areas, cumulative effects would be minor.

Facilities

Introduction

The information provided in this section was derived from the Cooper Spur Resort Property Condition Survey, March 2012 and the Government Camp-Cooper Spur Land Exchange Facilities Report, July 2016. Both documents are filed in the project record.

The Forest Service currently owns one structure in the Government Camp parcel, which is the Mt. Hood Ski Patrol building. This structure is currently being used by the Mt. Hood volunteer ski patrol. Through the land exchange, all improvements to the land would become property of Mt. Hood Meadows, thereby removing the Ski Patrol building from the Mt. Hood National Forest facility inventory.

Depending on the outcome of the appraisal equalization process, the Forest Service may acquire a significant number of structures that comprise the Cooper Spur Ski Area and Mountain Resort. However, the assumption for this analysis is that the Forest Service would acquire the structures along with the lands. The following described infrastructure at the ski area is considered in the estate to be conveyed: ski lift system comprised of one double chair, one rope tow and two tube tows; a day lodge, A-frame cabin, first-aid station, four multi-purpose buildings, instructor's hut, and pump house. The day lodge is the primary building with kitchen and dining area on the main floor, additional seating area in a loft, and lift ticket/equipment rental in the lower daylight level. Restrooms are housed in one of the multi-purpose buildings. In addition, there is a private well water system, irrigation system, and septic system.

The Cooper Spur Mountain Resort is located about two miles east of the Cooper Spur Ski Area at the intersection of Cooper Spur and Cloud Cap roads. The resort site consists of 11 different structures. The registration desk portion of the restaurant building and the Homestead Cabin were built in 1942. The restaurant addition and all other structures were added in 1985-1986. There are five log cabins of 1,200 square feet, each with a kitchen area, living room and fireplace, two bedrooms and one bath on the main floor. The resort also includes spas, storage, tennis court, equipment storage and shop, and a single-family residence.

In addition to the cabins and restaurant, there are several septic tanks that lead to a single leach field northeast of the improvements. A well with well house and another small building are located on Tax Lot 401. Another recently installed well is located on Tax Lot 102.

The public expressed concern over the ability of the Forest Service to care for and manage these newly acquired facilities. They were interested in the plans the Forest Service has for the future use and management of the resort and ski area, and the condition the facilities to be acquired are in.

Condition assessments for the facilities to be acquired have been conducted. A number of inadequacies were identified that would need to be addressed before they could be opened for public use. A special use permit would also need to be developed for the future operation of the Cooper Spur Mountain Resort. A prospectus would be sent out for review and response by interested citizens. If there was no interest or the respondent could not prove their ability to maintain the facility to specific standards as outlined in the prospectus, the resort and/or ski area would be decommissioned.

Affected Environment

Existing Condition

The Cooper Spur Mountain Resort facilities were mostly constructed in the 1980's with one building originating in 1917, called the Cooper Spur Inn. The resort has 18 structures with most of the structures situated around the Cooper Spur Inn, 15 total. The other facilities are located near the ski area with the day lodge and other support buildings. The majority of the structures in both locations are log construction but there are a few light framed wood and pole barn structures. The lower portion of the site is located at approximately 4,000 feet with the ski area at 4,350 feet above mean sea level. The terrain is mountainous with the lodge site dropping approximately 80 feet in grade. Access to the resort area is directly adjacent to Cooper Spur Road. Cooper Spur Road is a paved loop that starts and ends at Highway 35. The Cooper Spur Inn and the day lodge each have their own paved parking areas, with some short paved routes to the rental cabins.

While the facilities near the day lodge only see seasonal use, dependent on snow accumulation, the facilities around the Cooper Spur Inn are used year round, with most of the usage peaking in the winter months. The condition survey of 2012 noted that, "the overall condition of the various structures on the property ranges from poor to good, but the majority of the structures are in good condition" (USDA 2012). The properties have ongoing preventative maintenance and improvements have been made to various structures. There were not any signs of pest infestations or hazardous materials during the 2012 visual site observation.

Some utilities in the resort area are handled on-site and do not connect to county or city services. All water is accessed by an on-site water system provided by wells and wastewater is disposed of through a septic system that flows into drain fields. The electrical service is provided commercially by Pacific Power and runs to the transformers and meters where the user then becomes responsible for maintenance. The phone system consists of individual lines running into each unit. There was no central system. There were wireless routers in the rental cabins and the lodge/motel.

The Mt. Hood National Forest Facilities Master Plan (FMP) is incorporated into this analysis by reference (USDA 2015). It provides context for how the facilities that would be acquired through

this land exchange would be evaluated and addressed. Per the FMP, "*The goal of this FMP was to evaluate the facilities of the Mt. Hood NF and develop an intelligent investment roadmap for the future by identifying optimum facility locations to meet the needs of the Forest and become more sustainable. This document lays out the criteria used to evaluate facilities, including historic value, forest needs, and management direction, and the reasons why recommendations were made within this FMP. The FMP was successful in recommending that 99 buildings of the 197 existing administrative buildings be removed from the administrative inventory. It is recognized that while this is a large reduction in the facility footprint, additional reductions may be needed in the future to reach the goal of sustainability with future budgets. This FMP is a living document and will be revisited as appropriate with this goal in mind.*"

Environmental Consequences

Direct and Indirect Effects

Alternative 1

Under the no-action alternative, the facilities would continue to be maintained and managed by Mt. Hood Meadows. The Property Condition Assessment states that, "the property appears to have ongoing preventative maintenance and improvements to the various structures" (USDA 2012). Also, the Mt. Hood Ski Patrol building would remain under Federal ownership.

Alternative 2

With the acquisition of the facilities at the Cooper Spur Mountain Resort and Ski Area, the Forest Service has the option to retain the buildings or consider them excess, depending on the outcome of the prospectus process for issuing a special use permit. Under the proposed action, the Mt. Hood Ski Patrol building would no longer be managed by the Forest Service.

Special Use Permit

If the buildings are retained, as stated in the proposed action description, they would need to be operated under a special use permit with a concessionaire. There is an option in which the buildings could be owned and operated by the concessionaire, and a special use permit would be required for conducting business on Federal lands. Another method of a special use permit is through the Granger-Thye Act, where the Forest Service would continue to own the buildings, but they would be operated by the concessionaire. Some examples of these agreements made through the Granger-Thye Act in the Pacific Northwest include Timberline Lodge, Multnomah Falls, and Cloud Cap Inn. In this scenario, a Request for Proposals would be advertised for what could include the operation of the ski resort, rental facilities, and Cooper Spur Mountain Resort. The benefit of using this particular special use permit is that day-to-day operations are the responsibility of the concessionaire with Forest Service oversight and stipulations. In either scenario, a percentage of the revenue would be earmarked for deferred maintenance, renovations and upgrades for accessibility.

Accessibility

With the buildings coming under Federal ownership, there would need to be upgrades to meet the accessibility requirements of the Architectural Barriers Act (ABA), as summarized below. A transition plan would need to be developed to ensure that the structures would meet accessibility requirements as renovations occur.

In the Cooper Spur Inn, the entrance would need to be replaced with a 32-inch doorway and handles with levers that can be opened with a closed fist. A 36-inch path of travel would need to be added from designated parking areas to waiting areas, restrooms, food bars and entertainment areas. The men's restroom in the lobby would require reconstruction to become accessible.

The spa area would require upgrades to the access gate and handles for accessibility. There would need to be a 36-inch path from a parking spot or other location to meet accessibility requirements.

The hotel would require upgrades to comply with the ABA. Upgrades would include power assisted opening outside doors and replacement of door handles with lever styles. To meet accessibility in the restrooms, the showers would need to be replaced without lips, toilets moved to the acceptable height, and the grab bars should be added. In the living areas, countertop heights may need to be adjusted. In the communal areas, the weight room and laundry room may need to be modified. Lastly, a designated parking stall and 36-inch path from the parking to the entrance would need to be provided. According to Table F224.4 in the Architectural Barriers Act Standards, only one room would need to be made accessible.

The following buildings would need to be reevaluated for accessibility compliance: The Homestead Suite, the five Rental Cabins, the Log Home, the Day/ Ski Lodge, the A-Frame Cabin, and the First Aid Station. It appears there are some elements in most of these buildings that would need to be upgraded to meet ABA requirements.

Table 8 summarizes some of the accessibility upgrades that would be required by the ABA with their estimated costs for reconstruction. The Property Condition Assessment did not provide many cost estimates for accessibility upgrades (USDA 2012). Prices without a 2012 cost are a rough government cost estimate from RS Means 2002 cost estimating guide, adjusted for an inflation of 34 percent (RS Means 2002). If the cost for an accessibility upgrade is not listed in the table below (e.g., costs for the weight room and laundry room), then the estimated cost is unknown.

Table 8. Estimated cost for accessibility upgrades

Building	Corrective Action for Accessibility	Estimated Cost (2012)	5% inflation (2016)
Cooper Spur Inn	Site access ramp	$ 1,834.00	$ 1,925.70
	Replace entry door		$ 1,418.46
	Men's restroom		$ 1,662.54
Spa	Site access		$ 1,750.00
Hotel	Site access		$ 1,750.00
	Replace entry door		$ 1,418.46
	Bathroom upgrade		$ 1,804.71
		Total	$11,729.86

Life and Safety

In addition to accessibility upgrades, there were some urgent corrections needed to a few of the buildings to make them safer for public use identified in the Property Condition Assessment (USDA 2012). The total cost for all activities needing corrections is approximately $38,895.

From those urgent corrective actions, the table below is a summary of actions that are needed for life and safety upgrades.

The Cooper Spur Inn has modified electrical panels and older electrical wire that is incorrectly installed and would need to be remedied immediately. Loose wires are a fire hazard and should be corrected upon ownership of the building. The equipment shop has a similar issue with loose wiring that would need to be corrected by providing conduit. Other buildings that need electrical work are the A-Frame Cabin and the Homestead Suite. Also, the Log Home electrical panel needs to be relocated.

The rental cabins and hotel need some renovations to their water system. The hotel and rental cabins need domestic water cross connections; and circulating hot water system needs to be installed to meet current energy code requirements.

A number of buildings need structural upgrades. In the Cooper Spur Inn, a few beams need to be replaced and some floor beam connections are needed. The foundation for the Homestead Cabin needs to be installed in the north section and replaced in the south section. The A-Frame Cabin needs the balcony replaced and there are some connections in the Ski Lodge deck that need new connections in the stairs and better anchorage of the fabric canopy.

Table 9. Corrective action for life and safety

Building	Corrective Action for Safety	Estimated Cost (2012)	5% Inflation (2016)
Cooper Spur Inn	Electrical upgrade	$ 13,180.00	$ 13,839.00
	Fire service connections	$ 2,525.00	$ 2,651.25
	Sprinkler piping	$ 1,380.00	$ 1,449.00
	Structural upgrade	$ 1,286.00	$ 1,350.30
Equipment Shop	Electrical upgrade	not determined	unknown
Rental Cabin (1-5)	Domestic water cross connections	$ 1,080.00	$ 1,134.00
Homestead Suite	Electrical upgrade	$ 3,000.00	$ 3,150.00
Spa	Signage for chemical storage	$ 50.00	$ 52.50
Hotel	Domestic water cross connections	$ 840.00	$ 882.00
	Laundry room ventilation	$ 250.00	$ 262.50
	Hot water recirculation system	$ 1,125.00	$ 1,181.25
Log Home	Relocate electrical panel	$ 5,050.00	$ 5,302.50
Ski Lodge Decks	Structural connections	$ 2,357.00	$ 2,474.85
A-Frame Cabin	Bury wires in conduit	$ 219.00	$ 229.95
	Correct electrical panel	$ 435.00	$ 456.75
	Replace balcony	$ 1,311.00	$ 1,376.55
		Total	$ 35,792.40

Deferred Maintenance

In addition to urgent corrective actions, the 2012 Property Condition Assessment identified immediate upgrades that need to occur within one to three years. The total cost of immediate upgrades estimated in the 2012 Property Condition Assessment was approximately $235,774 worth of improvements. Using an estimate of 5% for inflation that cost in 2016 dollars is approximately $247,563. Some examples of repairs in this tier of improvements include

replacing materials from normal deterioration such as exterior siding and roofing, mechanical systems, a log sealant for log construction buildings. The highest cost maintenance item is a 2-inch overlay of asphalt pavement for the parking lot and driveways at a cost of $46,620.

Deferred maintenance items are defined as upgrades or repairs that should be addressed between 3 and 10 years, according to the Property Condition Assessment. The total cost of deferred maintenance expected is approximately $48,494. A major component of this category is replacing the galvanized piping in the Cooper Spur Inn, addressing chimney cracks in the five rental cabins and lodge home, and replacing the deck at the Ski Lodge with proper members for beams.

Excess

In the event that a special use permit is not issued to a potential permittee, a prospectus would be developed to consider the need to keep the structures administratively, with a likely outcome of considering the buildings excess to the government's need. Once a structure is considered excess, it would trigger a disposal process for that structure. The options for disposal include transferring buildings through General Services Administration (GSA) procedures, where another government agency would presume ownership of the buildings and maintain the facilities. It is also possible to donate the buildings to public bodies for offsite removal, where the Forest Service would not be compensated, but would realize savings through the absence of future maintenance costs. The Property Condition Assessment estimates a repair total of $323,488 in 2012, or $339,662 adjusted for an inflation of 5%.

The Forest Service could also convey structures through the sale of facilities for offsite removal. The sale of the structure may be retained if it is sold under the Forest Service Facility Realignment Act (109-54 Pub. L.), the other option would be to convey the structure through GSA.

Excess buildings could also be demolished; however, only properties that have been determined to have no commercial value, or if the cost of care and handling exceeds estimated proceeds from sales, could be demolished. The total cost for decommissioning the suite of buildings on the acquired lands is approximately $161,412. Compared to the total maintenance cost of $339,662 identified in the Property Condition Assessment, the Forest Service could realize a savings of over $178,000 if the facilities are decommissioned.

Cumulative Effects

The Mt. Hood National Forest currently manages and maintains 197 facilities. Of those buildings, it was determined that 98 are designated as necessary to meet the mission of the Forest, while the remaining buildings were either designated to be disposed of, conveyed, or converted for other uses such as recreation use under concessionaires. The Facility Master Plan recommends that 99 buildings of the 197 existing administrative buildings be removed from the administrative inventory (USDA 2015). This is considered a large reduction in the number of facilities and there could be more reductions in the future to account for future budgets.

The current trend of facilities is downsizing and restructuring. In the late 1980s, the Forest managed approximately 230 buildings with 700 employees, and that has been reduced to 197 buildings serving a workforce of 235 employees. This reduction has been made to match declining budgets. With limited funding, investments in facilities have focused on emergency repairs and meeting health and safety codes.

Some of the Forest direction according to the Facilities Master Plan includes providing facilities to meet the needs of the current and future workforce, including retention and recruitment. Additionally, the Forest direction is to provide facilities for an effective visitor contact network.

Most of the buildings in the Cooper Spur Mountain Resort would qualify as quarters. In the Facilities Master Plan a summary of quarters is provided. One-third of quarters are to be retained and one-third are to be converted. There are two quarters that the Forest proposed to obtain to fill its needs, which is three percent of the total count of 72. The remaining quarters, just under one third, are to be disposed of or conveyed (USDA 2015). Adding additional quarters from the Cooper Spur Mountain Resort would lead to a two-thirds chance that these facilities would not be retained.

The addition of the Copper Spur facilities could put a strain on facilities management in the Mt. Hood National Forest. As discussed above, the buildings would likely be considered excess and would be added to the list of facilities that need to be disposed. Although half of the buildings in the Forest's inventory are scheduled to be excess, there has not been enough funding to execute the disposal of these buildings. Thus, the cumulative impact of adding the Cooper Spur facilities to a list of excess buildings without sufficient funding, could possibly result in reordering the queue of buildings to be disposed of.

Fisheries

Introduction

Forest management activities that may alter aquatic habitat or affect individuals or populations of proposed, endangered, threatened, and sensitive fish and aquatic species require a biological evaluation to be completed (FSM 267l.44 and FSM 2670.32) as part of the National Environmental Policy Act (NEPA) process and Endangered Species Act to determine their potential effects on sensitive, threatened or endangered species. The biological evaluation process (FSM 2672.43) is intended to conduct and document analyses necessary to ensure proposed management actions will not likely jeopardize the continued existence or cause adverse modification of habitat for:

> A. Species listed or proposed to be listed as endangered (E) or threatened (T) by the USDI Fish and Wildlife Service or USDC NOAA Fisheries, and their listed or proposed listed critical habitat.

The biological evaluation process (FSM 2672.41) is also intended to conduct and document analyses to ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native plant or contribute to animal species or trends toward Federal listing of any species for:

> B. Species listed as sensitive (S) by USDA-Forest Service Region 6.

In addition to the above, the Forest Service is required to assess and disclose the effects of any Federal action on Regional Forester's special status species, as outlined in the Endangered Species Act of 1973 and National Forest Management Act of 1976 (see effects determination section). The Magnuson-Stevens Fishery Conservation and Management Act of 1976 requires the Forest Service to assess and disclose the affects to Essential Fish Habitat. Clean Water Act compliance and consistency with the standard and guidelines outlined in the Northwest Forest Plan Aquatic Conservation Strategy objectives is discussed in the Hydrology specialist report.

The Fisheries Specialist Report (Project Record) provides additional information from what is provided in this section of the DEIS, regarding analysis methodology, applicable Forest Plan Standards and Guidelines, and other supporting information and detail relating to this resource.

Affected Environment

The affected environment, also known as the action area, is defined as all areas to be affected directly, indirectly, or cumulatively as a result of the Federal action and not merely the immediate area involved in the action [50 CFR §402.02]. This includes an analysis of how long (short-term versus long-term) the effects will occur (FSH 1909.15, 152b). For this analysis, the action area is defined as all of the land proposed under the exchange, as well as aquatic habitat areas where potential effects could occur. The short-term effects are defined as any effects that will take place within two years and the long-term effects are those that will take place over multiple decades.

The project encompasses two separate geographic areas with multiple subwatersheds on Mt. Hood. During this discussion, we will divide the effects analysis in the following way. In Government Camp, there are two 7th-field watersheds that are part of the action area; Camp Creek and the Little Zigzag River. Both are tributaries to the Zigzag Canyon 6th-field watershed. For purposes of this report, a discussion about effects to those two subwatersheds will be referred to as the Government Camp action area. On the Cooper Spur side, there are four 7th-field subwatersheds in the action area: Tilly Jane Creek, Doe Creek, Ash Creek, and Crystal Springs Creek. All are tributaries to the Middle East Fork Hood River. These subwatersheds will be referred to as the Cooper Spur action area (figure 15).

In the Government Camp area, this analysis documents measurable, indirect effects to aquatic environments that extend from the project area downstream below Yokum Falls in Camp Creek (about 4.5 river miles) and to the mouth of the Tributary to the Little Zigzag River (1.1 river miles) (figure 15). The timing of those effects will be observed both over the short term (less than 2 years) and extend out over many decades as the land is developed. Cumulative effects include actions that overlap in time and space, and therefore, the cumulative effects action area is larger than the direct and indirect effects action area. In Camp Creek, it extends from the Government Camp parcels to the Zigzag River (about 8.1 river miles). And from the Government Camp parcels to the Little Zigzag River and then to the confluence with the Zigzag River (about 2.4 river miles).

In the Cooper Spur area, there are no measurable effects to aquatic organisms or habitat documented under either of the alternative actions. Therefore, the analysis area is the same as the parcel boundary and is only discussed in the existing condition section (figure 15). Since there are no effects, there is no evaluation of the temporal or cumulative impacts of the project.

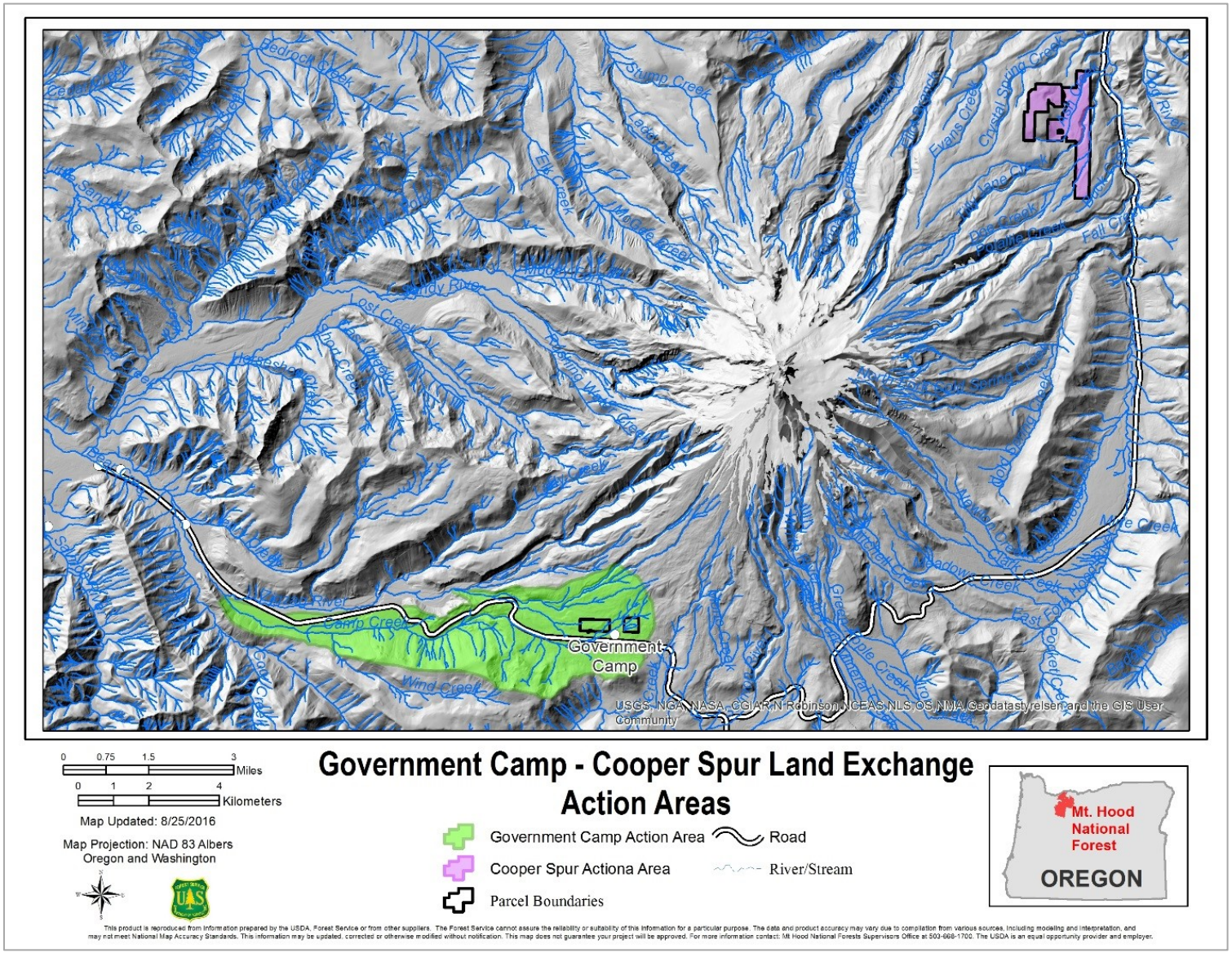

Figure 15. Map of action area in the Hood River and Sandy River Basins

Existing Condition

The existing condition discussion is divided into two main sections: (1) aquatic species distribution and basic life history; and (2) existing habitat conditions, particularly as they relate to designated critical and essential fish habitat, and the primary processes that may be impacted by the project. Only those species and associated habitat that are found within the action area are discussed and analyzed since there would be no effect/impact to species/habitat outside the action area.

Presence of Proposed, Endangered, or Threatened Species

The Mt. Hood National Forest supports several species of anadromous salmonids, including Chinook, coho, and steelhead. These salmon and steelhead populations, which historically numbered in the tens of thousands (Taylor 1998; NOAA Fisheries 2013), have experienced substantial declines during the last century. Although there are different reasons for their current status, common issues throughout their range include impaired fish passage at dams and other obstructions, commercial and recreational fishing, habitat modification and/or loss, hatchery influences, and pollution. Hydropower, irrigation, domestic water supply, and flood control dams have disrupted migrations and eliminated historically available habitat. Commercial and recreational fishing have reduced numbers of wild fish in some populations. Habitat has been degraded, simplified, and fragmented due to a variety of land management activities both on and off the Forest. Important food sources such as aquatic macroinvertebrates have been impacted from habitat modification and water quality degradation. Hatchery programs have influenced populations, partly by masking declines in native fish abundance and dilution of native gene pools due to interbreeding. Reduced water quality from both point and non-point sources has had an impact at localized and even watershed scales in some areas (NOAA Fisheries 2013).

Government Camp. There are three Endangered Species Act (ESA)-listed fish species present in the action area in Government Camp; Lower Columbia River winter steelhead, Lower Columbia River Chinook salmon, and Lower Columbia River coho (table 10). There are about 5.8 miles of designated critical habitat for Lower Columbia River steelhead, and about 3.8 miles for Lower Columbia River Chinook and coho salmon in the area (figure 16, figure 18, and figure 19). No other ESA-listed fish species that occur elsewhere on the Forest are found in the action area.

Cooper Spur. There are no ESA-listed fish species present in the Cooper Spur action area. Resident cutthroat trout and rainbow trout are present in the lowermost section of Crystal Springs Creek and in Tilly Jane and Doe Creeks (figure 17).

Restoration of abundant native salmon and steelhead populations and the habitat that supports them is a high priority for the Mt. Hood as well as other Federal, tribal, state, and local governments and agencies, as those species play critical economic, cultural, and recreational roles.

Table 10. Presence of ESA-listed fish, designated critical habitat, and essential fish habitat within the analysis area of the Government Camp-Cooper Spur Land Exchange

Species	Distinct Population Segment (DPS)/ Evolutionary Significant Unit (ESU)	Status	Action Area Presence	
			Government Camp	Cooper Spur
Steelhead trout *Oncorhynchus mykiss*)	Lower Columbia River DPS	Threatened 1/06 Critical Habitat 9/05	Yes	No
Chinook salmon (*O. tshawytscha*)	Lower Columbia River ESU	Threatened 6/05 Critical Habitat 6/09 Essential Fish	Yes	No
Coho salmon (*O. kisutch*)	Lower Columbia River ESU	Threatened 6/05 Critical Habitat 2/16 Essential Fish	Yes	No

Note: The date in the status column is the date of listing or most recent status review and subsequent *Federal Register* notice for ESA-listed species.

Lower Columbia River Steelhead

Lower Columbia River steelhead trout are found in both the Hood River and Sandy River Basins. These trout occupy a greater range of habitat than any other listed salmonid species in their range, extending from high elevation mountain streams to the Columbia River. Both Lower Columbia River summer and winter steelhead runs occur in the Hood River Basin; however, only winter steelhead are present in the East Fork Hood River Watershed. Only Lower Columbia River winter-run steelhead are present in the Zigzag River Basin. Sandy River historic returns may have once numbered 20,000 adults (ODFW 2002, as found in Sandy River Basin Partners [2005]). The mean return size for the period of 1999 to 2008 was 777 native adults (NOAA Fisheries 2016). The mean return size for winter-run steelhead in the Hood River Basin for the period of 1999 to 2008 was 558 native adults (NOAA Fisheries 2016).

In both the Sandy and Hood Rivers, winter-run steelhead typically enter the basin in significant numbers from February through May, with peak spawning occurring in mid-May. Following emergence, steelhead fry will often seek refuge from fast currents by inhabiting stream margins and pool backwater habitats (as found in Sandy River Basin Partners (2005). As they begin to mature and grow larger, juveniles will typically inhabit deeper water habitats of pools, riffles, and runs. Steelhead juveniles may rear 2 to 3 years in their natal stream before migrating as smolts to the ocean. As such, the quality of the habitat they inhabit during this time is critical to their survival. Smolt emigration takes place primarily from March through June during spring freshets (Sandy River Basin Partners 2005).

In Camp Creek, Lower Columbia River steelhead are present up to Yokum Falls, which is the historic upper limits for the anadromous form of rainbow trout; however, the resident form is present to the headwaters of Camp Creek, which is where the two Government Camp parcels are located. Designated critical habitat for Lower Columbia River steelhead extends from the mouth upstream to the natural barrier at Yokum Falls (about 5.8 miles) (figure 16). Today, the majority of steelhead in the Zigzag River 5th-field watershed, reside in Still Creek. However, there is strong historical evidence that Camp Creek and the mainstem Zigzag River provided important habitat for steelhead.

Lower Columbia River steelhead use the section below Little Zigzag Falls for spawning, rearing, and as a migration route. Designated critical habitat is present to the Little Zigzag Falls (figure 2).

Lower Columbia River winter steelhead runs are present in the East Fork Hood River, but are not currently known to be present in the action area (figure 17). Steelhead spawning has been documented in the East Fork Hood River near the Tilly Jane and Crystal Spring tributaries, and while they may potentially be able to utilize the East Fork Hood River up to the Tilly Jane Creek confluence near the Forest boundary, they have not been documented there (Rod French; personal communication October 16, 2015). There is no designated critical habitat in any of the tributaries within the Cooper Spur action area. Designated critical habitat for steelhead is located about 0.25 mile downstream of the action area in the East Fork Hood River.

Lower Columbia River Chinook Salmon

Lower Columbia River spring and fall Chinook salmon are also present in both the Sandy and Hood River Basins. Lower Columbia River spring Chinook salmon are found throughout the Sandy River including the Zigzag River 5th-field watershed and Camp Creek, and are present within the Government Camp action area (figure 18). Historic returns may have once numbered 15,000 adults (City of Portland 2004). The mean return size for the period of 1999 to 2008 was 1,108 native origin spawning adults (NOAA Fisheries 2016). In the East Fork Hood River, known spring Chinook salmon upper distribution ends about 4 miles downstream of the action area, although they may potentially be able to utilize the East Fork Hood River up to the Tilly Jane Creek confluence near the Forest boundary (Rod French; personal communication, October 16, 2015). Chinook salmon are not currently known to be present in the Cooper Spur action area (figure 17).

Both the Sandy River and Hood River spring Chinook share similar life histories. Both populations enter the river in early spring, most commonly in April and May. Peak migration occurs in June, with a smaller peak occurring in September. Spawning occurs primarily in August through October. Juveniles emigrate in the fall or the following spring after emergence, and return generally at age 4 or 5.

Fall Chinook salmon are present in both basins, but not in either of the action areas.

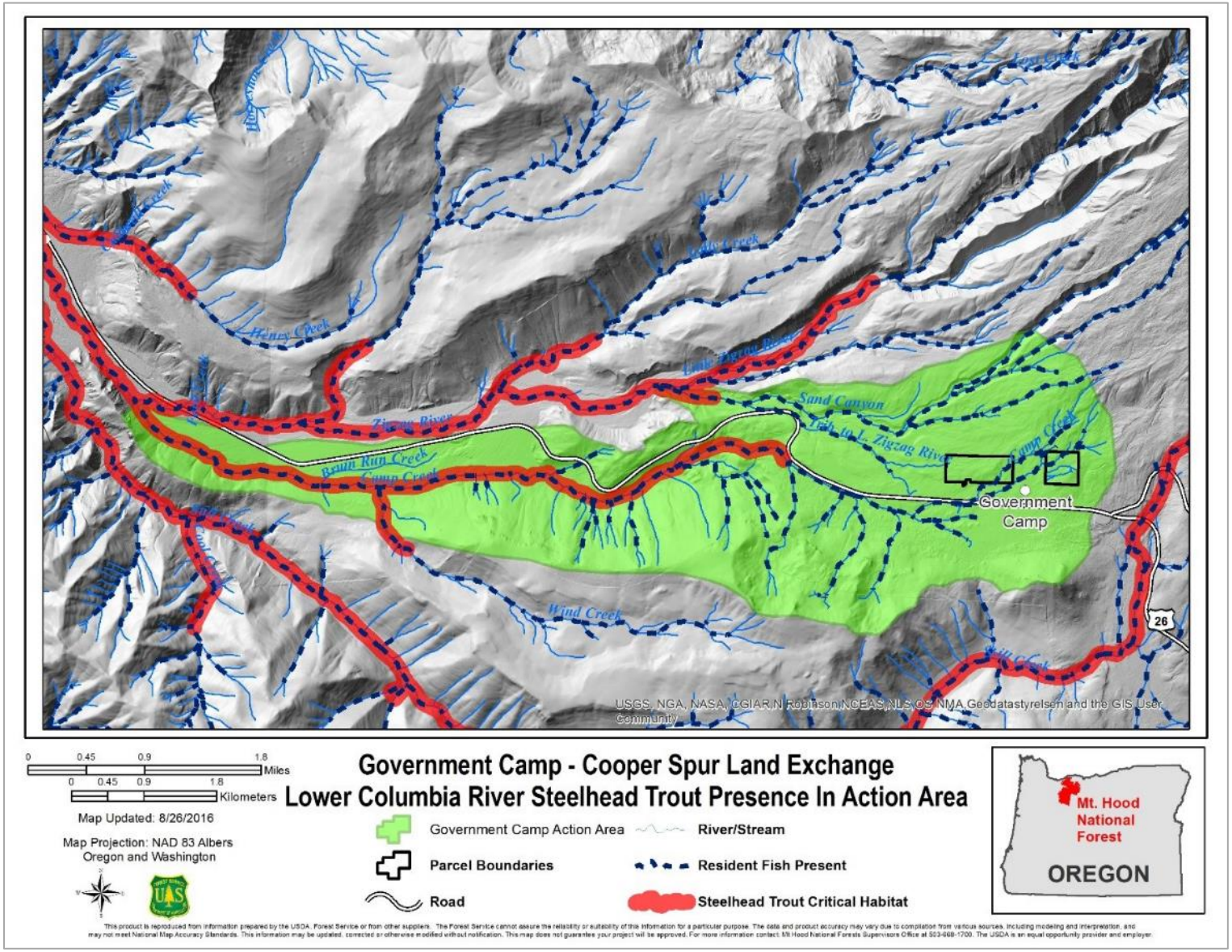

Figure 16. Map of Lower Columbia River steelhead and designated critical habitat in the Government Camp action area

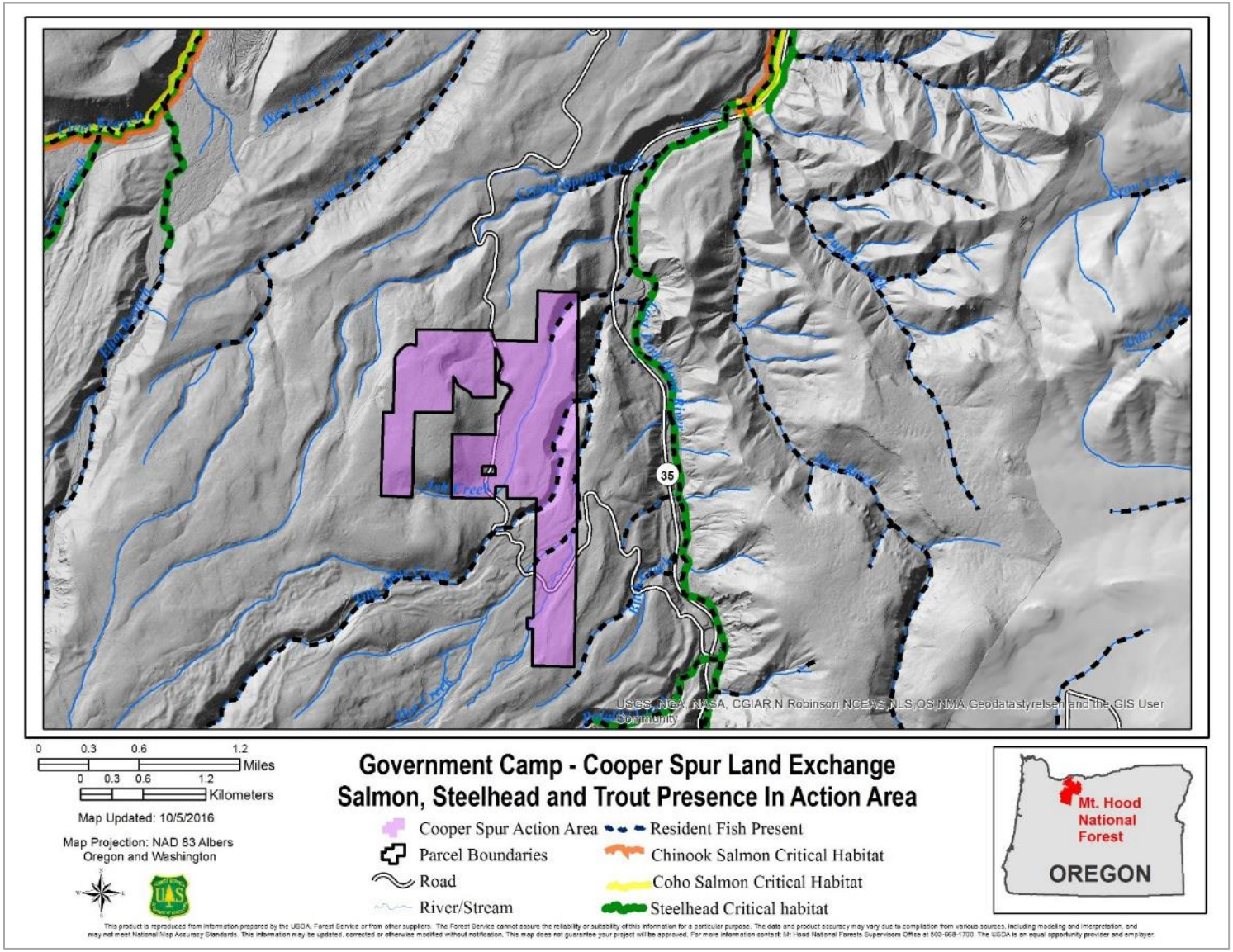

Figure 17. Map of resident trout and Lower Columbia River steelhead, coho, and Chinook designated critical habitat in the Cooper Spur action area

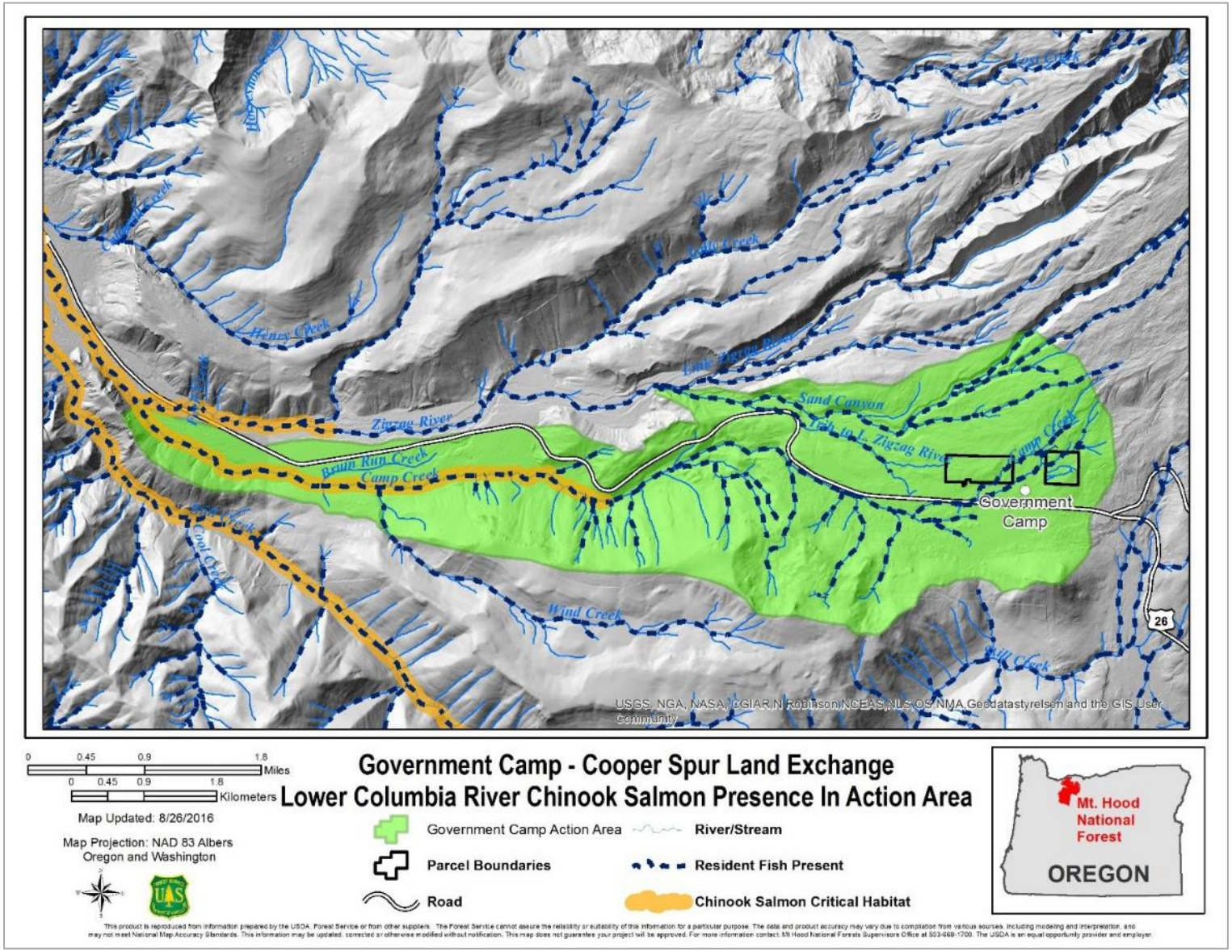

Figure 18. Map of Lower Columbia River Chinook salmon and designated critical habitat in the Government Camp action area

Lower Columbia River Coho Salmon

Lower Columbia River coho are present throughout the Upper Sandy River Basin and in the action area in Government Camp (figure 19). They may be present up to Little Zigzag Falls which prevents fish passage into the upper watershed, but designated critical habitat is not present in the Little Zigzag River (figure 19). Coho are also present in Camp Creek with designated critical habitat extending to the Laural Hill pit area (figure 19). The Sandy River population includes both an early hatchery-origin run of coho, with peak presence occurring in September and October, and a late wild run generally peaking from October through December.

Lower Columbia River coho salmon are known to reside in the East Fork Hood River up to Dog River and based on limited observations in the past (Mt. Hood National Forest Plan, unpublished data) they inhabit the lower 0.25 mile of Dog River (figure 18). Proposed critical habitat, however, extends well beyond the upper limit of known distribution—up to the headwaters of the East Fork Hood River and about 1.2 miles above the mouth in Dog River. Critical habitat was designated for the Lower Columbia River coho populations in February 2016 (figure 17).

Fry emergence primarily occurs from February through April and peaks in March (Sandy River Basin Partners 2005). Following emergence, juvenile coho typically seek stream margin habitats and backwater pools for initial rearing (ODFW 1997). As they continue to grow in size, juveniles seek low velocity pool and off-channel habitats for summer and winter rearing. Juvenile coho rely heavily on slack water habitats with complex large woody debris for protection from winter freshets. Juvenile coho in the Sandy River typically emigrate to the ocean as smolts at about 12 to 14 months of age (ODFW 1997). The timing of juvenile coho outmigration is usually late March through June, peaking in April and May (ODFW 1997). Coho salmon in the Lower Columbia River and Southwest Washington Coast Evolutionary Significant Unit typically rear in the ocean for two summers and return as 3-year-olds.

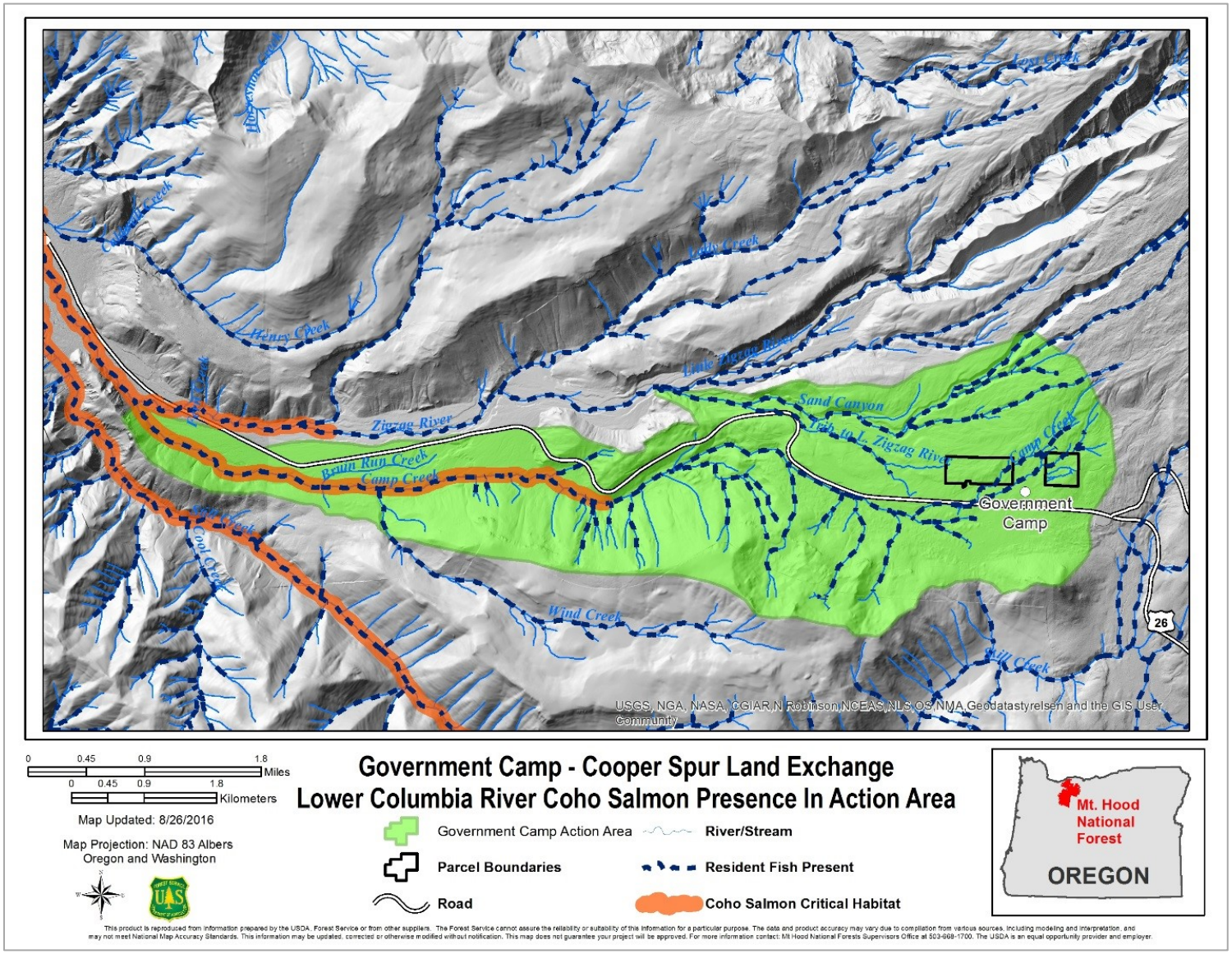

Figure 19. Map of Lower Columbia River coho salmon and designated critical habitat in the Government Camp action area

Presence of Region 6 Regional Forester's Special Status Sensitive Species

As part of the NEPA process, the Forest Service reviews programs and activities to determine their potential effect on sensitive species. Species on the Mt. Hood National Forest included in the July 2015 Regional Forester's special status species list are described below (table 11).

Government Camp. There are four Region 6 Regional Forester's sensitive species present within the action area including Pacific lamprey (about 5.8 miles of habitat), and resident and anadromous cutthroat trout (about 8.8 miles of habitat). Brook trout, a non-native salmonid, have been documented in Collins Lake (USDA Forest Service unpublished data). Scott's apatanian caddisfly are present in the headwaters of Camp Creek and within a few hundred feet of the land exchange boundaries. The Columbia duskysnail, which are Northwest Forest Plan Survey and Manage Species, are also present.

Cooper Spur. There are two Region 6 Regional Forester's sensitive species within the action area. Resident and anadromous cutthroat trout are in Doe, Tilly Jane, and Crystal Springs Creeks (about 3.5 miles of habitat). The Columbia duskysnail is also present.

Table 11. Presence of Region 6 Regional Forester's special status sensitive and strategic species within the action area

Scientific Name	Common Name	Forest Presence	Action Area Presence	
			Government Camp	Cooper Spur
Sensitive Species				
Entosphenus tridentatus	Pacific lamprey	Documented	Yes	No
Onchorynchus mykiss gairdneri	Redband trout	Documented	Unknown	No
Onchorynchus clarki	Coastal cutthroat trout	Documented	Yes	Yes
Juga hemphilli dallesensis	Dalles juga	Suspected	No	No
Juga hemphilli hemphilli	Barren juga	Documented	No	No
Juga hemphilli maupinensis	Purple-lipped juga	Suspected	No	No
Allomyia scotti	Scott's apatanian caddisfly	Documented	Yes	Unknown
Namamyia plutonis	Caddisfly (no common name)	Suspected	Unknown	Unknown
Strategic Species				
Juga sp. *nov.* (Basalt)	Basalt juga	Documented	No	No
Colligyrus greggi	Columbia duskysnail	Documented	Yes	Yes

Pacific Lamprey

Pacific lamprey occur throughout the Mt. Hood National Forest in both small and large streams and rivers. They are present throughout the Sandy River and Hood River Basins and are known to occur in Camp Creek and the Little Zigzag River, but have not been documented in the Cooper Spur subwatersheds. Pacific lampreys migrate from freshwater streams to the Pacific Ocean, then return upstream to spawn. Typical spawning habitat is similar to that for salmon or steelhead trout, in medium- and large-sized, low-gradient rivers and streams. Lampreys construct a nest (called a redd) in small gravel substrate. Females can lay up to 100,000 eggs, which are

fertilized externally by the male. Adult lampreys die within four days of spawning. Pacific lampreys spend most of their life in freshwater streams before entering the ocean as adults to feed. Young lamprey burrow into the muddy bottoms of backwater pools and eddies, where they filter the mud and water. The juveniles, called ammocoetes, live in fresh water for up to 5 or 6 years. Juvenile lampreys are filter feeders. After a 2-month metamorphosis they emerge as adults less than 5 inches long, then migrate downstream to saltwater. In the ocean they grow to 16 to 27 inches before returning after 1 or 2 years to fresh water to spawn and die. Adults are parasitic on other fish, scavenge, or are predators while in the ocean. Pacific lampreys do not feed while traveling to spawn. Pacific lampreys are vulnerable to habitat losses due to reduced river flows, water diversions, dredging, streambed scouring, channelization, inadequate protection of streamside vegetation, chemical pollution and spills, and impeded upstream passage due to dams and poorly designed road culverts.

Redband Trout

Redband/inland rainbow trout (redband trout) occur in the White River and Fifteenmile Watersheds and are suspected in the Upper Sandy River Watershed, but definitive genetic analysis has not been conducted (USDA Forest Service 2005). Redband rainbow trout are not known to occur in the Hood River Basin, and are not known in the Cooper Spur action area. Spawning occurs in the spring. Fry emergence from the gravel normally occurs by the middle of July, but depends on water temperature and exact time of spawning. Redband trout prefer water temperatures from 50 to 57 °F, but have been found actively feeding at temperatures up to 77 °F in high desert streams of Oregon and have survived in waters up to 82 °F. There is suitable habitat for redband trout within both action areas.

Coastal Cutthroat Trout

Cutthroat trout are present throughout the Forest and are present within both the Government Camp and at Cooper Spur action areas (figure 16). These fish are also a management indicator species on the Forest and a more detailed description of their life history and habitat requirements are described in the following “Management Indicator Species” section.

Dalles Juga

This species of aquatic mollusk has been found in Mill Creek and the central and eastern Columbia River Gorge from Hood River to The Dalles, in Hood River and Wasco Counties, Oregon, and Skamania County, Washington (Frest and Johannes 1995). The Dalles juga is found at low elevation large springs and small-medium streams with a stable gravel substrate and fast-flowing, unpolluted, highly-oxygenated cold water. Relatively few macrophytes or epiphytic algal taxa are present, with Rorippa being the most frequently encountered. The species cannot survive long out of water (Frest and Johannes 1995). None of these species were found during surveys conducted in 2013 within streams in the Cooper Spur area. Although no surveys have been conducted for them in the Government Camp area, the Upper Sandy River Basin is outside of the known range of the Dalles Juga, and therefore they are not expected to occur there.

Barren Juga

This species of aquatic mollusk is found in freshwater habitats in small- to medium-sized, highly oxygenated cold water streams at low elevations. The species prefers streams that have moderate velocity level bottoms with stable gravel substrates. The known range of this species is the Columbia River Gorge in Oregon and Washington. They have been found in the Mt. Hood National Forest and the Columbia River Gorge National Scenic Area. They are also suspected to

occur in the Gifford Pinchot National Forest. None were found during surveys conducted in 2013 within streams in the Cooper Spur area. Barren juga are not known to occur in the Upper Sandy River Basin which is outside of their known range. Therefore, they are not present in either of the action areas.

Purple-lipped Juga

The Purple-lipped juga snail is endemic to Oregon. It is found in large streams at low elevations. These snails prefer riffle habitat with stable gravel substrates, in cold, well oxygenated water. It is more tolerant of silt and slack water than other Juga subspecies. The known range of the species is the Lower Deschutes River drainage, below Pelton Dam, and the Warm Springs River in Wasco and Sherman Counties, Oregon. Sites where the species are known to occur are located on the Warm Springs Reservation and Prineville Bureau of Land Management in the Deschutes Wild and Scenic River Area. There are few locations on the Mt. Hood National Forest that match the above preferred habitat description. None of these species were found during surveys conducted in 2013 within streams in the Cooper Spur area. Although no surveys have been conducted for them in the Government Camp area, the Upper Sandy River Basin is outside of the known range of the purple-lipped juga, and therefore they are not expected to occur there.

Scott's Apatanian Caddisfly

Allomyia scotti is a glacial relict species with a patchy distribution only (endemic) recorded around Mt. Hood, Oregon. Scott's apatanian are present within 200 feet of the Government Camp parcels in Camp Creek, and suitable habitat exists at the confluence of the unnamed Tributary and the Little Zigzag River in the Government Camp action area. No surveys have been completed in the Cooper Spur area and no known suitable habitat exists, thus their presence there is unknown.

This species was first collected in 1964 in what was likely West Fork Salmon River near the Timberline Highway and in South Fork Iron Creek near Highway 35 (Wiggins 1973b). In 2010, this species was recorded at seven sites in headwater seeps, springs, and tributaries to the West Fork Salmon River (Wisseman 2010).

From 2013 to 2015 an exhaustive survey was conducted around Mt. Hood from 3,157 to 6,257 feet elevation for larval *A. scotti* (Wanner and Arendt 2015). Six new populations of *A. scotti* were recorded in the Little Zigzag River, Sand Canyon Creek, Still Creek, a tributary to the Muddy Fork of the Sandy River, a tributary to McGee Creek, and in a tributary to the East Fork Hood River within the Mt. Hood Meadows Ski Area. In 2016, surveys of the headwater springs adjacent to the land exchange found them to be present – thus expanding the known population to include Camp Creek.

As a result of the 2013 to 2015 survey efforts, and past records (Wiggins 1973b; Wisseman 2010), *A. scotti* populations are known to occur in approximately 4.6 linear miles of seeps, springs, and 1st- through 3rd-order streams around Mt. Hood (Wanner and Arendt 2015). However, because of their patchy distribution, association with cold seeps and springs, and dense mats of wiry moss, 4.6 miles maybe a gross over-estimate of their actual habitat. The Little Zigzag River and Sand Canyon Creek appear to be the stronghold habitat for this species. These two streams account for 69 percent of their entire known range. These two streams have stable discharge mostly originating from springs. Suitable habitat is present in the unnamed Tributary to the Little Zigzag within the action area. The population range in Still Creek and West Fork Salmon River are believed to only occur in the headwater springs of these streams. *A. scotti* habitat in South Fork Iron Creek and tributaries to McGee Creek, and Muddy Fork Sandy River

are much less known due to the steepness of terrain and lack of sampling that has occurred in these streams; however, these streams do have the required spring fed, cold water with dense mats of moss. Much of the *A. scotti* populations are protected from anthropomorphic disturbances (with the exception fires or climate change) due to their location within the congressionally designated Mt. Hood Wilderness. The populations on Still Creek, West Fork Salmon River, and the tributary to East Fork Hood River are more susceptible to human disturbance as they are located within ski permit areas with associated roads and trails and appear to be occupying limited ranges within those areas.

Namamyia plutonis

Little is known about the specific life history characteristics of *Namamyia plutonis* but it is likely that their life history is similar to other caddisflies in general (including *Allomyia scotti*) as described by Spellman (2008). They have been found in small streams in densely forested old growth or mature forest watersheds, and larvae have been found in core samples collected from areas composed of coarse gravel mixed with silt and organic sediments (Anderson 1976). They are known to reside in the Coastal and Cascade Ranges of Oregon and California, including documented occurrences in the Rogue River-Siskiyou, Siuslaw, and Willamette National Forests (Anderson 1976), and a more recent occurrence in the Rogue River-Siskiyou National Forest (Borgias and Wisseman 1999). *Namamyia plutonis* has never been documented in the Mt. Hood National Forest, including during surveys conducted in 2013 and 2014 in Tilly Jane Creek, Doe Creek, and the unnamed tributary to Polallie Creek. Suitable habitat, as described by Anderson (1976), may be present in the Government Camp area, however since they have never been observed in other suitable habitat on the Mt. Hood National Forest, they are presumed not present in the Government Camp action area.

Columbia Duskysnail

This species of aquatic mollusk has been found across the Mt. Hood National Forest during surveys conducted over the past several years (Mt. Hood National Forest, unpublished data) and has been documented in Camp Creek above Yokum Falls. Habitat requirements for this species are fairly specific: cold, well oxygenated springs, seeps, and small streams, preferring areas without aquatic macrophytes (Furnish and Monthey 1998). Until recently, individuals had not been found in larger streams and rivers, or glacial streams. However, one individual was found in the East Fork Hood River.

In 2013, the Columbia duskysnail was found within the East Fork Hood River (one site below Polallie Creek), and several other sites including Clinger Springs (two sites, a tributary to the East Fork Hood River) and Dog River (four sites). Interestingly, no Columbia duskysnail individuals were found in Tilly Jane or Doe Creek. It is also noteworthy that the one specimen found in the East Fork Hood River is the first described in a glacially influenced stream on the eastside of the Mt. Hood National Forest (Mt. Hood National Forest, unpublished data). While surveys have not been completed for Columbia duskysnail in all of the Government Camp area or in Crystal Springs, there is suitable habitat present; and since they have been documented in several places nearby (an unnamed tributary to Camp Creek and in the East Fork Hood River), they are assumed to be present within the Government Camp action area and in Crystal Springs within the Cooper Spur action area.

Basalt Juga

This species of aquatic mollusk is a rare and uncommon species as outlined in the Northwest Forest Plan. Their habitat requirements appear similar to that of the Columbia duskysnail

(Furnish and Monthey 1998). These small snails have only been found in one survey on the Mt. Hood National Forest in North Fork Mill Creek (Mt. Hood National Forest, unpublished data). They have not been found in any other stream or water body surveyed since Mt. Hood National Forest personnel began surveying in 1998. They are not believed to reside in watersheds other than those that drain into the Columbia River near The Dalles, Oregon.

Surveys for Basalt juga were conducted throughout Tilly Jane Creek and Doe Creek in 2013 (Mt. Hood National Forest, unpublished data). No individuals were found at any site surveyed in those streams, and therefore they are not assumed to be present. No surveys have been completed in either Crystal Springs Creek, Camp Creek, or the Little Zigzag River, but since these locations are outside of the known range of the Basalt juga's habitat, they are not assumed to be present in either of those streams.

Presence of Mt. Hood National Forest Management Indicator Species

During the preparation of the Mt Hood National Forest Land and Resource Management Plan (USDA Forest Service 1994), a group of fish and wildlife species were identified as management indicator species. Because of their relative sensitivity to change, salmonids were selected as "an indicator species group" for aquatic habitats. This group of species is especially important for their commercial and game values and because they occupy the spectrum of aquatic habitats on the Mt. Hood National Forest. These requirements are restricted enough that it is reasonable to assume that if the life history needs of salmonids are met, the rest of other fish species found on the Mt. Hood National Forest will be met (see final EIS, page III-58).

A forest-level analysis of the status of these species and their habitat was conducted in March 2011. The state of Oregon, in collaboration with the regulatory agencies, manages fish populations while the Mt. Hood National Forest manages the habitat. For a population to be viable, attributes such as species abundance, productivity, spatial structure, and genetic diversity are needed for the species to maintain its capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment. All of these attributes are affected by habitat and other environmental conditions that influence species behavior and survival.

The forestwide analysis also assessed the quantity and quality of habitat available on the forest, and how much habitat was occupied, for each of the salmonid species. The analysis was performed by calculating the linear distance of stream miles of the intersect between widely available National Hydrography Dataset and StreamNet fish distribution layers of the geo database on file at the Mt. Hood National Forest headquarters office. Fish distribution was determined by utilizing the Oregon Department of Fish and Wildlife 1:24000 data for anadromous fish (which matched StreamNet data), U.S. Fish and Wildlife Service data for bull trout, and Mt. Hood National Forest legacy fish distribution data for resident trout distribution. Results of this analysis are summarized below (table 12). Since other sections of this document discuss the location, trends, and project-related impacts to all other management indicator species salmonid species present within the action area, the following discussion will focus solely on cutthroat trout.

Table 12. A comparison of salmonid management indicator species occupied habitat within the Mt. Hood National Forest (total) and the occupied habitat within the action area

Management Indicator Species (MIS)	ESA Status	Miles of Occupied Habitat on Forest	Miles of Habitat in the Action Area		Percentage of Habitat In Action Area	
			Government Camp	Cooper Spur	Government Camp	Cooper Spur
Chinook Salmon	Threatened	143	~4.5	0	0.03	0
Coho Salmon	Threatened	193	~4.5	0	0.03	0
Steelhead Trout	Threatened	303	~6.4	0	0.21	0
Bull Trout	Threatened	20	No	0	0	0
Cutthroat Trout	None	1,290	~8.8	~3.52	0.006	0.002
Rainbow Trout	None	1,290	~8.8	~3.52	0.006	0.002

Note: Private land wholly within the Mt. Hood National Forest boundary is included in the "Occupied Habitat" column. Steelhead trout is the winter run only.

The life history of coastal cutthroat trout may be one of the most complex of any Pacific salmonid (USFWS 2010). Three general life-history forms of coastal cutthroat trout have been recognized and all are assumed to be present within both action areas.

Nonmigratory Coastal Cutthroat Trout

This life history form includes fish generally found in small streams and headwater tributaries. These non-migratory coastal cutthroat trout, in general, appear to grow more slowly than other life-history forms of trout, are smaller at maturity, and generally do not live as long as migratory forms (USFWS 2010).

Freshwater-Migratory Coastal Cutthroat Trout

This freshwater, or potamodromous, life-history form includes fish that migrate entirely within fresh water. This includes populations that migrate from large tributaries to small tributaries to spawn (fluvial-adfluvial), populations that inhabit lakes and migrate upstream to spawn in the lake's tributaries (lacustrine-adfluvial), and populations that live in lakes and migrate downstream to spawn in the lake outlet (allucustrine). These freshwater-migratory populations are best documented in rivers and lakes with physical barriers to anadromous fish, such as above waterfalls (USFWS 2010).

Saltwater-Migratory Coastal Cutthroat Trout

Juvenile fish typically spend 2 to 5 years rearing in fresh water before making their initial seaward migration in the late winter and spring to feed in marine environments (estuarine or nearshore) during the summer. They then enter fresh water in the winter to feed, seek refuge, or spawn, sometimes returning to seawater in the spring (USFWS 2010). Unlike other anadromous salmonids, the saltwater migratory form of coastal cutthroat trout does not overwinter in the ocean and only rarely makes extended migrations across large bodies of water.

Cutthroat trout typically spawn from December through June. Eggs begin to hatch within 6 to 7 weeks of spawning, depending on temperature; fry emerge between March and June, with peak emergence in mid-April (USFWS 2010). These trout use a large variety of habitat types, including lower and upper reaches of both large and small river systems, estuaries, sloughs, ponds, lakes, and nearshore ocean waters. In freshwater habitat these fish prefer deeper pool habitat and cover, such as that formed by woody debris.

There are approximately 1,290 miles of stream habitat used by resident trout (including cutthroat) on the Mt. Hood National Forest. The total miles of stream occupied by resident cutthroat trout within the Government Camp action area is about 8.8 miles and 3.5 miles in the Cooper Spur action area; a fraction of 1 percent of available habitat on the Mt. Hood. The existing conditions within the analysis area and the relation to forest-scale conditions are described in the following section.

Existing Habitat Conditions, Including Designated Critical Habitat and Essential Fish Habitat

Aquatic habitat conditions within the action area vary depending on the location, past land management activities, and natural events such as floods, fire, and debris torrents. Habitat conditions where land management has occurred range from poor to good, depending on the type and scale of disturbance, proximity to streams, timing and duration of land management activities, and sensitivity of channel type to perturbation. The subwatersheds within both action areas have been altered by some of the following: recreation development, urban infrastructure, large wildfires as well as fire suppression, past logging practices, municipal water diversions, municipal sewage facilities, and road networks. Separately and cumulatively, these activities have resulted in loss of function of natural processes related to water quality and quantity, riparian and floodplain function and connectivity, in-channel habitat, and obstruction free migration corridors for aquatic organisms. As a result of this project, some additional effects to those processes are possible. The parameters identified include water quantity and quality, substrate and fine sediment levels in streams; and pool quantity and quality. Because other habitat parameters and/or fluvial processes are analyzed in the Hydrology specialist report or proposed activities would not impact them, only those habitat parameters listed above will be discussed in the effects sections that follow.

Designated critical habitat is present for three species within the action area in Government Camp, but is not present within the action area in Cooper Spur. Much of the discussion concerning critical habitat, including effects analyses, will center on the physical and biological features related to freshwater habitat conditions that include spawning, rearing, and migration for Lower Columbia River steelhead trout and Lower Columbia River coho and Chinook salmon. Nothing in the proposed project would have an effect on estuarine or marine habitat components, thus they are not discussed.

A baseline determination of functioning, functioning at risk, or not properly functioning is given to each habitat element that may be effected by the project and summarized in table 13.

Government Camp. Camp Creek originates from a series of seeps and springs on the southern shoulders of Mt. Hood at an elevation of about 3,700 feet. Three perennially flowing channels combine into what is considered Camp Creek proper within the community of Government Camp near Collins Lake. Its course takes it from its origination on U.S. Forest Service land, through private land in Government Camp, and then back onto Forest Service land before joining with the Zigzag River.

Historically, Camp Creek meandered across the Government Camp valley, through the flat bench of wetlands and small lakes that still dot the landscape, until dropping over the steep topography at Yocum Falls (Laural Hill) into a gently sloped valley where it joined the Zigzag River. Today, Camp Creek is highly confined and urbanized as it flows through the town of Government Camp. Passing through a series of culverts and impoundments; including Collins Lake, the stream runs under Highway 26 and through the SkiBowl permit area, receives outfall from the

Government Camp sewage treatment facility, and is then forced into a ditch adjacent to Highway 26 for almost a mile, before going over Yokum Falls. Below the falls, the stream environment is less urban and more forested, but habitat conditions are still impacted by acute amounts of sediment, as well as the presence of campgrounds, summer cabins, and other infrastructure adjacent to the stream channel.

Camp Creek lacks riparian cover and floodplain in sections where it runs through Government Camp and along Highway 26. Storm water runoff from Government Camp, highway sanding, and floodplain development have created conditions where water quality is degraded, sediment loading can be acute, and riparian vegetation is lacking. In the past, sewage treatment plant failures resulted in excess nutrient loads and other potential pollutants entering the stream. Chemical pollutants from highway vehicle traffic and winter de-icing are also present. Several large historic fires burned across the watershed and past logging practices removed mature riparian forests below Yokum Falls. But the principal process of concern is the amount of sediment present in Camp Creek. Since the early 1980s, surveys have documented acute sediment loads below Yokum Falls resulting from human-caused activities. The channel is dominated by fine sediment in both riffles and pools and there are “beaches” of sand along the stream margins and floodplains. The principal source of the sediment is from winter-time road sanding on Highway 26 that is routed into Camp Creek due to its close proximity to the highway. As a result, Camp Creek currently does not meet many of the parameters of the Northwest Forest Plan or Mt. Hood Forest Plan standards for riparian and in-stream habitat within the analysis area.

Despite many of the chronic problems facing Camp Creek due to its urbanized nature, it still provides important habitat for all life stages of salmon, trout, and sensitive aquatic invertebrates, and these species are present year round, although in greatly reduced numbers. Federally threatened salmon and steelhead use the section below Yokum Falls both for spawning and rearing and as a migration route. Resident cutthroat trout and rainbow trout have been documented in perennial streams above Yokum Falls and throughout the action area.

The Little Zigzag River originates from the base of a glacial moraine on the Zigzag Glacier and flows in a southwestern direction to its confluence with the Zigzag River. At its headwaters, it flows through steep unstable canyons which are a natural source of sediment into the channel. The channel flows intermittently and subsurface until about river mile 4.4 at which point it is perennial. The stream borders the Mount Hood Wilderness from river mile 2.75 to the headwaters at about river mile 5.5. Human management activities appear to have had little impact to this stream (USDA Forest Service 2000; Wanner et al. 2015). A tributary to the Little Zigzag River originates just below the wetlands on the westernmost edge of the west parcel and passes through undisturbed forest. This tributary flows into the Little Zigzag immediately above the Little Zigzag River Falls. Federally threatened salmon and steelhead use the section below Little Zigzag Falls for spawning rearing and as a migration route. Resident cutthroat and rainbow trout have been documented below the falls but there is no information about fish presence above the falls or in the little Tributary. No fish information is available for Enid Lake.

Cooper Spur. There are many streams, springs and wetlands located within the 7th-field watersheds in this area. The primary streams include Tilly Jane Creek, Doe Creek, Ash Creek, Crystal Spring Creek, and Buck Creek. The hydrology in the Cooper Spur action area is characterized by numerous ephemeral drainages that eventually become intermittent streams and in a few cases perennial streams (examples include Evans Creek and Doe Creek). Tilly Jane Creek is the only stream in this area that is perennial from the source. The streams are small,

spring fed, with relatively gentle gradients except some steeper sections depending on stream and location. In the headwaters of Doe Creek and some tributaries to the East Fork Hood River, the streams "pipe" water underground for varying distances, with occasional surface flow, before the water surfaces and the stream becomes perennial.

Sediment, Turbidity and Substrate

Fine sediment deposition and turbidity in streams can adversely affect fish and fish habitat, particularly for salmonids, by reducing the quantity and/or quality of spawning habitat; reducing food supply by impacting invertebrate habitat; reducing interstitial habitat, thereby decreasing fry survival; and reducing pool quality and quantity. Both past and on-going land use activities can contribute fine sediment in streams. The Mt. Hood National Forest Land and Resource Management Plan (forest plan) states that spawning habitat shall maintain less than 20 percent fine sediments less than 2 millimeters (FW-096).

Government Camp. Considerable housing and infrastructure development has already occurred in the Camp Creek Watershed. The infrastructure and development associated with single family and multi-family residences, ski areas, and road construction has resulted in forest clearing and acres of impervious surfaces. Each of these human activities increases fine sediment input to stream channels and as a result, fine gravel substrates dominate stream bottoms within the action area. Modeling results suggest that wintertime safety sanding is the largest contributor of sediment in the action area, followed by the road network, and recreation, respectively (Hydrology Specialist Report). Current sediment loads have already caused sufficient habitat alteration to adversely impact threatened fish species and other sensitive aquatic fauna in Camp Creek (USDA Forest Service 2011). Acceleration of fine sediment inputs from human activities will only exacerbate that problem.

Many of the roads within this area are adjacent to Camp Creek and road sand is blown directly into the stream network during winter snow removal operations. This problem occurs throughout the watershed, but is particularly acute on Highway 26 where Camp Creek runs directly adjacent to the highway for about 1 mile. In total, approximately 2,102 tons of road sand are delivered into the Camp Creek 7th-field watershed each year (Hydrology specialist report). Stream surveys and project reports dating back to the 1980s also identify the unstable cut-slopes adjacent to the highway as a direct source of sediment into the stream (USDA Forest Service 1991, 1992, 2000).

Sediment and embeddedness levels in Camp Creek are substantially higher than natural background levels. Fine sediment (sand or silt less than 2 millimeters in diameter) accumulations in stream reaches in the action area are acute and extend all the way downstream to the confluence with the Zigzag River (USDA Forest Service 2011; Hydrology specialist report). The watershed analyses for the Zigzag River identifies sedimentation of streams in the upper watershed as a process of concern. "Wolman" pebble counts collected during stream surveys have documented excessive in-channel sediment loading since the first stream surveys were conducted in the 1980s. In addition, as residual road sand builds up along road margins and ditch-lines it is mobilized into the stream network during snowmelt and/or rain events. If culverts and ditch relief pipes are blocked or not properly maintained, large pulses of road sand can be mobilized into the stream within a few hours, resulting in spikes of turbidity. There is limited data available to evaluate the magnitude of turbidity spikes in Camp Creek. Baseline determination is: *Not properly functioning.*

In general, streams that have experienced little to no land management are in good condition even though forest plan standards (such as, pools per mile and pieces of wood per mile) are not

always met. Some of these streams have been impacted by natural events and, indeed, were formed or maintained by such events. Glacial streams such as the headwaters the Zigzag River and Little Zigzag River are examples of streams exhibiting relatively degraded, but natural, conditions due to natural events. The Little Zigzag River is spring fed, but is also influenced by snowmelt from headwater glaciers. Long stretches of exposed talus slopes in the headwaters are a source of glacial fines and sediment, and therefore the natural background condition for sediment is high. Human management activities appeared to have little impact on this stream above Kiwanis Camp. The tributary to the Little Zigzag River is also relatively unaffected by human activities. Baseline determination is: *Properly functioning.*

Cooper Spur. As in Camp Creek, there are a number of past and on-going land use activities which are likely contributing fine sediment into these streams. All the streams are located near potential anthropogenic sources of fine sediment, including roads, small-scale resort facilities, the Cooper Spur Ski Area, and in some cases old timber harvest units. In addition, a large-scale fire (Gnarl) occurred over a decade ago in the headwaters of these streams which replaced much of the mature forest and may have exacerbated erosion. These small stream channels naturally lack the hydraulic power or competence to effectively move fine sediment quickly downstream and fine substrates dominate stream bottoms within the action area. The source of this sediment is likely a combination of natural and human-caused, but there has not been an analysis to determine the proportional amounts. There is no survey data available for Ash Creek. There is no data available about the magnitude or duration of human cause turbidity in the action area but it is assumed there are occasional, short-term spikes. Baseline determination is: *Functioning at risk.*

Chemical Contaminants/Nutrients

Chemical contamination in water can cause both lethal and sub-lethal effects to salmonids and other aquatic species. Effects from contaminants may reduce or eliminate production of specific aquatic invertebrates which could impact food forage for salmonids. Introduction of nutrients may be beneficial (increase primary production and aquatic invertebrate production) or in excess may lead to lethal or sub-lethal effects to aquatic plants and invertebrates.

Government Camp. There are no ODEQ (Oregon Department of Environmental Quality) 303d reaches within the two subwatersheds listed for contaminants. There is one known point source of pollution within the action area that effects Camp Creek. Treated effluent from the Government Camp Sewage Treatment Facility empties into Camp Creek. On occasion, total dissolved solids releases into Camp Creek have exceeded the NPDES permit (ODEQ 2016). There may also be a small amount of untreated effluent generated into lower Camp Creek from poorly functioning septic systems in the Camp Creek Summer Home tract which consists of 138 cabins. There are no known point sources of pollution to Little Zigzag River in the action area.

Camp Creek has other sources of non-point source pollution is a result of the urban environment it passes through. Roadways and parking lots are impervious and accumulate a mixture of contaminants, including metals; petroleum-derived compounds from oil, grease, and vehicle exhaust; among others (NOAA Fisheries 2016). “Runoff pollution is associated with rainwater or melting snow that washes off roads, bridges, parking lots, rooftops, and other impermeable surfaces. As it flows over these surfaces, the water picks up dirt and dust, rubber and metal deposits from tire wear, antifreeze and engine oil that has dripped onto the pavement, pesticides and fertilizers, and discarded cups, plastic bags, cigarette butts, pet waste, and other litter. A large amount of this runoff pollution is carried directly to water bodies (as found in EPA 1995).” In addition, the Oregon Department of Transportation uses magnesium chloride as a de-icing agent

on U.S. Highway 26 during the winter. The average application rate is approximately 30 gallons per lane mile or about 1 ounce per square yard (Parker 2011). Application timing is related to projected weather and the chances for snow or ice.

Since Camp Creek is the principal waterbody in Government Camp, it is likely that it receives the majority of the runoff pollution generated from the area. There is little to no data regarding the magnitude of chemical contamination in Camp Creek, and therefore it is difficult to assess the potential impacts to aquatic species. There is no documentation of lethal effects to fish species and no data are available to evaluate potential effects to aquatic invertebrates, therefore this analysis assumes there may be some impacts to water quality parameters and thus to juvenile and adult fish species that are sub-lethal. Baseline determination is: *Functioning at risk.*

There are no known non-point sources of chemical contamination in the Little Zigzag River action area: Baseline determination is: *Properly functioning.*

Cooper Spur. There are no ODEQ 303d reaches within the three subwatersheds listed for contaminants. Oregon Department of Transportation and Hood River County use magnesium chloride (de-icing agent) on U.S. Highway 35 and the county portions of Cooper Spur Road during the winter months. Some de-icing may occur on Forest Service roads that access the Cooper Spur Ski Area; however, there is no information on the amount except that it happens as needed during winter months (pers. comm., Bob Ballard 2016).

Runoff pollution is likely negligible as these subwatersheds flow primarily through forested land with very little impervious surface present. Doe Creek runs adjacent to and below the Cooper Spur Ski Area and may intercept some runoff from the Cooper Spur parking lot and other infrastructure. Tilly Jane and Ash Creek cross the Cooper Spur road at a 90-degree angle minimizing the area where de-icing agent can enter the creeks. Baseline determination is: *Properly functioning.*

Peak/Base Flows and Drainage Network

Government Camp. "It is likely that past land management activities and wildfires in the 7th-field watersheds associated with the Government Camp area have affected peak and base flows (as found in Hydrology specialist report)." However, both Camp Creek and Little Zigzag are below the threshold of concern based on Grant (2008). All the subwatersheds are below the threshold associated with the methodology for addressing cumulative watershed effects, watershed sensitivity, and hydrologic recovery associated with the Mt. Hood Forest Plan (USDA Forest Service 1990a). When the combined impacts of vegetation management and roads are examined, all the subwatersheds are rated as properly functioning in the 6th-field watershed condition from the Northwest Forest Plan–The First 20 Years (1994–2013) Watershed Condition Status and Trend Report (Miller, *in press*) (as found in Hydrology Specialist Report).

Another factor in evaluating changes in peak/base flow are changes in the stream drainage network due to roads and trails. The relatively impermeable surfaces of roads and trails cause surface runoff to bypass subsurface flow routes in soils (Hydrology specialist report). Roads and trails are hydrologically connected by ditch-lines and gullies, and therefore the stream network is considered lengthened wherever they interrelate (Hydrology Specialist Report).

The final factor evaluated to determine the existing condition in peak/base flows was the amount of water being diverted from the Government Camp area. The Little Zigzag has only limited water diversions totaling about 0.002. Average low-flow in the Little Zigzag is approximately 16.1 cubic feet per second (Hydrologist specialist report). Thus, the amount of water being

diverted for human use is inconsequential from an aquatic habitat perspective. In Camp Creek however, there are multiple water diversions for human use. Water rights of 4.56 cubic feet per second are currently allocated and the mean low-flow is approximately 2 cubic feet per second (Hydrology specialist report). As a result, there could be impacts to aquatic habitat and species if all the water rights currently allocated were exercised.

In summary, watershed health related to flow is considered properly functioning. Changes to flows related to roads and trails are estimated to be somewhat impaired, and water rights may be over-allocated, but are not currently being fully exercised. Baseline determination is: *Functioning at risk.*

Cooper Spur. It is likely that past land management activities and wildfires in the 7th-field watersheds associated with the Cooper Spur area have affected peak and base flows. All of the subwatersheds, except Tilly Jane Creek, are below the threshold of concern based on Grant (2008; as found in the Hydrology specialist report). All the subwatersheds are below the threshold associated with the methodology for addressing cumulative watershed effects, watershed sensitivity, and hydrologic recovery associated with the Mt. Hood Forest Plan (USDA Forest Service 1990a). When the combined impacts of vegetation management and roads are examined all the subwatersheds are rated as properly functioning in the 6th-field watershed condition from the Northwest Forest Plan–The First 20 Years (1994–2013) Watershed Condition Status and Trend Report (Miller, *in press*). Baseline determination is: *Properly functioning.*

Tilly Jane Creek Watershed is above the threshold of concern from The Effects of Forest Practices on Peak Flows and Consequent Channel Response Report (Grant 2008, as found in the Hydrology specialist report) due to vegetation loss from the Gnarl Ridge Fire. However, indications of major increased peak flows such as channel bed instability or scour and channel bank erosion were not noted during field visits to Tilly Jane Creek just below the burned area. Baseline determination is: *Functioning at risk.*

None of the subwatersheds except for Crystal Springs have water withdrawal allocations that exceed the mean low-flow; therefore, there are no impacts to aquatic fauna or habitat related to water diversions. The Crystal Springs Water District has water rights of 7.16 cubic feet per second and the mean low-flow is approximately 5.14 cubic feet per second (Hydrology specialist report). As a result, there could be impacts to aquatic habitat and species if all the water rights currently allocated were exercised. Summary baseline determination is: *Functioning at risk.*

Pool Quality and Quantity

Pool habitat is a critical component of healthy stream habitat for salmonid populations. The forest plan requires that pool habitat be maintained or increased as a result of a given project (FW-088) and that streams contain one or more primary pools per five to seven channel widths in low-gradient streams (less than 3 percent slope), and one per three channel widths in steeper channels (FW-090/091). A primary pool is defined as a pool at least 3 feet deep, which occupies at least half of the low-water flow channel. Pool frequency is often related to the occurrence of large wood or other channel obstructions (Montgomery et al. 1995) and pool depth is a function of a variety of factors including sediment input and the ability of the stream at that site to scour, and maintain, a pool. Fine sediment above natural background levels can fill pools and increase bed mobility, resulting in shallower scour depths (Buffington et al. 2002).

Government Camp. Pool frequency and quality do not meet NMFS-AP indicator or forest management plan standards in Camp Creek above Yokum Falls. Below the falls, pool frequency

is better, primarily as a result of in-stream restoration projects which placed large wood structures in the channel and floodplain. However, stream surveys dating back to the 1980s document heavy sediment loads in the pool tail-outs below the falls which are impacting the quality of the pool habitat. Baseline determination is: *Not properly functioning.*

Pool quality is considered good in the Little Zigzag Canyon River. The residual depths of the pools are high for a stream of its size and despite the naturally high background levels for sediment (USDA Forest Service 2000). Pool frequency did not meet NMFS-AP indicator or forest management plan standards, but given that much of the watershed is within designated wilderness and has steep topography, it is likely the pool habitat frequency and quality is naturally limited and may not have met the above standards. Baseline determination is: *Properly functioning.*

Cooper Spur. Pool frequency in all streams within the action area is below forest plan standards (Hydrology specialist report). There are steam reaches that have been impacted by land management activities, including a reduction of pool-forming large wood, across the action area that may have fewer pools now than in the past. Although the forest plan standard is not met in any action area stream, most streams in the action area have at least some reaches within the range of natural conditions given stream size, gradient, and valley type in the action area. Baseline determination is: *Properly functioning.*

Table 13. Resource indicators and measures for the existing condition that may be affected by the land exchange

Indicator	Environmental Baseline Condition											
	Camp Creek			Little Zigzag River			Tilly Jane Creek			Ash & Doe Creek		
	PF	FAR	NPF	PF	FAR	NPF	PF	FAR	NPF	PF	FAR	NPF
Sediment, Turbidity and Substrate			X	X				X			X	
Chemicals/Nutrients		X[1]		X[1]			X[1]			X[1]		
Change in Peak/Base Flows		X		X				X		X		
Change in Stream Drainage Network		X		X				X		X[2]		
Pool Frequency and Quality			X	X				X			X[2]	

Note: PF = Properly functioning; FAR = Functioning at risk; NPF = Not properly functioning.

[1] No direct data.

[2] Limited data.

Environmental Consequences

Measures and Indicators

NOAA Fisheries has worked with the U.S. Fish and Wildlife Service (USFWS), Bureau of Land Management (BLM), and the Forest Service to revise the methods for making determinations of effect for land management activities impacting ESA-listed salmonid species in the Northwest Forest Plan geographical area (USDA Forest Service 2005). This approach was used to assess the effects of the proposed action. In this regard, the elements of the proposed action were analyzed for potential effects on Lower Columbia River Chinook salmon, Lower Columbia River Coho salmon, and Lower Columbia River (Distinct Population Segment) steelhead due to changes in

the habitat pathways of water quality, habitat access, habitat elements, channel conditions and dynamics, flow/hydrology, and watershed conditions. In applying the analysis approach, the agencies consider eight factors, derived largely from the joint NOAA Fisheries and U.S. Fish and Wildlife Service ESA Section 7 Consultation Handbook, when evaluating the effects of an action on habitat indicators and subsequently the effects on ESA-listed fish. These factors are proximity, probability, magnitude (severity and intensity), nature, distribution, frequency, duration, and timing, where applicable.

This analysis considered the potential direct and indirect effect of the project's elements on each habitat indicator, and then utilized the relevant factors to determine if there was an effect and whether it was measurable, insignificant, discountable, or beneficial. A summary for each habitat indicator was developed to ascertain whether effects from various elements combine to create adverse effects on any of the indicators. These effects and those of interrelated or interdependent actions to the proposed action were considered to reach an overall effect determination for this project. The effects of other concurrent Federal actions are disclosed to provide information to assist the Services in their jeopardy and destruction/adverse modification of critical habitat determinations.

Methodology and Analysis Assumptions

This effects analysis utilizes research, relevant monitoring, field data, previous experience and professional judgment, as well as GIS information, to provide the context, amount, and duration of potential effects on aquatic resources from the proposed project. The physical scientist reports on soils and hydrology provide the basis for the analysis for effects to aquatic habitat. The analysis method utilized to determine potential impact to fish, aquatic invertebrates, and their associated habitat are listed below.

- Determine known and suspected locations of federally listed or proposed aquatic species, designated critical habitat, essential fish habitat, Region 6 Regional Forester's sensitive species and survey and manage species, and Mt. Hood National Forest management indicator species in relation to proposed project activities.
- Assess proposed project activities and determine the aquatic habitat elements potentially impacted and the geographic area where effects could occur (i.e., the action area).
- Overlap the species/habitat locations with the action area and determine which species/habitat could be affected by project activities.
- When species/habitat overlaps with the action area impacts are predicted from proposed project activities to individuals and their associated habitat.
- Potential effects to aquatic fauna and habitat were determined from the following:
    - Direct and/or indirect effects to individuals from proposed activities;
    - Potential reductions in stream shade and subsequent increases in water temperature compared to existing levels;
    - Potential increases in erosion and fine sediment input to streams and wetlands compared to existing levels;
    - Potential impacts to existing and future levels of large wood in stream channels and Riparian Reserves, including any impacts to large wood recruitment;
    - Potential impacts to the quantity and quality of pool habitat; and,

- Cumulative effects associated with ongoing or proposed projects in the action area or close enough so that cumulative effects could occur.

- Where impacts to individuals or habitat parameters discussed above result from proposed project activities, the potential impacts to aquatic species/habitat were analyzed and then the effects to the biological resource were determined based on professional experience, applicable surveys/studies, and available literature/research.
- Assumptions associated with this methodology are listed below.
  - Aquatic faunal and habitat survey data utilized is the latest available and utilized standard survey protocols. It is assumed that this information is representative of current conditions unless otherwise noted.
  - Clackamas County Zoning and Development Ordinance, 704 River and Stream Conservation Area (RSCA), would be applied to ensure that medium-sized fish bearing, perennial channels (type F streams) in Government Camp will have a protective buffer of 70 feet and small-size fish bearing, perennial channels (small type F) would have a protective buffer of 50 feet. Small streams have an average annual flow of 2 cubic feet per second or less. Medium streams have an average annual flow greater than 2 cubic feet per second but less than 10 cubic feet per second. Large streams have an average annual flow of 10 cubic feet per second or greater.
  - Clackamas County Zoning and Development Ordinance, 704 River and Stream Conservation Area (RSCA), would be applied to ensure that aquatic organism passage would be retained in the event roads or infrastructure cross streams in the Government Camp parcels.
  - The Oregon Forest Practices Act standards for all commercial activities involving the establishment, management, or harvesting of trees on Oregon's forestlands was used to evaluate the current management of private forestlands in the Cooper Spur action area.
  - The Hood River County Stream Protection Overlay Zone was used to evaluate the current management of private non-forested lands in the Cooper Spur action area.
  - The areas of impact outlined in the environmental impact statement, chapter 2, are the actual areas of disturbance.

Direct and Indirect Effects

Alternative 1

Under the no-action alternative, current management plans would continue to guide management of the project area. The land exchange would not be implemented and the purpose and need would not be met. The parcels north of the village of Government Camp would remain under National Forest System ownership under their current land allocations. The parcels in the Cooper Spur area would remain under private ownership. The existing 1,172-acre Cooper Spur Ski Area special use permit area would remain the same. No new special use permit prospectus would be advertised.

The designation of wilderness would not occur on 1,709 acres, and there would be no measurable change to aquatic habitat and fauna because the existing land allocations under the Forest Plan and the Northwest Forest Plan include protective measures that preserve aquatic ecosystems. In the near term (years), conditions for aquatic habitat and fauna under National Forest System management would remain essentially unchanged from existing conditions unless

natural events, such as floods or fire, occurred. Over the long term, aquatic habitat would continue to recover under either the existing land use allocations or the wilderness designation.

The Crystal Springs Watershed Special Resources Management Unit would not be created. The 2,090 acres of National Forest System lands that are currently in the land use allocations A4 (660 acres), A11 (236 acres), B2 (1,160 acres), and C1 (34 acres) would continue to be classified as they are now and aquatic resources would continue to be protected for the foreseeable future. The Crystal Springs Watershed Special Resources Management Unit would not be established on the existing private lands and riparian reserves would not be established on existing private land. In this case, the private forestland adjacent to streams would continue to be protected under the Oregon State Forest Practices Act. The private non-forested land would continue to be protected under Hood River County stream protection overlay regulations. The difference between preservation of aquatic habitat under the Northwest Forest Plan and the Oregon State Forest Practices and Hood River County Regulation is difficult to measure since all three are designed to prevent aquatic ecosystem loss. It is possible that there would be an increased buffer width (riparian reserve) which could provide more protection for riparian resources, but those changes are not expected to change the functional processes in the East Fork Hood River Watershed (Hydrology specialist report).

There would be no development on Federal land in the headwaters of Camp Creek and the Little Zigzag River, and therefore, no increase in effects to federally threatened fish species or designated critical habitat or essential fish habitat, or to sensitive aquatic species or management indicator species salmonids. There would be no change to aquatic habitat in the Cooper Spur action area because the existing Federal lands would remain within Federal status. A summary of the effects of the no-action alternative on habitat elements that may have been affected by the project activities is provided in table 14.

Sediment, Turbidity and Substrate

Because no ground-disturbing actions would occur, the existing condition in regards to fine sediment and turbidity levels in both action areas would remain. Current sources of fine sediment including roads, winter-time sanding, and housing and recreation development would continue to contribute sediment into Camp Creek and the Cooper Spur action area streams for the short term and long term. In Camp Creek, there would be no increase in sediment from the conversion of forested lands to residential lands. In the Little Zigzag River, there would be no increase in sediment as a result of development within the tributary headwaters. In summary, sediment input to streams from human-caused activities would remain the same in Camp Creek and the Cooper Spur subwatersheds, but would not increase in the Little Zigzag River tributary.

Chemicals/Nutrients

Because no change in land use or ground-disturbing actions would occur, the existing condition in regards to current sources of chemicals and nutrients would remain the same in both action areas.

Change in Peak/Base Flows

Because no change in land use or ground-disturbing actions would occur, the existing condition in regards to current sources of chemicals and nutrients would remain the same in both action areas. Because no increase in impervious surfaces or storm-drainage networks would occur on Federal land, the existing condition in regards to peak flows would remain unchanged.

Change in Stream Drainage Network

Because no change in land use or ground-disturbing actions would occur, the existing condition in regards to current sources of chemicals and nutrients would remain the same in both action areas. Because no increase in road and ditch networks would occur on Federal land, the existing condition in regards to stream drainage would remain unchanged.

Pool Quantity and Quality

Because no change in land use or ground-disturbing actions would occur, the existing condition in regards to pool quantity and quality would remain the same in both action areas. The principal mechanism effecting pools is related to sediment delivery and would therefore not change.

Table 14. Change in effect to habitat indicators for alternative 1 (no action)

Habitat Indicator		No-action Effect Government Camp: Camp Creek	No-action Effect Government Camp: Little Zigzag	No-action Effect Cooper Spur: Tilly Jane	No-action Effect Cooper Spur: Doe/Ash
Sediment, Turbidity and Substrate	Existing Condition	Not properly functioning	Properly functioning	Functioning at risk	Functioning at risk
	Alternative 1	No change	No change	No change	No change
Chemicals and Nutrients	Existing Condition	Functioning at risk	Properly functioning	Properly functioning	Properly functioning
	Alternative 1	No change	Maintain	No change	No change
Change in Stream Drainage Network	Existing Condition	Functioning at risk	Properly functioning	Functioning at risk	Properly functioning
	Alternative 1	No change	Maintain	No change	No change
Change in Peak/Base Flows	Existing Condition	Functioning at risk	Properly functioning	Functioning at risk	Properly functioning
	Alternative 1	No change	Maintain	No change	Maintain
Pool Frequency and Quality	Existing Condition	Not properly functioning	Properly functioning	Functioning at risk	Functioning at risk
	Alternative 1	No change	Maintain	No change	No change

Alternative 2

The following effects analysis assumes full build-out within five years once the land exchange is completed. Depending on the exact size of the conservation easement, there would be 54 to 65 developable acres or 212 to 260 lots that could be potentially developed. Each lot would be 0.25 acre in size and impervious surface would not exceed 40 percent. The building type would be residential and would not exceed 50 feet in height. Wetlands would be preserved and stream buffers would prevent development within 50 to 70 feet of the stream bank (please refer to the proposed action in chapters 1 and 2 of the draft EIS for complete discussion of the proposed action and analysis assumptions).

As previously described, the number of habitat parameters that may be affected by proposed project activities are related to water quantity and quality, substrate and fine sediment levels in streams, and pool quantity and quality.

Direct Effects. Direct effects are those that occur during project implementation; in this case actions such road and home building in Government Camp. To directly impact aquatic species/habitat the activity needs to be in close proximity to the water body where they reside, often within the water body itself. From an aquatic perspective, direct effects most often result in disturbance to aquatic organisms—forcing movement or a flight response. Depending on the activity, it is possible that individuals can be injured or killed; this is almost always a result of people or equipment working directly in water. Direct habitat effects are possible, but depend on the activity. For example, removal of vegetation directly adjacent to a stream can immediately reduce shade, thereby reducing available cover for fish which might alter their use of that area.

This analysis assumes that Clackamas County zoning and construction codes would provide stream protection buffers of 70 feet for medium-sized perennial, fish-bearing streams, and 50 feet for small-sized perennial, fish-bearing streams, and would protect wetlands. These buffers are sufficient to prevent any construction material or equipment from entering the stream and should prevent disturbance to streamside vegetation. Therefore, there are no direct effects identified for aquatic organisms or their habitat in the Government Camp analysis area. There are no direct effects identified for the Cooper Spur action area as there would be no ground disturbance.

Indirect Effects. Indirect effects are effects caused by or resulting from the proposed actions, are later in time, and are reasonably certain to occur. For example, in the vegetation removal scenario mentioned above in the “Direct Effects” section, the indirect effect associated with shade reduction could be an increase in water temperature. The magnitude of such an effect, if it occurred, would depend on the amount of vegetation removed, location and elevation of the stream, amount of stream flow, etc. In this case, indirect effects from the proposed action are limited to aquatic organisms present in the Government Camp action area (table 11) as there are no effects documented in the Cooper Spur area because the difference between preservation of aquatic habitat under the Northwest Forest Plan and the Oregon State Forest Practices and Hood River County regulation is difficult to measure since all three are designed to prevent aquatic ecosystem loss.

Sediment, Turbidity and Substrate

Camp Creek. In Camp Creek, high levels of sedimentation have resulted in increased turbidity and embeddedness. Sediment modeling predicts an increase of approximately 70 tons of sediment entering Camp Creek each year as a result of the proposed action. As previously described, the existing condition related to sediment is acute with an estimated 2,144 tons of sediment entering Camp Creek from human activities (Hydrology Specialist Report). The projected increase in sediment of 70 tons generated from new roads and the development of the parcels is a substantial increase, and when compared to the natural background level of 504 tons per year, results in a 14 percent increase within Camp Creek (Hydrology Specialist Report).

Once sediment enters a stream it interacts with complex stream dynamics. Above Yokum Falls, the confined and simplified channel lacks large wood and connectivity to its floodplain and off-channel habitat. Sediment is expected to be transported through the relatively confined and simplified channel reaches in the Government Camp area and settle out in the lower gradient valley below Yokum Falls (about 2.5 miles below the project area). Sediment sampling demonstrates that this is an area where high levels of fine sediment accumulate from upstream sources (USDA Forest Service 1992, 2000, 2004). During flood and storm events, the overall storage capacity serves to buffer sedimentation impacts on downstream areas. Large debris in channels reduces the rate of downstream sediment movement and tends to feed sediment through

the stream ecosystem in a slow trickle (Hydrology specialist report). In Camp Creek, storage capacity is poor because there is a lack of large wood structure which can capture and retain sediment; channel riffles are armored as a result of embedded fines; and many of the pools are already filled with fine sediments (USDA Forest Service 1992, 2000). Therefore, it is expected that as sediment is generated during annual storm events, the material will be routed downstream within a short period of time (days to weeks).

Camp Creek is spring fed and quite clear, with turbid conditions naturally occurring only during flood or high water events. Turbidity increases related to the project may temporarily redistribute resident rainbow and cutthroat as well as Lower Columbia River salmon and steelhead individuals as they either avoid it or move into it to feed on drifting invertebrates. Primary production, benthic invertebrate abundance, and thus, food availability, for fish may be reduced as sediment levels increase due to reductions in photosynthesis within murky waters (Cordone and Kelley 1961; Loyd et al. 1987). Social (Berg and Northcoate 1985) and feeding behavior can be disrupted by increased levels of suspended sediment (Noggle 1978).

Turbidity and sediment increases are most likely expected October through March during rain and snow-melt events when Chinook and coho are spawning, which may reduce egg survival and developing alevins by reducing the availability of dissolved oxygen in the gravel (Everest et al. 1987; Hicks et al. 1991). Rearing capacity of Lower Columbia River salmon and steelhead habitat may decrease as cobble embeddedness levels increase. Furthermore, over-wintering rearing habitat within substrate may be a limiting factor to fish production and survival, and the reduction of this over-wintering habitat may result in increased levels of mortality during rearing life stages (as found in USDA Forest Service et al. [2013]). Over time, the continuous input of even small amounts of sediment added to the existing condition may have chronic negative effects to Lower Columbia River salmon and steelhead critical habitat.

Little Zigzag River. The tributary to the Little Zigzag River is relatively unchanged from its historic condition, based on ecosystem function. Human-caused disturbance in the upper watershed is primarily related to hiking trails and dispersed recreation. Existing sediment, turbidity, and embeddedness levels are low and considered to be properly functioning. Turbidity and embeddedness are not currently processes of concern in the tributary because the intact, complex channel and floodplain habitat appear to be providing adequate storage capacity for the negligible amount of sediment entering from the trail network. Sediment modeling predicts an increase of approximately 12 tons of sediment entering the Little Zigzag River Tributary and then the Little Zigzag River each year as a result of the proposed action. This is a substantial increase from the existing condition in the Little Zigzag Tributary, but it is difficult to assess whether the added sediment will tip the scale on turbidity and embeddedness as those are processes that are hard to predictively model.

In the Little Zigzag River, there are inputs from highway sanding (406 tons) and existing roads (3 tons) and natural sediment background levels are high due to the glacial influence of the stream. An increase of 12 tons may not be large when compared to the existing condition, but is still a concerning amount. It is difficult to assess whether the added sediment will tip the scale on turbidity and embeddedness as those are processes that are hard to predict. It is less likely that the increased turbidity or sediment will change the existing condition in the Little Zigzag River because the amount of sediment may be undetectable at that scale.

There are no listed fish in the tributary and resident fish presence is unknown, although there is suitable habitat within the tributary. There is also suitable habitat for *A. scotti* in the lowermost reach of the tributary where it meets the Little Zigzag River which could be affected. Lower

Columbia River steelhead critical habitat is present below Little Zigzag Falls and may be slightly impacted by the increase in sediment delivery but it is unlikely that turbidity would result in behavioral changes in aquatic biota.

Indicator Summary. Sediment and turbidity associated with this project would occur annually and would result in chronic, human-caused sediment delivery into designated critical habitat and essential fish habitat occupied by Lower Columbia River salmon and steelhead, management indicator species trout, and Region 6 sensitive aquatic species in Camp Creek and the Little Zigzag River. The source and delivery potential is detailed in the Soil and Hydrology specialist reports. It would likely increase during high flows for the first couple of storm events each fall as unstable soils are carried into nearby stream channels. During storm events, the duration of increased turbidity would depend on the length of time and the intensity of the storm. The total amount of sediment generated within the Camp Creek action area resulting from human-caused disturbance would be increased by about 14 percent and overall would remain high. In the Little Zigzag River, the effect on habitat for fish and aquatic invertebrates is expected to increase by 12 tons, which may not result in behavioral changes in aquatic biota but could change some habitat conditions. As a result, there is a high probability that there would be a negative effect in Camp Creek. There is also a high probability that there would be a slightly negative effect in the Little Zigzag River.

Chemicals/Nutrients

Roofs, roadways, and parking lots are impervious and accumulate a mixture of contaminants, including metals; petroleum-derived compounds from oil, grease, and vehicle exhaust; and pesticides; among others. During rainfall events, storm water collects these contaminants from the impervious surfaces in Government Camp and Highway 26 and deposits them into Camp Creek.

When toxics enter our waterways via storm water runoff, they can cause a variety of adverse effects to aquatic species. In addition to directly impacting salmon and steelhead, toxics can harm or kill the aquatic insects that salmon eat. Pollution risks vary depending on the particular chemical, the amount transported in storm water, and environmental persistence. Recent research has shown that common contaminants can impair salmon health in a variety of ways. For example, certain metals, such as copper, and pesticides are toxic to the salmon nervous system, thereby disrupting feeding and predator avoidance. Copper is used in roofing materials, treated wood, and is a by-product found in the exhaust and brake pads of vehicles. Pesticides and petroleum-derived compounds suppress the immune system, rendering salmon more vulnerable to pathogens that cause lethal diseases. Petroleum-derived compounds are also known to depress growth rate of juvenile salmon, which can affect their survival. Other compounds target the developing cardiovascular system, causing heart failure or permanent heart defects (as found in NOAA Fisheries [2016]).

Camp Creek. As previously described, the magnitude of chemical and nutrient levels in Camp Creek is unknown. The Government Camp sewage treatment facility has occasionally discharged untreated effluent into Camp Creek, and winter-time road de-icing agents likely enter Camp Creek. Runoff pollution occurs; however, the magnitude and duration is unknown. A combination of impervious surface development and peak flow changes was used to assess potential increases in surface water that could be carrying runoff pollution. The project is expected to result in a development footprint (impervious surface) of about 32 acres (40 percent of the project parcel) in the Camp Creek Watershed. There are 2,073 acres in the subwatershed above Yokum Falls which is where most of the increase in peak surface flows is predicted to

occur (Hydrology Specialist Report). Increases in peak flows were detectable near Government Camp, but reduced as they traveled downstream through the system. Modeling showed peak flow increases of 21 percent at Highway 26, and 11 percent at Yokum Falls, and not detectable at the confluence with the Zigzag River. The increase in surface area that may contribute to runoff pollution is small when compared to the watershed area, but changes to peak streamflow that could be carrying contaminants through sensitive and Endangered Species Act (ESA)-listed fish habitat is measurable. Impacts to aquatic invertebrates in Camp Creek are difficult to measure, but are assumed to be small.

Little Zigzag River. Approximately 15 acres within the western parcel of the land exchange that is part of the Little Zigzag River Tributary Watershed would be developed (impervious surface) out of a total of 538 acres (3 percent); with a modeled 31 percent change in peak flows as a result of the project. Hence, there would be a measurable increase in storm-water that could be carrying pollutants into the tributary and on into the Little Zigzag River where sensitive and ESA-listed species are present. Impacts to aquatic organisms are difficult to measure, but are assumed to be small.

Indicator Summary. Human-caused runoff pollution into Camp Creek and the Little Zigzag River is a process of concern for aquatic organisms and their habitat. Based on the Wildcat Peak flow modeling described in the Hydrology specialist report, there would be increases in storm-water runoff into Camp Creek that would have a greater effect on aquatic species above Yokum Falls (as compared to below). In the Little Zigzag River Tributary there is currently no known runoff or nutrient pollution. As a result of the project, there would be a small increase that would not likely be detectable at the 7th-field scale. As a result there is a high probability that there would be a slightly negative effect.

Change in Peak/Base Flows

There are two several primary pathways that can change flows in the Government Camp area. The first is related to the amount of water being withdrawn from the stream for human use (such as for drinking water or snowmaking). The second is related to change in peak flows due to an increase in the stream-drainage network from new road ditches or trails. As described in the hydrology specialist report, modeling suggests there would be no change in flows related to water withdrawal, but there would be a change as a result of stream-drainage network increases. The report states that,

> A primary mechanism that changes the volume and timing of peak flows is the road network, which essentially increases the drainage density of channels, intercepts subsurface water, and decreases the time for overland runoff to reach the stream channel. Even though a watershed receives the same amount of precipitation, it is transported through the system much more quickly, thus resulting in higher peak discharges and resultant increases in stream power. This increased stream power can more effectively erode the streambed and banks. Because the total amount of water remains relatively constant, base flows decrease because the rapid runoff reduces the total amount of water that can infiltrate and be stored in the soil (Castro [2003] as found in Hydrology Specialist Report).

At the site scale, both Camp Creek and the unnamed tributary to the Little Zigzag River have predicted peak streamflow increases above 10 percent, which is considered to be above the threshold where changes to aquatic habitat occur. Based on predicted increases in peak streamflows, streambed composition, and stream gradient; there may be impacts in the form of increased bank erosion, channel scour, channel widening, and sedimentation in these areas. As

the watershed size gets larger, peak streamflow impacts are reduced in Camp Creek at Yocum Falls; the Little Zigzag River at the confluence with the Zigzag River predicted peak flow increases are less than 10 percent.

Streamflows may result in less suitable habitat for resident fish, as well as listed salmon and steelhead, and may have an adverse effect on *A. scotti* habitat in the Little Zigzag River Tributary. Stable discharge appears to be one of the principal habitat elements that is required for this species. Changes to the stream drainage network and resulting increases in peak flows may result in scouring or shearing along the mossy stream banks where this caddisfly resides. There is potential for long-term, localized effects to Scott's apatanian habitat downstream of the tributary. Since this area is considered to be the bottom of the available habitat in the Little Zigzag River, the effects are not expected to be significant; however, any changes to suitable habitat for a species with such limited range is a cause for concern.

Indicator Summary. Annual storm events and saturated soil conditions are likely to result in increased peak flows, which may affect channel habitat in Camp Creek above Yokum Falls where resident trout and Region 6 sensitive species occur, but is not expected to be detectible in critical habitat below the falls. The magnitude of the effect to the Little Zigzag River Tributary is much greater (31 to 62 percent) and will likely result in significant changes to channel structure and composition where resident trout and Region 6 sensitive species may occur. In the Little Zigzag River 7th-field watershed peak flows are modeled to increase about 6 percent, which is not likely to significantly alter critical habitat for listed fish species. As a result, there is a high probability that there would be a slightly negative effect at the 7th-field-watershed scale in Camp Creek and the Little Zigzag River.

Change in Stream Drainage Network

As described in the Hydrology Specialist Report, changes in the stream drainage network is strongly correlated to the road network. The key process of concern is associated with inboard ditches delivering runoff to a stream where a road intercepts the stream. This channel lengthening process can result in increased peak flows which is described above in the stream drainage network section.

Pool Quantity and Quality

In Camp Creek, the combination of multiple factors has resulted in a highly impaired existing condition in regards to pool quality and quantity. The lack of large wood and the large volumes of fine sediment related to human-caused disturbance, results in pool frequency and quality which are considered to be not properly functioning. In the Little Zigzag Subwatershed, primary pool frequency is considered to be properly functioning even though it does not meet some Mt. Hood National Forest standards. Given the steep topography within the upper watershed it is likely the pool habitat frequency and quality is naturally limited and may not have met the above standards.

Indicator Summary. Given the existing condition in Camp Creek, there could be some additional reduction in pool volume resulting from increased fine sediment levels. In the Little Zigzag Tributary some reductions in pool quantity could occur as a result of increased fines in pools. As a result, there is a high probability that there would be a negative effect at the 7th-field-watershed scale in Camp Creek, and a high probability that there would be a slightly negative effect at the 7th-field-watershed scale in the Little Zigzag River.

Table 15. Change in effect to habitat indicators for alternative 2 (proposed action)

Habitat Indicator		Proposed Action Effect Government Camp: Camp Creek	Proposed Action Effect Government Camp: Little Zigzag	Proposed Action Effect Cooper Spur: Tilly Jane	Proposed Action Effect Cooper Spur: Doe/Ash
Sediment, Turbidity and Substrate	Existing Condition	Not properly functioning	Properly functioning	Functioning at risk	Functioning at risk
	Alternative 2	Degrade	Degrade	No change	No change
Chemicals and Nutrients	Existing Condition	Functioning at risk	Properly functioning	Properly functioning	Properly functioning
	Alternative 2	Degrade	Degrade	No change	No change
Change in Peak/Base Flows	Existing Condition	Functioning at risk	Properly functioning	Functioning at risk	Properly functioning
	Alternative 2	Degrade	Degrade	No change	No change
Change in Stream Drainage Network	Existing Condition	Functioning at risk	Properly functioning	Functioning at risk	Properly functioning
	Alternative 2	Degrade	Degrade	No change	Maintain
Pool Frequency and Quality	Existing Condition	Not properly functioning	Properly functioning	Functioning at risk	Functioning at risk
	Alternative 2	Degrade	Degrade	No change	No change

Cumulative Effects

Cumulative effects include the effects of past, present, and reasonably foreseeable future state, tribal, local or private actions that overlap in time and space within the action area (i.e., affected environment) of the Federal action subject to consultations (50 CFR 402.02). The “reasonably foreseeable” clause is a key factor in assessing and applying cumulative effects and could include actions that are permitted, imminent, have an obligation of venture, or have initiated contracts (U.S. Fish and Wildlife Service and NOAA Fisheries 1998). Past and present impacts are incorporated as part of the environmental baseline and discussed here in the effects discussion.

Only those indicators that are effected by the project are included in the cumulative effects analysis (if the action has no direct/indirect effects there would be no cumulative effects). The spatial context for the following cumulative effects analysis is the action area as described previously. Project/activities occurring outside this area may have an effect on aquatic species/habitat, but would not add to those effects from projects proposed in this environmental assessment. The temporal context depends on the existing or future project/activity. If there is an overlap in time from an effects perspective then it is included.

Cumulative effects from an aquatic species and habitat perspective overlap considerably with water quality (sediment delivery, chemicals/nutrients/ peak flows) cumulative effects because most of the attributes analyzed by the hydrologist are directly related to aquatic habitat conditions.

The analysis summary outlined in table 16 follows a similar format as the cumulative effects table in the Hydrology Specialist Report.

Table 16. Summary of past, present, and reasonably foreseeable future actions which may contribute to cumulative effects to aquatic fauna and habitat for all alternatives

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
Ongoing ODOT road maintenance, including snowplowing on National Forest System lands, Government Camp, and Highway 26	Suspended Sediment	Yes	Yes	Yes	An overlap in time and location exists with Highway 26 road maintenance (summer and winter). There is annual introduction of fine sediment from winter safety sanding (2,102 tons into Camp Creek and 406 tons into Little Zigzag) that may mix with the fine sediment from the project which is modeled to be 70 tons in Camp Creek and 3 tons in Little Zigzag River. There is a likelihood of negative cumulative effects which are measurable both in the short term and long term (chronic).	Potential for cumulative effects to aquatic resources are expected to extend from the Government Camp parcels to the mouth of Camp Creek and the Little Zigzag River Tributary. Effects are expected to impact habitat for resident fish, Region 6 aquatic organisms, and Lower Columbia River coho, Chinook, and steelhead. Based on the volume of sediment entering both subwatersheds, it is anticipated the following habitat elements will be further degraded: water quality, pool quality and quantity, spawning and rearing habitat. Fish may exhibit sediment avoidance behavior. Egg survival may be reduced and juvenile survival may be reduced. Aquatic invertebrate species may experience poor stream conditions.
	Chemicals/Nutrients	Yes	Yes	Yes	An overlap in time and location exists with Highway 26 winter de-icing and runoff pollution. Increased runoff from impervious surfaces in the Government Camp parcels may mix with the runoff pollution from Highway 26 and winter de-icing agents. There is a moderate risk of cumulative effects in both subwatersheds, but the magnitude and extent is difficult to measure.	Potential for cumulative effects to aquatic organisms are expected to extend from the Government Camp parcels to below Yokum Falls and the Little Zigzag River Tributary. Effects are expected to impact habitat and aquatic species described in table 17 and table 18. Aquatic organisms may be exposed to increased pollution from runoff.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
Ongoing Forest Service trail use and maintenance (winter and summer uses) for the Glade, Alpine, Timberline to Town, Mirror Lake, and Government Camp area trails	Suspended Sediment	Yes	Yes	Yes	An overlap in time and location exists with these trails and the project. At each stream crossing, small amounts of fine sediment generated from the trail can enter the stream channel and may mix with the fine sediment from the project. The amount at the trails is likely small and local, but will occur over the life of the trails (decades). There is a moderate risk of cumulative effects in both subwatersheds, but the magnitude should remain small and localized.	Potential for cumulative effects to aquatic resources is expected to be localized with a potential for some sediment avoidance behavior. Aquatic invertebrate species may have low levels of short-term negative stream conditions. Trail maintenance project design criteria are in place that should reduce the overall amount of sediment delivered to streams and minimize effects to aquatic resources.
	Stream Drainage Network	Yes	Yes	No	Trails are hydrologically connected by ditch-lines and gullies, and therefore, the stream network is considered lengthened wherever they interrelate (Parker 2011). There is a small risk of cumulative effects in both subwatersheds, but the magnitude should remain small and localized.	Aquatic invertebrate species may have low levels of short-term negative stream conditions with slightly higher turbidity and some local scour. Trail maintenance project design criteria are in place that should reduce the overall amount of sediment delivered to streams and minimize effects to aquatic resources.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
Mirror Lake Trailhead Relocation Project	Suspended Sediment	Yes	Yes	Yes	This new trail will cross Camp Creek once and cross nine tributaries to Camp Creek. Small amounts of fine sediment generated from the trail can enter the stream channel and may mix with the fine sediment from the project. The amount at the trails is likely small and local, but will occur over the life of the trails (decades). There is a moderate risk of cumulative effects to the Camp Creek Subwatershed, but the magnitude should remain small and localized.	Potential for cumulative effects to aquatic resources is expected to be localized with a potential for some sediment avoidance behavior. Aquatic invertebrate species may have low levels of short-term negative stream conditions. Trail maintenance project design criteria are in place that should reduce the overall amount of sediment delivered to streams and minimize effects to aquatic resources.
	Stream Drainage Network	Yes	Yes	Yes	Trails are hydrologically connected by ditch-lines and gullies, and therefore, the stream network is considered lengthened wherever they interrelate (Parker 2011). There is a moderate risk of cumulative effects to the Camp Creek Subwatershed, but the magnitude should remain small and localized.	Potential for cumulative effects to aquatic resources is expected to be localized with a potential for some localized scour and channel change. Trail maintenance project design criteria are in place that should reduce the overall amount of sediment delivered to streams and minimize effects to aquatic resources.
ODOT Highway 26 Safety Widening Project	Suspended Sediment	Yes	Yes	Yes	There may be an overlap in timing of this project with the Highway 26 safety project; any minor suspended sediment would not be measurable due to implementation of mitigation measures and design criteria and conformance with existing standards and guidelines in the project.	Potential for cumulative effects to aquatic resources is expected to be localized with a potential for some sediment avoidance behavior. Aquatic invertebrate species may have low levels of short-term negative stream conditions. Road maintenance project design criteria are in place that should reduce the overall amount of sediment delivered to streams and minimize effects to aquatic resources.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
ODOT Highway 26 Safety Widening Project (continued)	Chemicals/ Nutrients	Yes	Yes	Yes	An overlap in time and location exists with the Highway 26 safety project and this project. Increased runoff from impervious surfaces in the Government Camp parcels may mix with the runoff pollution from Highway 26. There is a moderate risk of cumulative effects in both subwatersheds, but the magnitude and extent is difficult to measure.	Potential for cumulative effects to fish are expected to extend from the Government Camp parcels to Yokum Falls and the Little Zigzag River Tributary. Effects are expected to impact habitat and aquatic species described in table 17 and table 18. Aquatic organisms may exposed to increased pollution from runoff.
	Stream Drainage Network	Yes	Yes	Yes	Roads are hydrologically connected by ditch-lines and gullies, and therefore, the stream network is considered lengthened wherever they interrelate (Parker 2011). There is a high risk of cumulative effects to the Camp Creek Subwatershed.	Potential for cumulative effects to aquatic resources is expected to be localized with a potential for some localized scour and channel change.
SkiBowl and Summit ski area winter recreation activities, operation and maintenance	Chemicals/ Nutrients	Yes	Yes		Increased runoff from impervious surfaces in the Government Camp parcels may mix with the runoff pollution from SkiBowl parking areas. There is a moderate risk of cumulative effects in the Camp Creek watersheds, but the magnitude and extent is difficult to measure.	Potential for cumulative effects to fish are expected to extend from the Government Camp parcels to the mouth of Camp Creek and the Little Zigzag River Tributary. Effects are expected to impact habitat and aquatic species described in table 17 and table 18. Aquatic organisms may exposed to increased pollution from runoff.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
SkiBowl and Summit ski area summer recreation activities, operation and maintenance (such as bike parks, race events and concerts)	Suspended Sediment	Yes	Yes	Yes	Trails are hydrologically connected by ditch-lines and gullies, and therefore, the stream network is considered lengthened wherever they interrelate (Parker 2011). There is a moderate risk of cumulative effects to the Camp Creek Subwatershed, but the magnitude should remain small and localized.	Potential for cumulative effects to aquatic resources is expected to be localized with a potential for some localized scour and channel change. Trail maintenance project design criteria are in place that should reduce the overall amount of sediment delivered to streams and minimize effects to aquatic resources.
SkiBowl Ski Area Snowmaking Infrastructure Improvements Project (water withdrawal from Camp Creek)	Water Quantity	Yes	Yes	Not measurable	Water withdrawal from Camp Creek for snowmaking occurs from November 1–March 30; the total withdrawal is 0.03 cubic feet per second.	None.
PGE powerline right-of-way maintenance	Suspended Sediment	Yes	Yes	Not Measurable	No cumulative effects are expected due to mitigation measures and design criteria implementation, and conformance with existing standards and guidelines on the existing projects.	None.
	Stream Drainage Network	Yes	Yes	Not measurable	No cumulative effects are expected due to mitigation measures and design criteria implementation, and conformance with existing standards and guidelines on the existing projects.	None.
Clackamas County waterline/infrastructure maintenance	Suspended Sediment	No	Yes	Not Measurable	None.	None.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
Timberline Ski Area Mountain Bike Trails and Skills Park Project, including watershed restoration activities	Suspended Sediment	Yes	No	Not Measurable	There may be a spatial and temporal overlap of effects of this project with the Bike Park project. Several of the Bike Park trails are within the Little Zigzag River. However, there were no effects to aquatic species or habitat identified in that watershed as a result of the Bike Park Project.	None.
Camp Creek Summer Home Tract	Suspended Sediment	Yes	Yes	Yes	An overlap in time and location exists with the Summer Home Tract on Camp Creek and the project. There is annual introduction of fine sediment from roads and infrastructure present within the summer home tract that may mix with the fine sediment from the project; however, the extent is expected to be localized. There is a likelihood of small negative cumulative effects which are measurable both in the short term and long term (chronic).	Potential for cumulative effects to aquatic resources are expected to extend from the Camp Creek Summer Homes to the mouth of Camp Creek and the Little Zigzag River Tributary. Effects are expected to impact habitat for the species listed in table 17 and table 18. Based on the volume of sediment entering both subwatersheds, it is anticipated the following habitat elements will be further degraded: water quality, pool quality and quantity, spawning and rearing habitat. Fish may exhibit sediment avoidance behavior. Egg survival may be reduced and juvenile survival may be reduced. Aquatic invertebrate species may experience poor stream conditions.
	Chemicals/ Nutrients	Yes	Yes	Yes	Increased runoff from impervious surfaces in the Camp Creek tract may mix with the runoff pollution from the project. There is a moderate risk of cumulative effects in the Camp Creek Watersheds, but the magnitude and extent is difficult to measure.	Potential for cumulative effects to fish are expected to extend from the Government Camp parcels to the mouth of Camp Creek and the Little Zigzag River Tributary. Effects are expected to impact habitat and aquatic species described in table 17 and table 18. Aquatic organisms may exposed to increased pollution from runoff.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
Camp Creek Summer Home Tract (continued)	Water Quantity	Yes	Yes	Not Measurable	As outlined in the Hydrology specialist report, there is not expected to be a change in water quantity as a result of the project.	None.
Government Camp Sewer District operations	Chemicals/ Nutrients	Yes	Yes	Yes	An overlap in time and location exists with Sanitary Sewer operations and this project. Increases in chemicals and nutrients are possible because chemical runoff from impervious surfaces in the Government Camp parcels may mix with sanitary sewer discharge. There is a moderate risk of cumulative effects in the Camp Creek Subwatershed, but the magnitude and extent is difficult to measure.	Potential for cumulative effects to fish are expected to extend from the Government Camp parcels to the mouth of Camp Creek. Effects are expected to impact habitat and aquatic species described in table 17 and table 18. Aquatic organisms may exposed to increased pollution from runoff and nutrients.
Government Camp Water District operations	Water Quantity	Yes	Yes	Not Measureable	As outlined in the Hydrology specialist report, there is not expected to be a change in water quantity as a result of the project.	None.
Collins Lake Resort operations	Chemicals/N utrients	Yes	Yes	Yes	An overlap in time and location exists with the Collins Lake Resort and this project. Increases in chemicals and nutrients are possible because chemical runoff from impervious surfaces in the Government Camp parcels may mix with Collins Lake runoff from impervious surfaces and infrastructure. There is a moderate risk of cumulative effects in the Camp Creek Subwatershed, but the magnitude and extent is difficult to measure.	Potential for cumulative effects to fish are expected to extend from the Government Camp parcels to the mouth of Camp Creek. Effects are expected to impact habitat and aquatic species described in table 17 and table 18. Aquatic organisms may exposed to increased pollution from runoff.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
Collins Lake Resort operations (continued)	Stream Drainage Network	Yes	Yes	Yes	Roads are hydrologically connected by ditch-lines and gullies, and therefore, the stream network is considered lengthened wherever they interrelate (Parker 2011). There is a risk of cumulative effects to the Camp Creek Subwatershed	Potential for cumulative effects to aquatic resources is expected to be localized with a potential for some localized scour and channel change.
Private water diversions from Camp Creek and Little Zigzag	Water Quantity	Yes	Yes	Not Measurable	As outlined in the Hydrology specialist report, there is not expected to be a change in water quantity as a result of the project.	None.
Mazama Lodge Parking Area Expansion Project	Suspended Sediment	Yes	No	No	There is no spatial overlap with the project and the Mazama Lodge Project. The Mazama Lodge Project does not occur in the Camp Creek or Little Zigzag Subwatersheds.	None.
Operation and maintenance of Kiwanis Camp	Suspended Sediment	Yes	Yes	Yes	An overlap in time and location exists with Kiwanis Camp and Little Zigzag River and the project. There is annual introduction of fine sediment from roads and infrastructure present within Kiwanis Camp that may mix with the fine sediment from the project; however, the extent is expected to be localized. There is a likelihood of small negative cumulative effects which are measurable both in the short term and long term (chronic).	Potential for cumulative effects to aquatic resources are expected to be local and extend from the Camp to the mouth of the Zigzag River. Effects are expected to impact habitat for the species listed in table 17 and table 18. It is anticipated the following habitat elements will be further degraded: water quality, pool quality and quantity, spawning and rearing habitat. Fish may exhibit sediment avoidance behavior. Egg survival may be reduced and juvenile survival may be reduced. Aquatic invertebrate species may experience poor stream conditions.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species and Stream Habitat Effects
		Time	Space			
Operation and maintenance of Kiwanis Camp (continued)	Chemicals /Nutrients	Yes	Yes	Yes	An overlap in time and location exists with the Kiwanis Camp operations and this project. Increased runoff from impervious surfaces in the Government Camp parcels may mix with the runoff pollution from the impervious surfaces from the Camp which is located in the Little Zigzag Subwatershed. There is risk of cumulative effects in the Little Zigzag Watershed, but the magnitude and extent is difficult to measure.	Potential for cumulative effects to fish are expected to extend from the Government Camp parcels to the mouth of Camp Creek. Effects are expected to impact habitat and aquatic species described in table 17 and table 18. Aquatic organisms may exposed to increased pollution from runoff.
Operation and maintenance of Lady Creek Water System	Water Quantity	Yes	Yes	Not Measurable	As outlined in the Hydrology specialist report, there is not expected to be a change in water quantity as a result of the project.	None.
	Suspended Sediment	Yes	Yes	No	Repair and ongoing replacement of existing infrastructure will continue to occur in the future. Excavation of trenches to replace waterlines can result in increases in sediment. Sediment would not be measurable due to implementation of mitigation measures and design criteria and conformance with existing standards and guidelines in the projects.	None.

Summary of Environmental Effects to Fisheries

Determinations for the proposed action were made as a result of analysis at the 6th-field watershed scale (Middle Zigzag River and Middle East Fork Hood River) and 7th-field watershed scale (Camp Creek, Little Zigzag River, Tilly Jane Creek, Doe Creek, Buck Creek, and Ash Creek). The checklist for Documenting Environmental Baseline and Effects of Proposed Action(s) on Relevant Indicators was consulted for this project and a cumulative effects analysis was completed. A summary of the effects of the alternatives on habitat elements that may be effected by the project is provided in table 19.

There would be measurable change from baseline conditions resulting from implementation of this project which may affect designated critical habitat and associated listed fish species as well as essential fish habitat. A review of potential impacts found the proposed development of the Government Camp parcels would increase sediment, turbidity and embeddedness, water quality, peak/base stream-flows, and pool habitat for Lower Columbia River Chinook, coho, and steelhead as well as Region 6 sensitive species and management indicator species. The land exchange was determined to have no effects to aquatic organisms or habitat in the Cooper Spur area as there were no causal mechanisms to indicator measures.

The following discussion summarizes effects to ESA-listed fish, their critical habitat, Regional Forester's sensitive aquatic species, management indicator species, and essential fish habitat for the project. A brief rationale is given for each.

Effect Determination for Listed Species

No direct effects to listed species were identified. Elements of the project may indirectly effect (may affect, and is likely to adversely affect) ESA-listed fish species designated as threatened (table 17) based on the potential for increases in sediment, turbidity, and embeddedness, which can impact spawning and rearing as well as food source availability. Changes to water quality could impair navigation or reduce food sources. Increases in peak/base stream-flows could reduce suitable in-channel habitat for rearing, spawning, or migration.

Effect Determination for Critical Habitat

The project "may adversely modify" designated critical habitat for Lower Columbia River Chinook, coho, and steelhead in the Zigzag Watershed (table 17). Three of the six physical and biological features that have been established for the critical habitat of the species are addressed here; freshwater spawning sites, freshwater rearing sites, and freshwater migration corridors (50 CFR Part 226 70 FAR 52664-5). The project would measurably modify these physical and biological features.

Effect Determination for Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance essential fish habitat for those salmon species regulated under a Federal fisheries management plan. The Pacific Fisheries Management Council (PFMC) has recommended an essential fish habitat designation for Pacific salmon fishery that would include those waters and substrate necessary to ensure the production needed to support a long-term sustainable fishery.

Salmon fishery essential fish habitat includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to the three salmonid species identified under

the MSA, coho salmon, Chinook and Puget Sound pink salmon in Washington, Oregon, Idaho, and California, except above impassable barriers identified by PFMC (PFMC 1999). Salmon essential fish habitat excludes areas upstream of longstanding naturally impassable barriers (natural waterfalls in existence for several hundred years).

Essential fish habitat is commensurate with critical fish habitat where designated. If critical habitat has not been designated, then the action agency defines the extent of essential fish habitat based on known or suspected fish distribution. The proposed project would "adversely affect essential fish habitat" for Lower Columbia River Chinook and coho in the Zigzag Watershed.

Table 17. The Government Camp-Cooper Spur Land Exchange Project effects determination summary for ESA-listed species, designated critical habitat, and Region 6 Regional Forester's sensitive species present in the action area

Species Present	Effects of Action: Government Camp Action Area		Effects of Action: Cooper Spur Action Area	
Endangered Species Act Listing by Evolutionary Significant Unit/Distinct Population Segment	**No Action**	**Proposed Action**	**No Action**	**Proposed Action**
Lower Columbia River Steelhead Trout				
Threatened	No effect	Likely to adversely affect	No effect	No effect
Designated Critical Habitat	No adverse modification	Adverse modification	No adverse modification	No adverse modification
Lower Columbia River Chinook				
Threatened	No effect	Likely to adversely affect	No effect	No effect
Designated Critical Habitat	No adverse modification	Adverse modification	No adverse modification	No adverse modification
Designated Essential Habitat	No adverse effect	Likely to adversely affect	No adverse effect	No adverse effect
Lower Columbia River Coho				
Threatened	No effect	Likely to adversely affect	No effect	No effect
Designated Critical Habitat	No adverse modification	Adverse modification	No adverse modification	No adverse modification
Designated Essential Habitat	No adverse effect	Likely to adversely affect	No adverse effect	No adverse effect

Effect Determination for Forest Service Region 6 Regional Forester's Special Status Species

The project "may impact individuals or habitat, but will not likely contribute to a trend toward Federal listing or loss of viability to the population or species" based on the potential for increases in sediment, turbidity and embeddedness, water quality, peak/base streamflows, and pool habitat (table 18).

Effect Determination for Management Indicator Species Fish Species

On the Zigzag Ranger District, both resident and anadromous cutthroat trout and other salmonid species are present within the Government Camp action area. Sediment, water quality, and stream drainage network increases would be the most likely avenue of potential effects to cutthroat trout. Because this project impacts a fraction of 1 percent of suitable habitat across the Mt. Hood National Forest, the overall direct, indirect and cumulative effects will result in a small negative trend of habitat (increase in disturbance). The loss of habitat (increase in disturbance) will be insignificant at the scale of the Mt. Hood National Forest. Thus, continued viability of

cutthroat trout and other salmonid management indicator species is expected on the Mt. Hood National Forest.

Table 18. The Government Camp-Cooper Spur Land Exchange Project effects determination summary for ESA-listed species, designated critical habitat, and Region 6 Regional Forester's sensitive species present in the action area

Species Present	Effects of Action: Government Camp Action Area			Effects of Action: Cooper Spur Action Area		
Forest Service Region 6 Regional Forester's Sensitive Species						
Pacific Lamprey *Entosphenus tridentatus*	NI[1]	NI	MIIH[2]	NI	NI	NI
Redband Trout *Onchorynchus mykiss gairdneri*	NI	NI	MIIH	NI	NI	NI
Cutthroat (management indicator species) *Onchorynchus clarki*	NI	NI	MIIH	NI	NI	NI
Barren Juga *Juga hemphilli hemphilli*	NI	NI	MIIH	NI	NI	NI
Caddisfly *Namamyia plutonis*	NI	NI	MIIH	NI	NI	NI
Scott's Apatanian Caddisfly *Allomyia scotti*	NI	NI	MIIH	NI	NI	NI

[1] NI = No impact: There is no impact to the species, because there is no causal effect to the species.

[2] MIIH = May impact individuals or habitat, but will not likely contribute to a trend toward Federal listing or loss of viability to the population or species.

Table 19. Change in effect to habitat indicators which compares both alternatives to the existing condition in the Government Camp and Cooper Spur areas

Habitat Indicator		**Alternatives Effect Government Camp: Camp Creek**	**Alternatives Effect Government Camp: Little Zigzag**	**Alternatives Effect Cooper Spur: Tilly Jane**	**Alternatives Effect Cooper Spur: Doe/Ash/Crystal**
Sediment, Turbidity and Substrate	Existing Condition	Not properly functioning	Properly functioning	Functioning at risk	Functioning at risk
	No Action	No change	No change	No change	No change
	Proposed Action	Degrade	Degrade	No change	No change
Chemicals and Nutrients	Existing Condition	Functioning at risk	Properly functioning	Properly functioning	Properly functioning
	No Action	No change	Maintain	No change	No change
	Proposed Action	Degrade	Degrade	No change	No change
Change in Peak/Base Flows	Existing Condition	Functioning at risk	Properly functioning	Functioning at risk	Properly functioning
	No Action	No change	Maintain	No change	No change
	Proposed Action	Degrade	Degrade	No change	No change
Change in Stream Drainage Network	Existing Condition	Functioning at risk	Properly functioning	Functioning at risk	Properly functioning
	No Action	No change	Maintain	No change	No change
	Proposed Action	Degrade	Degrade	No change	Maintain
Pool Frequency and Quality	Existing Condition	Not properly functioning	Properly functioning	Functioning at risk	Functioning at risk
	No Action	No change	Maintain	No change	No change
	Proposed Action	Degrade	Degrade	No change	No change

Hydrology and Water Rights

Introduction

To ensure compliance with Forest Plan and State and Federal requirements, the hydrology report considers potential project-related effects on watershed and hydrologic resources, including wetlands, floodplains, stream channels, and associated riparian areas as well as water and sediment yield changes from soil disturbance, ground cover removal and impervious surfaces.

The Hydrology Specialist Report (Project Record) includes additional detail regarding the analysis methodology, regulatory framework that would guide the implementation of this project, including Forest Plan standards and guidelines, as well as best management practices (BMPs) and project design features that would be required should the project be implemented.

Affected Environment

Existing Condition

The project consists of a number of parcels distinctly recognized as the lands to be conveyed (Government Camp parcels) and the lands to be acquired (Cooper Spur parcels). The Government Camp parcels are in the Zigzag Canyon 6th field watershed and the following 7th field watersheds: Little Zigzag River (28 percent of the project area.) and Camp Creek (72 percent of the project area). The Cooper Spur parcels are in the Middle East Fork Hood River 6th field watershed and the following 7th field watersheds: Crystal Springs (33 percent of the project area), Tilly Jane Creek (28 percent of the project area), East Fork Hood River (7 percent of the project area) and East Fork Hood River Lower (32 percent of the project area).

There are many streams, springs, and wetlands located within the sub-watersheds associated with the lands to be conveyed and acquired.

Lands to be conveyed - Government Camp Parcels Description

The primary streams associated with the Government Camp Parcels include Camp Creek and Little Zigzag River. There are approximately 51 miles of stream in these 7th field watersheds in the following categories: 35 miles of perennial streams (flow year around), and 15 miles of intermittent streams. There are no springs identified in the National Hydrography Dataset (NHD) and there are 166 acres of wetlands identified in the National Wetlands Inventory.

There are 1.2 miles of streams (0.5 perennial and 0.7 intermittent) within the parcels. There are 9 acres of wetlands and no springs.

Thick pyroclastic flow and debris flow deposits from approximately 1,500 years ago comprise the surface material in the project area. These permeable deposits filled in over the older topographic surface (including stream channels) and created the present smooth fan on the southwest side of Mt. Hood (Sherrod and Scott 1995). The age and permeability of this material explains the limited stream development above Timberline Lodge; the buried topography (including stream channels) probably helps to concentrate groundwater flow in certain areas and partially explains why springs are located where they are (USDA Forest Service 2005a).

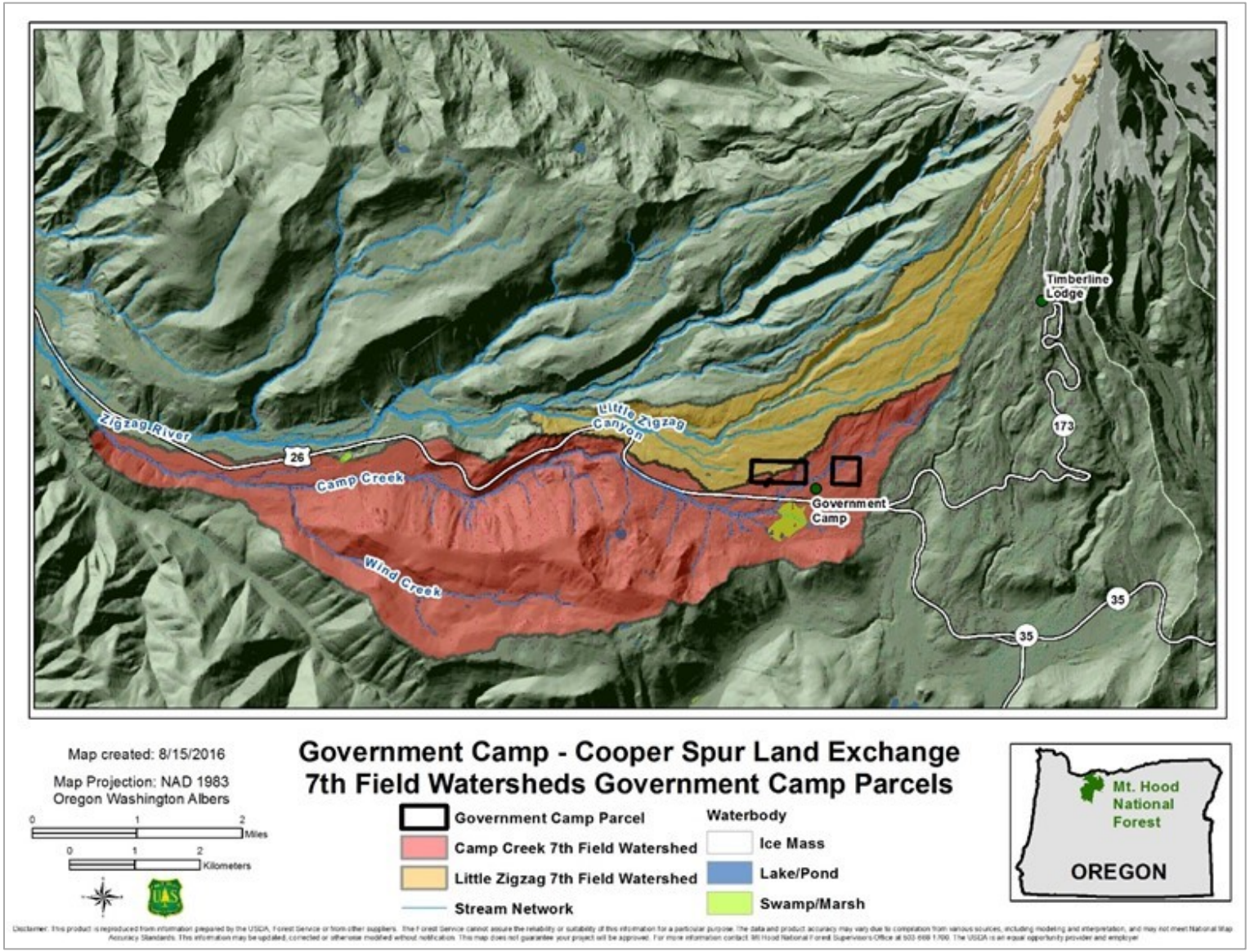

Figure 20. Government Camp parcels and associated 7th field watersheds

Camp Creek is in the area affected by pyroclastic flow and debris flow deposits from approximately 1,500 years ago. Camp Creek and its associated tributaries originate from a series of seeps and springs in the 4,000- to 4,300-foot elevation band. As with Still Creek, it is assumed that the location of the current seeps and springs that form the headwaters of Camp Creek are associated with topography that was buried 1,500 years ago.

Springs in the area (groundwater discharge) appear to form at the contact between the Polallie eruptive period, pyroclastic-flow and debris-flow deposits (between 12,000 and 15,000 years ago) that is surrounded by Timberline eruptive period, pyroclastic-flow and debris-flow deposits (approximately1,500 years ago). The springs appear to be at the lower end of the Polallie eruptive period, pyroclastic-flow and debris-flow deposits and the upper end of the Timberline eruptive period, pyroclastic-flow and debris-flow deposits. It is assumed that this is based on buried streams or transmissivity contacts due to contrasting perviousness (Reinwald, Pers. Comm., July 2016)

The streamflow regime in Still Creek is “buffered” by the constant influx of groundwater. Pulses of surface runoff during rain events occur primarily when the ground surface becomes saturated and the ephemeral reaches of Still Creek carry water (USDA Forest Service 2005). The Camp Creek 7th field watershed is adjacent to the Still Creek 7th field watershed with similar geology and spring sites so it is assumed that the streamflow regime of Camp Creek is similar to that of Still Creek.

The planning area receives approximately 84.5 inches of precipitation annually in the form of rain and snow based on data from the PRISM model developed by the Oregon Climate Service (http://www.prism.oregonstate.edu/explorer/). There is a SNOTEL (Snow Telemetry) site adjacent to the project area. The Mud Ridge Site is about 4 miles south of the Government Camp parcels at 3,800 feet elevation (the Government Camp parcel varies from 3,760 to 4,120 feet elevation).

Table 20. Data from the Mud Ridge SNOTEL Site from 1979 through 2004

	Total Precipitation (inches)	Snowpack measured as inches of Snow Water Equivalent	% of Total Precipitation contained in the Snowpack
Average	66.44	28.08	42
Minimum	45.20	6.80	15
Maximum	95.10	45.10	47

Lands to be acquired- Cooper Spur Parcels Description

There are many streams, springs and wetlands located within the 7th field watersheds in these parcels. The primary streams include East Fork Hood River, Tilly Jane Creek, Doe Creek, Ash Creek, Crystal Spring Creek, and Buck Creek. There are 22 springs (NHD and Yinger 2003), and 120 acres of wetlands in the watersheds. There are approximately 70 miles of stream in these 7th field watersheds in the following categories: 34 miles of perennial streams (flow year around), 31 miles of intermittent streams, and 6 miles of ephemeral streams.

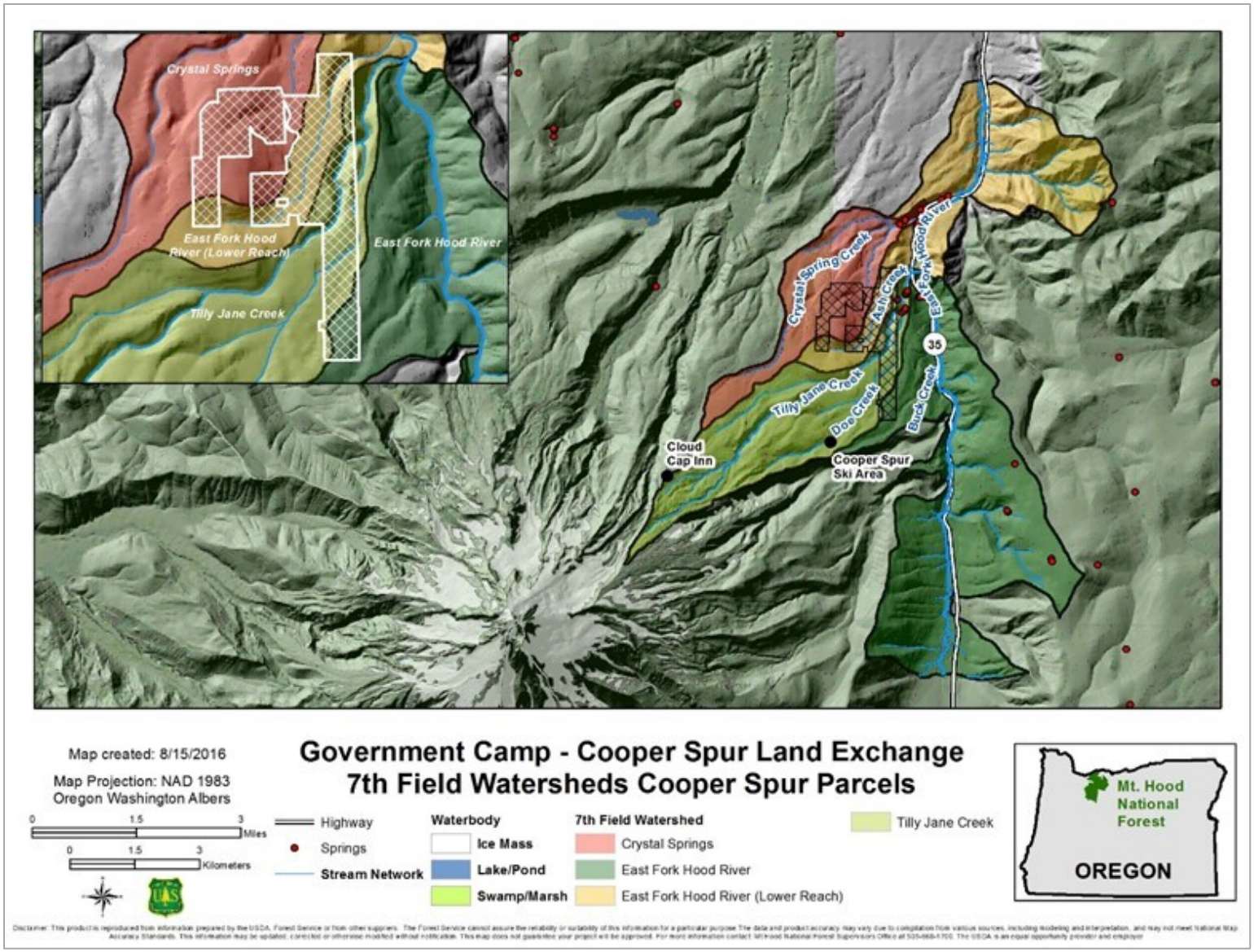

Figure 21. Cooper Spur parcels and associated 7th field watersheds

Within the parcels there are 3.3 miles of streams (3.0 perennial and 0.3 intermittent), 2 springs (Yinger 2003), and 8 acres of wetlands.

Outside of the East Fork Hood River, streams have steep channels, particularly in the upper reaches of their basins, that are cut into relatively young, unconsolidated volcanoclastic units, and they have an abundant source of easily erodible material. The lower basins of these streams are heavily wooded with conifers and have channels that are bordered by brush and small deciduous trees (Gallino and Pierson. 1985).

These parcels receive approximately 88 inches of precipitation annually in the form of rain and snow based on data from PRISM model developed by the Oregon Climate Service (http://www.prism.oregonstate.edu/explorer/). Using modeled data from the National Operational Hydrologic Remote Sensing Centers interactive snow information website (http://www.nohrsc.noaa.gov/interactive/html/map.html) for 2012 and 2013 as representative years from the closest SNOTEL site (approximately 6 miles away) at Red Hill (4,416 feet: the base of Cooper Spur Ski area is at 4,000 feet), approximately 30 percent of the total precipitation for the area is in the form of snow.

Table 21. Modeled data for the Red Hill SNOTEL site

	Total Precipitation (inches)	Snowpack measured as inches of Snow Water Equivalent	% of Total Precipitation contained in the Snowpack
2012 data	72.84	24.15	33
2013 data	104.44	29.13	28

Table 22. Resource indicators and measures for the existing condition Government Camp Parcels

Resource Element	Resource Indicator	Measure	Area Analyzed	No Action
Watershed Condition	Upslope/Riparian Condition	AREMP[10] 6th Field Watershed Assessment	Zigzag Canyon 6th field watershed	Functioning at Risk
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	AREMP 6th Field Watershed Assessment	Zigzag Canyon 6th field watershed	Properly Functioning
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	2-year 24-hour storm event streamflow	Camp Creek 7th field watershed	323
			Little Zigzag 7th field watershed	296
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	Aggregate Recovery Percentage	Camp Creek 7th field watershed	89%
			Little Zigzag 7th field watershed	98%
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	Road Drainage Stream Network Enhancement	Camp Creek 7th field watershed	6%
			Little Zigzag 7th field watershed	1%
Water Quality, Riparian and Channel Function and Watershed Function	Water yield –base streamflows	Are more water rights allocated than the D50 lowflow	Camp Creek subcatchment	Yes
			Little Zigzag 7th field watershed	No
Water Quality	Overall Water quality	Water quality limited streams	Camp Creek 7th field watershed	0
			Little Zigzag 7th field watershed	5.5
Water Quality	Stream Temperature	Stream temperature. Compliance with State standard	Camp Creek 7th field watershed	Yes
			Little Zigzag 7th field watershed	Yes
Water Quality	Sediment delivery land use	Tons per year delivered	Camp Creek 7th field watershed	153.3
			Little Zigzag 7th field watershed	23.3
Water Quality	Sediment delivery roads	Tons per year delivered	Camp Creek 7th field watershed	42.4
			Little Zigzag 7th field watershed	2.8
Water Quality	Sediment	In channel fine sediment levels. Number of stream reaches that exceed threshold	Camp Creek 7th field watershed	5
			Little Zigzag 7th field watershed	2
Water Quality	Riparian Processes Indicator	AREMP 6th Field Watershed Assessment	Zigzag Canyon 6th field watershed	Properly Functioning

[10] The NW Forest Plan watershed monitoring module (also known as the Aquatic and Riparian Effectiveness Monitoring Program or AREMP)

Table 23. Resource indicators and measures for the existing condition Cooper Spur parcels

Resource Element	Resource Indicator	Measure	Area Analyzed	No Action
Watershed Condition	Upslope/Riparian Condition	AREMP[11] 6th Field Watershed Assessment	Middle East Fork Hood River 6th Field Watershed	Functioning at Risk
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	AREMP 6th Field Watershed Assessment	Middle East Fork Hood River 6th Field Watershed	Properly Functioning
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	2-year 24-hour storm event streamflow	Not assessed	
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	Aggregate Recovery Percentage	Crystal Springs 7th field watershed	91%
			Tilly Jane Creek 7th field watershed	69%
			East Fork Hood River 7th field watershed	93%
			East Fork Hood River Lower 7th field watershed	93%
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	Road Drainage Stream Network Enhancement	Crystal Springs 7th field watershed	7%
			Tilly Jane Creek 7th field watershed	13%
			East Fork Hood River 7th field watershed	12%
			East Fork Hood River Lower 7th field watershed	5%
Water Quality, Riparian and Channel Function and Watershed Function	Water yield –base streamflows	Are more water rights allocated that than the D50 lowflow	Crystal Springs 7th field watershed	Yes
			Tilly Jane Creek 7th field watershed	No
			East Fork Hood River 7th field watershed	Not assessed
			East Fork Hood River Lower 7th field watershed	Not assessed
Water Quality	Overall Water quality	Water quality limited streams (miles)	Crystal Springs 7th field watershed	0
			Tilly Jane Creek 7th field watershed	0
			East Fork Hood River 7th field watershed	6.4
			East Fork Hood River Lower 7th field watershed	3.4
Water Quality	Stream Temperature	Stream temperature. Compliance with State standards	Crystal Springs 7th field watershed	Yes
			Tilly Jane Creek 7th field watershed	Yes
			East Fork Hood River 7th field watershed	Yes
			East Fork Hood River Lower 7th field watershed	Yes

[11] The NW Forest Plan watershed monitoring module (also known as the Aquatic and Riparian Effectiveness Monitoring Program or AREMP)

Resource Element	Resource Indicator	Measure	Area Analyzed	No Action
Water Quality	Sediment delivery land use	Tons per year delivered	Not assessed	
Water Quality	Sediment delivery roads	Tons per year delivered	Crystal Springs 7th field watershed	37.9
			Tilly Jane Creek 7th field watershed	36.0
			E Fork Hood River 7th field watershed	10.5
			E Fork Hood River Lower 7th field watershed	20.3
Water Quality	Sediment	In channel fine sediment levels. Number of stream reaches	Crystal Springs 7th field watershed	1
			Tilly Jane Creek 7th field watershed	6
			E Fork Hood River 7th field watershed	Not assessed
			E Fork Hood River Lower 7th field watershed	Not assessed
Water Quality	Riparian Process Indicator	AREMP 6th Field Watershed Assessment	Middle East Fork Hood River 6th Field Watershed	Functioning at Risk

Resource Indicator and Measure Overall Watershed Condition

The existing condition for the 6th field watersheds is based on datasets associated with the Northwest Forest Plan–The First 20 Years (1994 to 2013) Watershed Condition Status and Trend Report (Miller et al. 2015). The watershed monitoring module (also known as the Aquatic and Riparian Effectiveness Monitoring Program or AREMP) determines if the NW Forest Plan's aquatic conservation strategy is achieving the goals of maintaining and restoring the condition of watersheds. AREMP determined the status and trend of upslope/riparian watershed condition for 6th field watersheds within the NW Forest Plan area. Upslope and riparian condition are based on mapped data (e.g., road density, vegetation) representing the years 1993 and 2012 for all watersheds with 5 percent or greater Federal ownership (Miller et al. 2015). Watersheds were scored from 0 to 100 for stream condition and upslope/riparian condition, separately. Scores for upslope/riparian conditions were normalized to fall between 0 (poor) and 100 (good) (Miller 2015). Scores closer to zero signify a watershed has adversely deviated from expectation; 100 denotes above expectation (Miller 2015).

The assessment was based on factors affecting five major aquatic processes: sediment production and delivery (mass wasting), wood production and delivery, riparian habitat, hydrologic processes (specifically peak flows), and fish passage. The status of each process was estimated based on impacts of road densities and vegetation conditions derived from mapped data, including road metrics from Forest Service and Bureau of Land Management geographic information system road layers and vegetation metrics derived from satellite imagery (Miller et al. 2015).

The AREMP approach applies expert-derived criteria to regionally available datasets (Lanigan and Gordon 2012).

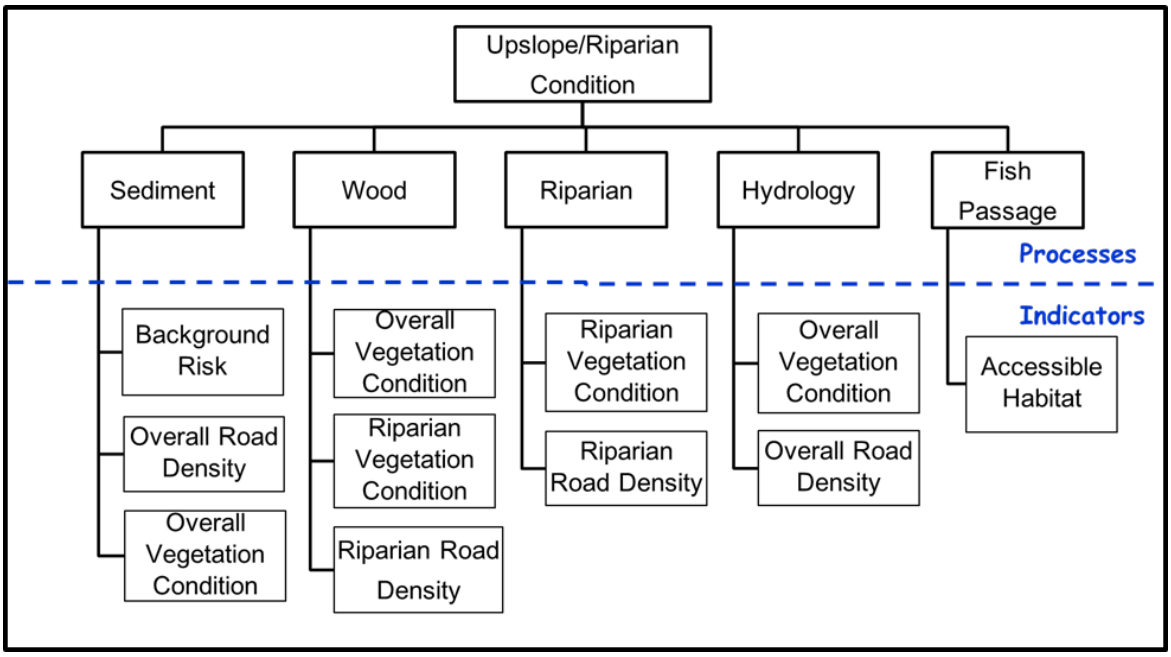

Figure 22. Overall upslope/riparian condition is based on the combination of 5 process indicators, which were in turn derived from a number of finer grained metrics (Miller et al. 2015)

The AREMP scores from 0 to 100 were converted to Watershed Condition Framework type of scores using the formula [2*((100-ArempScore)/100)+1] (AREMP 2016).

The Watershed Condition Framework (WCF) is a separate process that uses nationally consistent reconnaissance-level methodology for classifying watershed condition, using a comprehensive set of 12 indicators that are surrogate variables representing the underlying ecological, hydrological, and geomorphic functions and processes that affect watershed condition. The process is described at:

> http://www.fs.fed.us/publications/watershed/Watershed_Condition_Framework.pdf.

Watershed condition classification is the process of describing watershed condition in terms of discrete categories (or classes) that reflect the level of watershed health or integrity.

> Class 1 = Functioning Properly. Watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. These are considered to be functioning properly.
>
> Class 2 = Functioning at Risk. Watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. These are considered to be functioning at risk.
>
> Class 3 = Impaired Function. Watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. These are considered to have impaired function.

Both Watershed Condition Framework (WCF) and AREMP use the same general "multi-attribute" approach, in which a number of watershed indicators are evaluated individually and then their standardized scores are combined using a hierarchical model structure. However, the WCF differs considerably from the AREMP model in the watershed attributes used, how they are evaluated, and how they are combined. In terms of attributes used, the national model is more subjective, in that it relies on experts to rate each watershed, taking into account whatever data they may have. The AREMP approach is more mechanistic; it applies expert-derived criteria to regionally-available datasets. The national assessment includes many indicators for which consistent data are not available, whereas each AREMP indicator must be represented by a regional dataset (Lanigan and Gordon 2012).

The AREMP watershed indicators were used because the indicators were developed for processes in the area associated with the Northwest Forest Plan, the indicators evaluate whether the NWFP Aquatic Conservation Strategy (ACS) is achieving the goal of maintaining and restoring the condition of watersheds, and the ratings are more recent than the Watershed Condition Framework ratings.

Using the same break points as the WCF process for Properly Functioning, Functioning at Risk, and Not Properly Functioning the AREMP scores for process indicators were assessed.

Both the Zigzag Canyon and Middle East Fork subwatersheds are classified as functioning at risk.

Water Quantity

Human activities such as tree removal and roads can influence the amount of water available for runoff and the timing of runoff, which may translate into increased peak flows. These increased peak flows can cause stream channel damage in the form of increased bank erosion, channel scour, channel widening, and sedimentation (USDA Forest Service 2014).

Changes in hydrologic processes associated with management activities can be grouped into two classes according to causal mechanisms. One class consists of change resulting from removing forest vegetation through harvest. A second class consists of changes in hydrologic processes that control infiltration and the flow of surface and subsurface water. This latter class is dominated by the effects of forest roads (USDA Forest Service 1993).

Changes in hydrologic processes associated with the removal of forest vegetation through harvest can be assessed using the Aggregate Recovery Percentage (ARP) methodology. The ARP model was developed for use in the transient snow zone. It provides a methodology for indexing the susceptibility of a watershed to increased peak flows from rain-on-snow events associated with management created openings in the canopy. This method assumes that the greatest likelihood for significant, long-term cumulative effects on forest hydrologic processes is caused by created openings in the canopy (from both timber harvest and from the existence of roads) that impact snow accumulation and snowmelt.

Changes in hydrologic processes that control infiltration and the flow of surface and subsurface water are dominated by the effects of forest roads. The relatively impermeable surfaces of roads cause surface runoff that bypasses longer, slower subsurface flow routes. Where roads are in-sloped to a ditch, the ditch extends the drainage network, collecting surface water from the road tread and intercepting subsurface water exposed by road cuts, and then transporting it to streams quicker than the norm. These changes in hydrologic processes are assessed by estimating the extension of the stream drainage network associated with roads.

A primary mechanism that changes the volume and timing of peak flows is the road network, which essentially increases the drainage density of channels, intercepts subsurface water, and decreases the time for overland runoff to reach the stream channel. Even though a watershed receives the same amount of precipitation, it is transported through the system much more quickly, thus resulting in higher peak discharges and resultant increases in stream power. This increased stream power can more effectively erode the streambed and banks. Because the total amount of water remains relatively constant, base flows decrease because the rapid runoff reduces the total amount of water that can infiltrate and be stored in the soil (Castro 2003).

Impervious surfaces are hard surfaces such as asphalt, concrete, rooftops, and highly compacted soils. Unlike pervious areas where soil and vegetation absorb rainwater, impervious surfaces are areas that water cannot go through. Land cover that is impervious prevents rainwater from entering into the soil and forces it to run off the land until it finds a place where it can enter the soil or is incorporated into human-made drainage systems that carry it directly to a stream, lake, or estuary. Research has shown that as the amount of impervious surface increases, the amount of runoff generated increases. This increased runoff has the potential to scour streambeds, erode stream banks, and cause sediment and other entrained pollutants to enter adjacent water bodies each time it rains (Shaver et al. 2007).

Resource Indicator and Measure: Hydrologic Processes Aquatic and Riparian Effectiveness Monitoring Program

The watershed monitoring module (also known as the Aquatic and Riparian Effectiveness Monitoring Program or AREMP) determined the status and trend of upslope/riparian watershed condition for sixth-field watersheds within the NW Forest Plan area (Miller et al. 2015).

The assessment evaluated hydrologic processes (specifically peak flow). The AREMP assessment factors in vegetative disturbance, roads and climate zone. The percent increases from roads and vegetation are then summed to estimate the overall indicator for peak flow change (Miller et al. 2015).

Both the Zigzag Canyon and Middle East Fork Hood River subwatersheds are rated as properly functioning for this attribute.

Resource Indicator and Measure: Peak Streamflows Wildcat5 Modeling

This software program is designed to assist watershed specialists in analyzing rainfall-runoff events to predict peak flow and runoff volumes generated by single-event rainstorms for a variety of watershed soil, vegetation, and land-use conditions, including post-wildfire conditions (Hawkins and Barreto-Munoz 2016).

The general model strategy of Wildcat5 is that of a traditional rainfall-runoff model. Necessary model inputs are: (1) rainstorm characteristics of depth, duration, and distribution; (2) parameters related to watershed soil and cover to calculate runoff depths; (3) runoff timing parameters to define the travel times to the watershed outlet; and (4) unit hydrograph shape and scale (Hawkins and Barreto-Munoz 2016).

The peak flow estimation techniques in Wildcat5 are applicable to the many kinds and complexity of projects on which U.S. Forest Service hydrologists and others typically work (Hawkins and Barreto-Munoz 2016).

Because Wildcat5 is based on general rainfall-runoff hydrology, it can be applied to almost any kind of land use and watershed where model inputs are available and where peak flows are due to large rainfall events. Wildcat5 and similar rainfall-runoff models were intended for watersheds where flow originates as direct runoff from rainfall (Hawkins and Barreto-Munoz 2016).

Within the Government Camp area flow events that originate as direct runoff from rainfall are not unprecedented. In November 2006, there was a rainfall event that on November 7 had 2.6 inches of rain and on November 8 had 2.9 inches of rain, and for the entire period from November 4 through November 14 there was 13.5 inches of rain at the Mud Creek SNOTEL site.

The following text is from Timberline Express Draft EIS March 2005 (USDA Forest Service 2005)

> Since stream flow conditions can be analyzed in an infinite number of temporal and spatial scales, it is useful to describe changes in flow conditions at a few key recurrence intervals that are of most concern for a specific stream flow study. The concept of recurrence interval is commonly used to describe the statistical probability that a particular flow event would be exceeded in any given year. For the purposes of this analysis, the existing and proposed stream flow conditions were calculated for the 2-year peak flow. This specific flow condition was selected for analysis because, according to

published literature, these are the flow conditions most likely to be affected by land cover changes

Another important consideration is the impact of bankfull flow, often described as the high flow during two out of three years, or as a stream discharge having a recurrence interval of 1.5 years. The shape of the channel more closely reflects the bankfull width and height than it does the less frequent floods. If the bankfull flow is raised above the range of natural conditions, excess scouring can occur. If lower, the stream may not have the power to move its natural sediment load, causing sediment deposition within the watershed.

For this project, Wildcat5 was used to model the Government Camp parcels to establish a baseline for streamflows associated with the 2-year 24-hour precipitation event in an area where under the proposed action there are changes in land use from forested land to developed areas. In order to isolate the potential impacts associated with the project, smaller watersheds were established to focus on the potential changes in land use. Wildcat5 was not used to model streamflow in the Cooper Spur parcels because there are no ground-disturbing activities proposed for the Cooper Spur parcels. The model was run at various sized watersheds to determine how far the potential impacts associated with the proposed action extend.

The 2-year 24-hour precipitation amounts for each area were from the basin characteristics from USGS StreamStats Version 3.0 output for that area.

Table 24. Predicted peak streamflows for the 2-year 24-hour precipitation event

Analysis Area	Acres	Peak Streamflow (cubic feet per second)
Camp Creek at Highway 26	441	23.8
Camp Creek at Yocum Falls	2,073	109.5
Camp Creek 7th Field	5,992	322.7
Unnamed Tributary to Little Zigzag River below Enid Lake	196	7.1
Unnamed Tributary to Little Zigzag River at Little Zigzag River	301	11.9
Little Zigzag River 7th Field	2,735	295.7
Zigzag River at Lady Creek	6,403	721.4

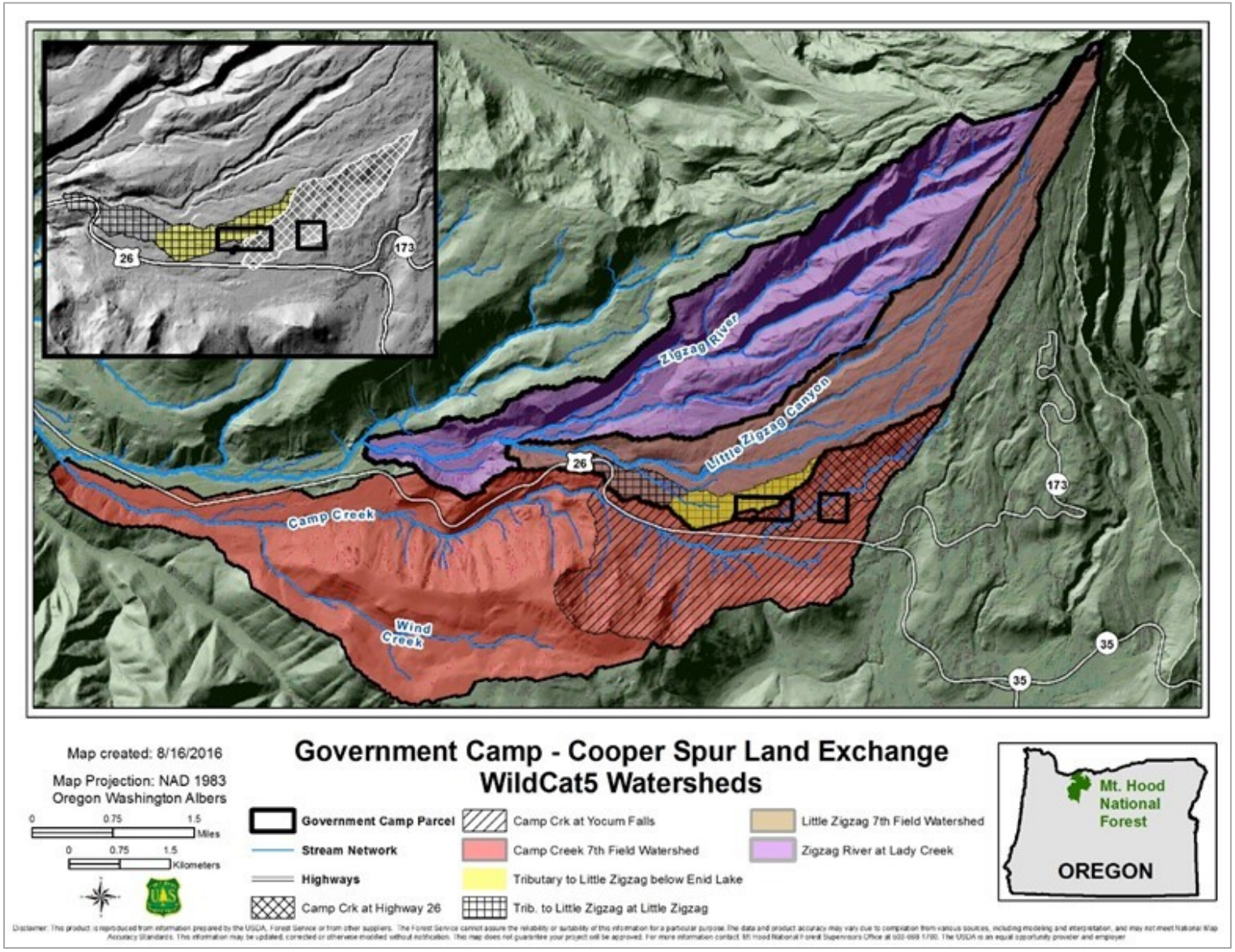

Figure 23. Wildcat5 modeled watersheds

Resource Indicator and Measure: Peak Streamflows Aggregate Recovery Percentage

The Aggregate Recovery Percentage (ARP) has been used to represent the proportion of a watershed in a "hydrologically mature" condition. By measuring the percent of an area in a hydrologically recovered condition, the ARP model evaluates the risk of increased peak flows from rain-on-snow events. In stands with little or no forest canopy within the transient snow zone, more snow accumulates than beneath a partially or fully intact forest canopy.

In western Oregon, the lower boundary of the transient snow zone falls between 350 and 450 meters (approximately1,150 to 1,475 feet), and the upper boundary falls between 1,100 and 1,200 meters (approximately 3,600 to 3,940 feet) (Grant et al. 2008). However, for this analysis the 7th field watersheds associated with the Government Camp parcels and Cooper Spur parcels were analyzed with ARP methodology associated with the following rationale:

> Streamflow data from Still Creek at 3,600 feet (Golder Associates Inc. 2010) indicate a peak flow event in January 2009, with an "estimated significant snowmelt contribution." Due to similarities in location, geology and the stream network between Still Creek and Camp Creek it is assumed that Camp Creek would respond similarly to Still Creek with a significant snowmelt contribution from a similar storm event.
>
> The watershed analysis for the East Fork Hood River (USDA Forest Service 1996) indicates; "Most of the streams in these watersheds lie entirely within the rain-on-snow zone. Typically, this zone extends from 2,500 to 4,500 feet, however, because of the shape and orientation of the East Fork Watershed and its proximity to Mt. Hood, the entire watershed reacts to rain-on-snow in a similar manner."

As timber harvest occurs either by complete or partial canopy removal, a portion of the watershed is no longer considered hydrologically mature if enough forest canopy is removed, thus the ARP for that drainage is reduced from 100 percent depending on the extent and intensity of timber harvest. Studies have shown that in forest openings, or areas that have had forest cover removed, snow accumulation is increased due to the loss of canopy interception. With higher levels of snow accumulation and increased rates of snowmelt in stands where sufficient canopy has been removed, there is the potential to generate more water during rain-on-snow events, which can contribute to increased peak stream flows. As an increasing portion of a watershed is put into an open or partially hydrologically immature condition, the potential for peak flows to be increased becomes greater. Over time, vegetation grows back and in 35 years would return to a hydrologic mature condition, thereby "recovering."

The ARP analysis also addresses many other factors including:

- All past timber harvest, road construction, rock quarries, and other openings such as power lines;
- Recent wildfires; and
- Other ownership

Table 25. Current level of hydrologic recovery 7th field watersheds[12]

Subwatershed	ARP Existing Condition	Impact Area Existing[13]
Camp Creek[14]	89	11
Little Zigzag River	98	2
Crystal Springs	91	9
Tilly Jane Creek	69	31
East Fork Hood River	93	7
East Fork Hood River Lower	93	7

The Effects of Forest Practices on Peak Flows and Consequent Channel Response Report (Grant et al. 2008) details (using the mean change for all reported data) that approximately 20 percent of an area can be harvested before increases in peak streamflows are detectable. Using the ARP values to reflect the percent of the area that is harvested, all of 7th field subwatersheds except Tilly Jane Creek are below the threshold where increases in peak streamflows are detectable from Grant et al. 2008.

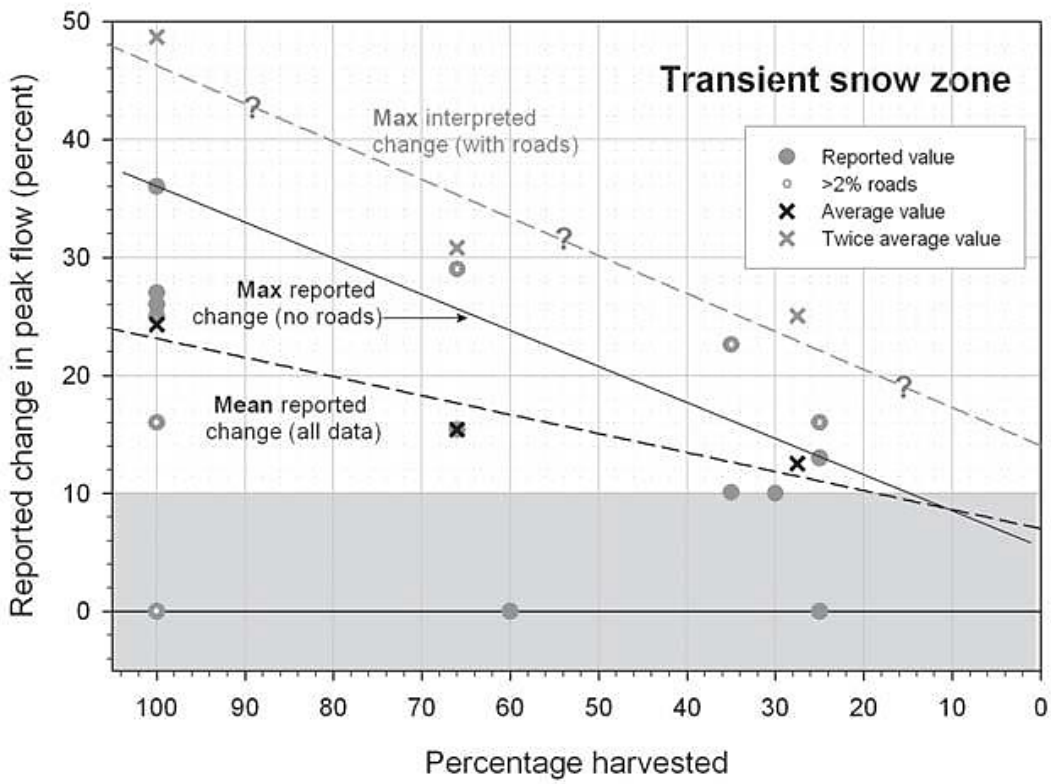

Figure 24. Change in peak flow associated with harvest activities (Grant et al. 2008)

[12] ARP values for Crystal Springs, Tilly Jane Creek, East Fork Hood River, and East Fork Hood River Lower are from the Polallie Cooper Hazardous Fuels Reduction Project Draft Environmental Assessment (USDA Forest Service 2016)
[13] Watershed impact area represents the portion of watersheds which are hydrologically disturbed by management activities (e.g., timber harvest and road construction) and/or natural disturbances (e.g., wildfire and landslides) (USDA Forest Service 1990a) and is derived by subtracting the Aggregate Recovery Percent (ARP) value from 100, i.e., an ARP value of 75 percent results in a watershed impact area of 25 percent.
[14] The ARP values for Camp Creek and Little Zigzag River were calculated for the year 2018. For the analysis it was assumed that the project would be implemented in 2018.

During development of the Mt. Hood Forest Plan a methodology for addressing cumulative watershed effects, watershed sensitivity, and hydrologic recovery was developed to address Special Emphasis Watersheds. As part of the process, a threshold of concern with respect to hydrologic recovery was recommended for all watersheds on the Forest (USDA Forest Service 1990a).

Using a combination of professional judgment and experience, resource specialists (hydrologists, soil scientists, and fisheries biologists) at the Forest and District level identified 28 “candidate” watersheds that were determined to be inherently sensitive due to their physical characteristics (soils, geology, channel morphology, susceptibility to snowmelt-induced peak flows, etc.). Several watersheds that appear to have been heavily impacted by frequent timber harvest and road construction entries were also evaluated (USDA Forest Service 1990a).

On the basis of observation and collective experience and judgment, Forest watershed and fisheries specialists developed a methodology for assigning, weighting, and summing values for various factors, yielding a unitless numerical rating, or index (USDA Forest Service 1990a):

WS = EH + LS + SM + CS + BU

Where:

WS = Watershed Sensitivity (a unit less numerical value)

EH = Erosion Hazard

LS = Land Stability

SM = Snow Melt

CS = Channel Stability

BU = Beneficial Uses

Based on Watershed Sensitivity ratings individual Thresholds of Concern (TOC) values were established forestwide for Special Emphasis Watersheds

On a forestwide basis, outside of Special Emphasis Watersheds, a watershed disturbance TOC of 35 percent has been recommended. This value allows more disturbance than the previously cited literature and applications of ARP seem to imply. Forest watershed staff believe that it represents a reasonable “threshold level of concern,” which is applicable to the less-sensitive watershed lands outside of the recommended Special Emphasis Watersheds, reflecting observations of such lands to date (USDA Forest Service 1990a).

Based on the watershed sensitivity analysis completed for the Forest Plan associated with special emphasis watersheds and current watershed impact areas, all of the 7th field watersheds associated with the project are below the disturbance TOC of 35 percent recommended for watersheds that are not designated as Special Emphasis Watersheds.

Resource Indicator and Measure: Peak Streamflows- Stream Drainage Network Extension

Based on research on two basins in the Western Cascades of Oregon, 57 percent of their road length is connected to the stream network by surface flowpaths including roadside ditches and gullies below road drainage culverts (Wemple et al. 1996).

Water generated on the road prism can enter the natural stream channel network in a variety of ways (http://www.stream.fs.fed.us/news/streamnt/jul00/jul00_2.htm):

- Inboard ditches delivering runoff to a stream at a road-stream crossing
- Inboard ditches delivering runoff to a cross drain (culvert, dip, waterbar, etc.) where sufficient discharge is available to create a gully or sediment plume that extends to a stream channel
- Other cross-drainage features, such as waterbars or dips, that discharge sufficient water to create a gully and/or sediment plume that extends to a stream channel
- Roads sufficiently close to streams so that the fill slope encroaches on the stream, such as at road-stream crossings
- Landslide scars on the road-fill that expose bedrock and create a surface flow path to an adjacent channel.

For this analysis, the key process of concern is associated with inboard ditches delivering runoff to a stream where a road intercepts the stream. The increase in channel length due to the inboard ditch was calculated as the length of the ditch directly connected to the stream up to the next ditch relief structure.

Table 26. Percent increase in the length of the stream channel due to roads [15]

Subwatershed	Percent increase in the length of the stream channel due to roads
Camp Creek	6
Little Zigzag River	1
Crystal Springs	7
Tilly Jane Creek	13
East Fork Hood River	12
East Fork Hood River Lower	5

It is generally accepted that based on considerations of gage and measurement error at high-flow events, a minimum detectable change in peak flow (detection limit) of ±10 percent for site-scale analysis. Percentage changes in peak flow that fall in this range are within the experimental and analytical error of flow measurement and cannot be ascribed as a treatment effect (Grant et al. 2008). Since this process increases flow routing efficiency and may result in increased magnitude of peak stream flows, the 10 percent threshold was used to set a level of concern associated with this process. Based on the 10 percent threshold of concern for this process, all of the analysis subwatersheds, except Tilly Jane Creek and East Fork Hood River, are below the threshold for concern.

In a study on the effects of forest roads on peak streamflows (LaMarche and Lettenmaier 2001) in the western slope of the Cascade Range in southwestern Washington, forest roads alone were predicted to have increased the mean annual flood in the subcatchments from 2.2 to 9.5 percent, and from 2.9 to 12.2 percent for the 10-year event. The largest increases associated with forest roads (without harvest) were roughly equivalent to those predicted for harvest, without roads. The predicted increases in floods due to roads generally increase with flood return period, while vegetation effects decrease. The effects of roads and harvest on peak flows at the subcatchment (7th field watershed, approximately 5,000 acres) and

[15] Values for Crystal Springs, Tilly Jane Creek, East Fork Hood River, and East Fork Hood River Lower are from the Polallie Cooper Hazardous Fuels Reduction Project Draft Environmental Assessment (USDA 2016) and based on 350-foot spacing (the midpoint between the 200-foot and 500-foot culvert spacing values)

catchment (6th field watershed, approximately20,000 acres) levels are essentially independent, and the combined effects on peak flows are, therefore, roughly additive.

Modeling studies for Washington watersheds suggest an approximate doubling of the percentage change in peak flows attributed to harvest alone when road construction is included in the model (Grant et al. 2008).

Since the effects of vegetation removal through harvest and roads are considered independent from each other and they are roughly additive, they should be integrated when assessing management effects on peak streamflows within a watershed. However, at different scales the combined effects are not always apparent. At the hillslope scale, modeled as well as field-observed road ditch response was dependent on vegetation state, with higher road effects occurring below harvested hillslopes. The absence of such a synergy at the subcatchment and catchment levels may well be due to scaling issues (most likely due to desynchronization in the channel system) of peak flows from the collective hillslopes (LaMarche and Lettenmaier 2001).

Table 27. Hydrologic impact area by 7th field watershed

Subwatershed[16]	Watershed Impact Area Existing
Camp Creek[17]	11
Little Zigzag River	2
Crystal Springs	9
Tilly Jane Creek	31
East Fork Hood River	7
East Fork Hood River Lower	7

With the approximate doubling of the percentage change in peak streamflows attributed to harvest alone the “doubled” impact area for the 7th field watersheds varies from 4 to 62 percent and all of the subwatersheds except Camp Creek and Tilly Jane Creek are below the approximately 20 percent of an area that can be harvested before increases in peak streamflows are detectable from the Grant et al. 2008 threshold.

However, the threshold where road construction is considered additive to harvest to assess impacts on streamflow in Grant et al. 2008 is 2 percent of the watershed area in roads, in Tilly Jane Creek 1.7 percent of the watershed area is in roads, and in Camp Creek, 1.1 percent of the area is in roads. Due to the limited area in roads for this assessment, the impacts of roads were not considered additive, so they did not suggest an approximate doubling of the percentage change in peak flows attributed to harvest alone in the Tilly Jane Creek and Camp Creek subwatersheds.

Resource Indicator and Measure: Peak Streamflows Summary

All of the subwatersheds, except Tilly Jane Creek, are below the threshold of concern from “*The Effects of Forest Practices on Peak Flows and Consequent Channel Response Report*” (Grant et al. 2008). All the subwatersheds are below the threshold associated with the methodology for addressing cumulative watershed effects, watershed sensitivity, and hydrologic recovery associated with the Mt. Hood Forest

[16] Values for Crystal Springs, Tilly Jane Creek, East Fork Hood River, and East Fork Hood River Lower are from the Polallie Cooper Hazardous Fuels Reduction Project Draft Environmental Assessment (USDA 2016)
[17] The ARP values for Camp Creek and Little Zigzag River were calculated for the year 2018. For the analysis it was assumed that the project would be implemented in 2018.

Plan (USDA Forest Service 1990a). When the combined impacts of vegetation management and roads are examined, all the subwatersheds are rated as properly functioning in the 6th Field Watershed Condition from the "*Northwest Forest Plan–The First 20 Years (1994-2013) Watershed Condition Status and Trend Report*" (Miller et al. 2015).

Tilly Jane Creek watershed is above the threshold of concern from "*The Effects of Forest Practices on Peak Flows and Consequent Channel Response Report*" (Grant et al. 2008) due to vegetation loss from the Gnarl Ridge fire. However, indications of major increased peak flows such as channel bed instability or scour and channel bank erosion were not noted during field visits to Tilly Jane Creek just below the burned area (USDA Forest Service 2016).

Resource Indicator and Measure: Base Streamflows Water Rights

Water rights for the project were examined by 7th field watershed or in the case of Camp Creek a smaller watershed to focus in on the project area. The water rights are from the Oregon Water Resources Department's water right surface Points of Diversion (POD) and groundwater Points of Appropriation (POA) locations in the state of Oregon geodatabase (Oregon Water Resources 2014). Wells and storm water were not included in water right totals in the table.

Table 28. Water rights summary

Area	Acres	Water Rights	D50 Low-Flow[18]
Camp Creek	441	4.56 cubic feet per second (cfs)	2.26 cfs
Little Zigzag River	2,735	0.002 cfs	16.1 cfs
Crystal Springs Creek	1,881	7.16 cfs	5.41 cfs
Tilly Jane Creek	2,860	0.89 cfs	14.9 cfs

Both Camp Creek and Crystal Springs Creek have more water rights than the predicted 50th percentile annual low flow. The D50 low-flow is the flow statistics for the 50th percent exceedances annual low-flow event. This has the potential to impact base streamflow in these areas.

When the water rights for Camp Creek are examined, 3 cfs out of the 4.56 cfs total water rights allocated are associated with Collins Lake. As the map of Collins Lake from the water rights permit application details, there are two outlets for the lake with one into Bezuco Pond and eventually into what was called Mosquito Creek at the time and the other back into Camp Creek. It appears that this is not a consumptive use with the water diverted into the lake flowing back into Camp Creek or one of its tributaries. If this is the case, there is 1.56 cfs total being used with the D50 low-flow, at 2.26 cfs the area is not over-allocated.

[18] Computed from USGS Oregon Streamstats site

Table 29. Water rights for Camp Creek in the Government Camp area

Water Rights Holder	Use	Rate Cfs
Collins	Domestic	1.5
Collins	Fish Culture	1.5
Western Novelty Co.	Domestic	0.025
Western Novelty Co.	Domestic	0.025
U.S. Mount Hood National Forest	Domestic	0.005
Leuthold	Domestic	0.005
Government Camp Water[19]	Municipal	1.5

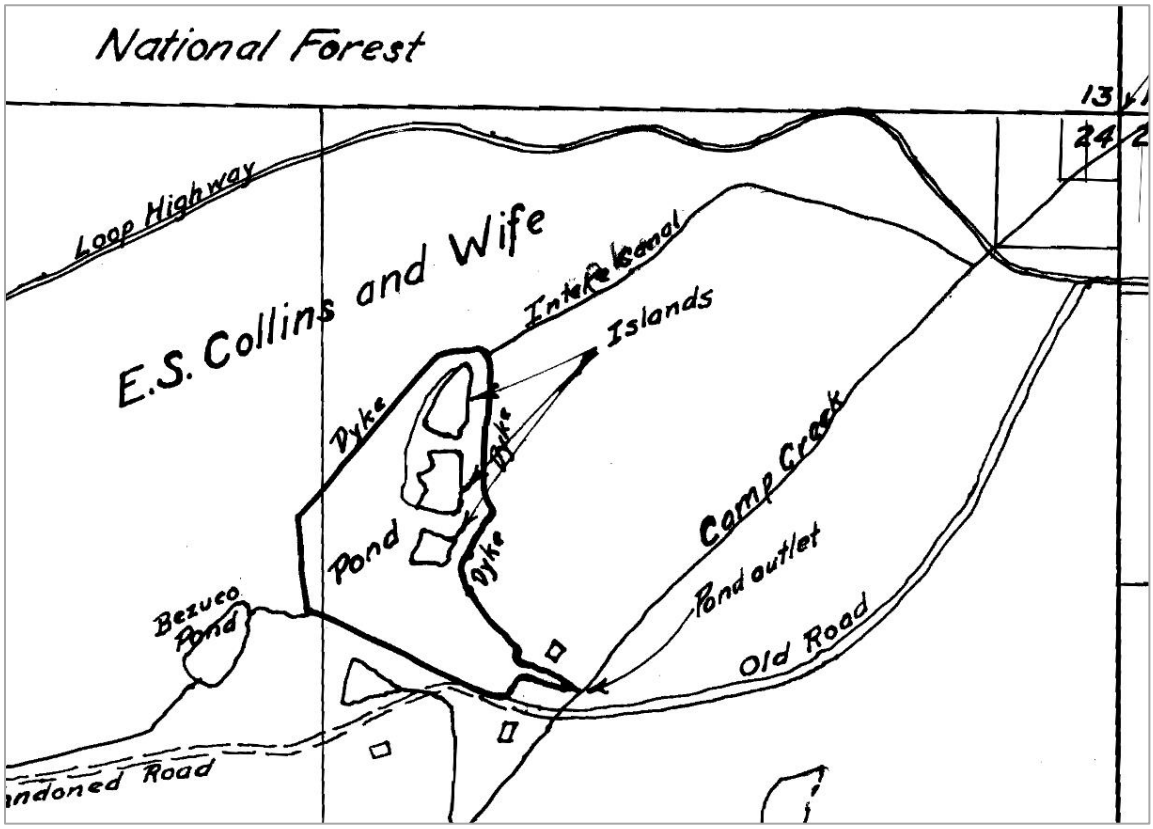

Figure 25. Map from application to appropriate the public waters of the State of Oregon (permit #8449, certificate #8919)

Water availability in Camp Creek at the confluence with the Zigzag River was evaluated by the Oregon Water Resources Department. The Oregon Water Resources Department (Department or OWRD) limits appropriation from Oregon streams to assure new applicants use of surface water a reasonable amount of time and to minimize regulatory conflict. Water availability is obtained from natural stream flow by subtracting existing storage, out-of-stream consumptive uses, and in-stream demands (Cooper 2002).

[19] This water right is not in the Oregon Water Resources Department's water right surface Points of Diversion (POD) geodatabase. The water right is based on information in Government Camp Water Company Incorporated Water Utility Annual Report C for the year ending December 31, 2011 (Oregon PUC 2012)

Consumptive use is divided into three major categories: irrigation, municipal, and all others (e.g., domestic, livestock). These uses are less than 100 percent consumptive. It is assumed the non-consumed part of a diversion is returned to the stream from which it was diverted (Cooper 2002).

There are two types of in-stream demands: instream water rights and scenic waterway flows. In-stream demands diminish availability upstream only. Because they are non-consumptive, they do not diminish stream flow downstream as do consumptive uses (Cooper 2002).

Table 30. Water availability in Camp Creek report

Month	Natural Stream Flow	Consumptive Use	Expected Stream Flow	Reserved Stream Flow	Instream Requirement	Net Water Avail
JAN	29.1	0.751	28.3	0	25	3.35
FEB	37.3	0.751	36.5	0	25	11.5
MAR	36	0.75	35.2	0	25	10.2
APR	47.4	0.75	46.6	0	25	21.6
MAY	45.7	0.75	45	0	25	20
JUN	22.1	0.75	21.4	0	20	1.35
JUL	10.2	0.75	9.45	0	16.2	-6.75
AUG	7.66	0.75	6.91	0	9.13	-2.22
SEP	6.6	0.75	5.85	0	10.5	-4.65
OCT	8.3	0.75	7.55	0	12.2	-4.65
NOV	17.1	0.75	16.4	0	25	-8.65
DEC	37.5	0.751	36.7	0	25	11.7

Based on the Oregon Water Resources Department output, there is no water available in Camp Creek at the confluence with the Zigzag River in July, August, September, October, or November.

When the water rights for Crystal Springs are examined, 7.15 cfs out of the 7.16 cfs total water rights allocated are associated with Crystal Springs Water District. The language from the application for a permit to appropriate the waters of the State of Oregon indicates that the water district intended to apply for more water than was available from the spring time water yield.

Table 31. Water rights Crystal Springs 7th field watershed

Water Rights Holder	Use	Rate Cfs
Crystal Springs Water District	Group Domestic	2.65
Crystal Springs Water District	Municipal Uses	3.5
Crystal Springs Water Co.	Domestic	1
Lee	Livestock	0.005

Remarks: Headworks, second storage reservoir, and first 60,000 feet of new pipelines already constructed (1967-1968). Next 125,000 feet of new pipelines and third storage reservoir under contract now and due to be completed by September 1969.

Domestic and industrial growth will require full use of all of existing water rights plus this application prior to year 2000.

Existing rights and permits are as follows:

Application 13490 - Permit 9831 for 1.0 cfs

Application 39422 - Permit 29377 for 2.65 cfs

Spring yield during water system high demand period is about 7.1 cfs.

Granting of this application will give the District rights to 7.15 cfs at the spring.

Figure 26. Water rights permit application #34196

Water rights is further discussed in the section below titled, “Soils, Wetlands and Water Rights.”

Resource Indicator and Measure: Water Quality- Water Quality Limited 303(d) Streams

Rivers, streams, and lakes within and downstream of the treatment areas are used for boating, fishing, swimming, and other water sports. Additionally, the Forest streams provide habitat and clean water for fish and other aquatic biota, each with specific water quality requirements. The CWA protects water quality for all of these uses.

The CWA requires states to set water quality standards to support the beneficial uses of water. The Act also requires States to identify the status of all waters and prioritize water bodies whose water quality is limited or impaired. For Oregon, the DEQ develops water quality standards and lists water quality limited waters. In addition, Region 6 of the Forest Service has entered into a Memorandum of Agreement (MOA) with the Oregon State DEQ to acknowledge the Forest Service as the Designated Management Agency for implementation of the CWA on National Forest System land. In an effort to support the CWA, the Forest conducts a variety of monitoring and inventory programs to determine status of meeting state water quality standards as well as other regulatory and agency requirements.

In an average year, approximately 75 sites are monitored for water temperature throughout the Forest. In addition, other water quality monitoring occurs at various locations throughout the Forest depending on the year. This could be turbidity monitoring, instream sediment sampling, water chemical sampling, or surveys of physical stream conditions. Currently, approximately 25 miles of physical stream habitat is surveyed every year and to date approximately 1,787 miles of stream have been surveyed or resurveyed. Some of the information collected during these surveys includes the number of pools and riffles, amount of large wood, riparian area condition and types, numbers of fish and other aquatic organisms, stream substrate and embeddedness.

Section 303(d)

Section 303(d) of the CWA requires that water bodies violating state or tribal water quality standards be identified and placed on a 303(d) list. The EPA regulations also allow states and tribes to include threatened waters (that is, waters that display a downward trend that suggests water quality standards would not be met in the near future).

By direction of the CWA, where water quality is limited, DEQ develops a Total Maximum Daily Load (TMDL) plan to improve water quality to support the beneficial uses of water. For water quality limited streams on NFS lands, the Forest Service provides information, analysis, and site-specific planning efforts to support state processes to protect and restore water quality.

The TMDL plans for water temperature for streams in the project area (Sandy River Basins and West Hood Sub-basin) were completed by the Oregon DEQ and accepted by the EPA in 2005 and 2002 respectively. In these documents, DEQ concluded that standards and guidelines in the Mt. Hood Forest Plan and the NW Forest Plan meet the requirements of a TMDL management plan.

The table below details the water quality status of streams in the project area with respect to associated Oregon's 2012 Integrated Report Assessment Database and 303(d) List.

Table 32. Water Quality Status -Oregon's 2012 Integrated Report Assessment Database and 303(d) List – Streams in Status Categories 4 or 5

Stream Name	Miles	Pollutant	Listing Status
Little Zigzag Canyon	0 to 5.5	Biological Criteria	Cat 5: Water quality limited, 303(d) list, TMDL needed
East Fork Hood River	0 to 27.4	Iron	Cat 5: Water quality limited, 303(d) list, TMDL needed
East Fork Hood River	0 to 27.4	Copper	Cat 5: Water quality limited, 303(d) list, TMDL needed
East Fork Hood River	0 to 27.4	Thallium	Cat 5: Water quality limited, 303(d) list, TMDL needed
East Fork Hood River	0 to 27.4	Biological Criteria	Cat 5: Water quality limited, 303(d) list, TMDL needed
East Fork Hood River	9.8 to 27.4	Temperature	Cat 4A: Water quality limited, TMDL approved

Category 4: Water is water quality limited but a TMDL is not needed. This includes:

> 4A: TMDL approved - TMDLs needed to attain applicable water quality standards have been approved.
>
> 4B: Other pollution control requirements are expected to address all pollutants and will attain water quality standards.
>
> 4C: Impairment is not caused by a pollutant (e.g., flow or lack of flow is not considered a pollutant.)

Category 5: Water is water quality limited and a TMDL is needed, Section 303(d) list.

The 303(d) listings for iron, copper, and thallium associated with East Fork Hood River are based on samples from the County Gravel Pit (River Mile 0.75). The confluence of Crystal Springs Creek and the East Fork Hood River is at approximately river mile 10.7 (approximately 10 miles upstream of the gravel pit) and due to the distance from the project site and the water quality variables involved it is assumed that the listings for iron, copper and thallium are not associated with forest management activities.

- The major sources of thallium in drinking water are leaching from ore-processing sites; and discharge from electronics, glass, and drug factories (https://safewater.zendesk.com/hc/en-us/articles/212075567-5-How-does-thallium-get-into-my-drinking-water-)
- The major sources of copper in drinking water are corrosion of household plumbing systems; and erosion of natural deposits. (https://safewater.zendesk.com/hc/en-us/articles/211402968-5-How-does-copper-get-into-my-drinking-water-)

- Iron is the fourth most abundant element, by weight, in the earth's crust. Natural waters contain variable amounts of iron depending on the geological area and other chemical components of the waterway. (http://www.water-research.net/index.php/metals-in-the-environment)

Biological Criteria Assignment of Assessment Category:

The following text is from: PREDATOR: Development and use of RIVPACS-type macroinvertebrate models to assess the biotic condition of wadeable Oregon streams (November 2005 models) (Hubler 2008)

> The Oregon Department of Environmental Quality (DEQ) is responsible for protecting the waters of the state from pollution that may adversely affect drinking water, aquatic life and recreational uses. DEQ routinely monitors conventional water quality parameters such as nutrients, dissolved oxygen, pH, turbidity, conductivity and bacteria to report on the water quality status and trends in Oregon. However, resource limitations make it impractical to measure all the potential pollutants which may impair Oregon's waters. Aquatic insect communities are direct indicators of biological conditions and a surrogate for watershed health. They provide a cost effective screening tool for assessing and identifying problems that may require further examination.
>
> The PREDictive Assessment Tool for Oregon (PREDATOR) consists of three regional models that assess the biological integrity of wadeable streams across Oregon. DEQ developed the models to supply a scientifically rigorous bioassessment tool that is easy to apply and provides a more complete understanding of the stream conditions across Oregon.
>
> The list of species generated from the reference locations is known as the "Expected" taxa list or "E". This list is compared to the captured aquatic insects or, "Observed" taxa ("O"), at an assessment site. The predictive model output is the observed to expected (O/E) taxa ratio. Scores less than one have fewer taxa at a site than were predicted by the model. Scores greater than one are either equivalent to the reference location or may have an enhanced insect community as a result of some type of enrichment.
>
> If a single sample falls below the 10th percentile of the reference distribution, the sample is considered to be outside the reference distribution. We feel confident that a single sample score below the 10th percentile is not different simply by chance, but rather a true difference in biological condition exists (assuming the site is not an outlier for any reason). In this case, a single sample is sufficient to classify the stream reach as biologically disturbed, or "not supporting" the beneficial use. However, if a sample falls between the 10th and 25th percentiles of the reference distribution ("moderately disturbed"), there is less confidence that the O/E score is outside of the reference distribution. In this case, DEQ recommends repeated measures of O/E to determine if a significant difference in biological condition exists. We also recommend assessments include surveys of water quality, instream and riparian habitat, and remote sensing of the watershed (GIS) to provide insights into possible sources of disturbance. A site with a "most disturbed" O/E score and minimal signs of human influences may indicate that the site was not accurately modeled with the current set of reference sites. These are important findings that may be used to increase the future accuracy of predicting locally common reference taxa.

Resource Indicator and Measure: Water Quality- Stream Temperature

Within the project area the following standards apply for stream temperature (Oregon Administrative Rule (OAR) 340-041-0028 Temperature)

- 13.0 °C during times and at locations of salmon and steelhead spawning.
- 16.0 °C during times and at locations of core cold water habitat identification.
- 18.0 °C during times and at locations of salmon and trout rearing and migration.

The core cold water habitat requirement applies to all perennial streams associated with the 7th field watersheds in the project area associated with the Government Camp parcels. The salmon and trout rearing and migration standards apply to all the streams in the 7th field watersheds associated with the Cooper Spur parcels. In addition, the salmon and steelhead spawning criteria apply in Camp Creek from Yocum Falls downstream for approximately 1 mile from January 1 to June 15 and from there downstream to the confluence with the Zigzag River from October 15 to June 15. The criteria apply in the Little Zigzag River from the confluence with the Zigzag River approximately 1 mile upstream from January 1 to June 15. In the East Fork Hood River the criteria apply from October 15 to May 15.

Stream temperatures from on-going Forest Service stream temperature monitoring, and Forest Service Stream surveys were assessed for compliance with stream temperature standards.

The ranges for the highest 7-day average maximum stream temperatures for stream temperature data loggers that were deployed during the summer months are displayed in table 33.

Table 33[20]. Highest 7-Day average maximum stream temperatures in the analysis area (degrees Celsius)

Stream	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007		2011
Camp Creek	ND[21]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		11.2
Doe Creek	ND	ND	ND	ND	10.5	10.0	10.3	12.3	10.4	ND	11.9	11.6	ND	ND		ND
E. Fork Hood River - Lower	15.9	12.7	13.3	13.0	ND	13.2	14.6	17.1	14.5	16.6	16.5	17.3	15.5	16.4		ND
E. Fork Hood River - Upper	ND	ND	ND	ND	ND	ND	13.6	15.8	15.5	15.5	15.6	16.4	ND	ND		ND
Tilly Jane Creek - Lower	ND	ND	ND	ND	8.6	10.0	10.0	10.6	10.5	10.4	10.8	10.2	ND	ND		ND

All of the sites detailed meet the applicable stream temperature standards

The table illustrates some cold water temperatures within the project area, due primarily to a contribution of flow from groundwater and glacial sources. Tilly Jane Creek has groundwater influence while East Fork Hood River water temperatures are somewhat influenced by glacial meltwater. Stream surveys also noted cool water temperatures in Crystal Springs Creek, and Doe Creek suggesting these streams also have a moderate to strong groundwater influence (USDA Forest Service 2016).

[20] Doe Creek, East Fork Hood River, and Tilly Jane Creek stream temperatures are from the Polallie Cooper Hazardous Fuels Reduction Project Draft Environmental Assessment (USDA Forest Service 2016)
[21] ND – Datalogger was not deployed

Since there is limited stream temperature data available on streams in the Government Camp parcels, including Camp Creek and Little Zigzag River, the NorWeST temperature database was examined.

The NorWeST project and database team has developed a comprehensive, interagency stream temperature database for the northwestern U.S. Those data were used to develop accurate (R2 = 90 percent; RMSE <1.0 °C), high- resolution (1 kilometer) stream temperature scenarios for 500,000 kilometers of streams and rivers (The NorWeST Interagency Stream Temperature Database and Climate Scenarios briefing paper, http://www.fs.fed.us/rm/boise/AWAE/briefing/AWAE_Science_Briefings-NorWeSTRegionalStreamTemperatureDatabaseAndModeledClimateScenarios.pdf).

The temperature database was compiled from hundreds of biologists and hydrologists working for dozens of resource agencies and contains more than 45,000,000 hourly temperature recordings at more than 15,000 unique stream sites. These temperature data are being used with spatial statistical stream network models to develop an accurate and consistent set of climate scenarios for all streams (http://www.fs.fed.us/rm/boise/AWAE/projects/NorWeST.html).

August mean stream temperature was the metric selected to be modeled in the NorWeST temperature model. Use of this metric allowed the largest proportion of data in the NorWeST observed temperature database to be used (approximately 80 percent), which facilitated calibration of the model to thousands of unique stream sites across the region (NorWeST Modeled Stream Temperature Stream Points for the “Oregon Coast” Processing Unit, Metadata).

Sites associated with the Government Camp parcel are in the Oregon Coast Processing Unit.

Model Prediction Accuracy (http://www.fs.fed.us/rm/boise/AWAE/projects/NorWeST/downloads/images/Scenarios/OregonCoastModelResults.jpg)

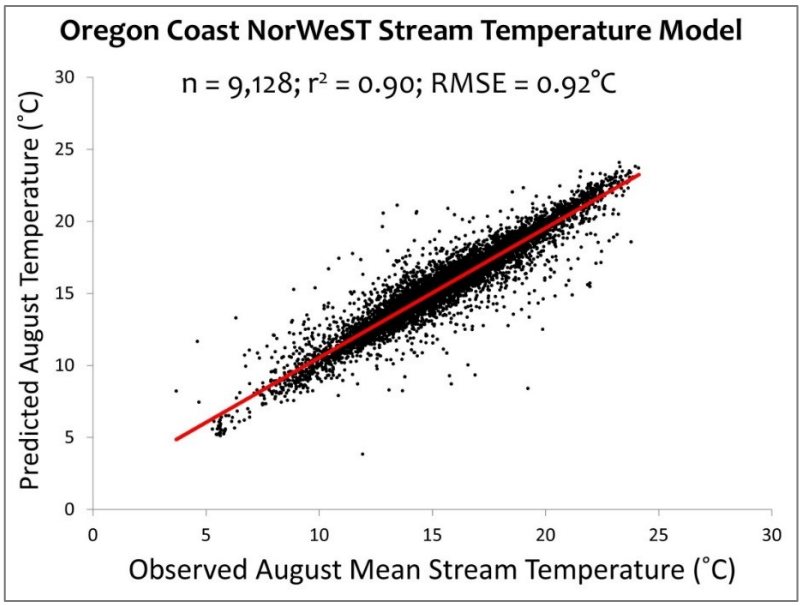

Figure 27. Zigzag Canyon 6th field watershed mean August Stream Temperature (2002-2011)

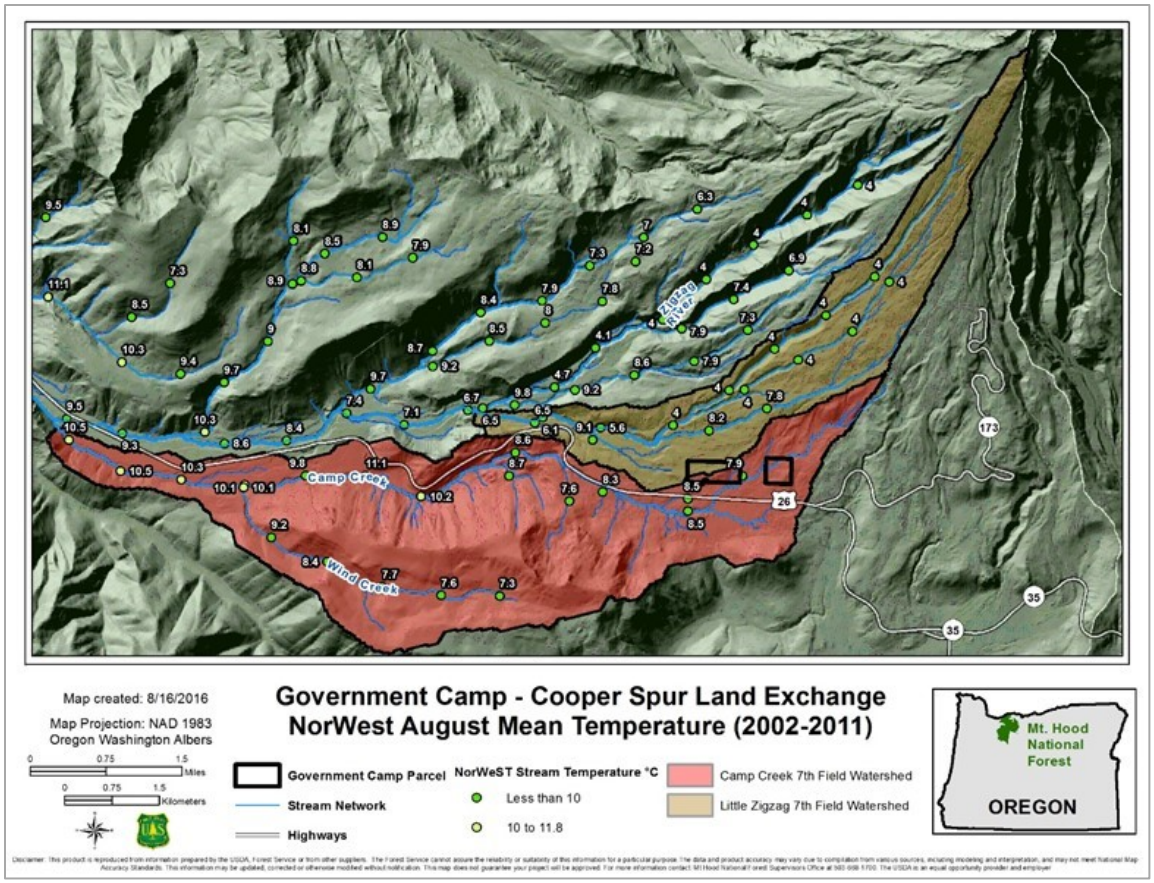

Figure 28. Historical composite scenario representing 9 year average August mean stream temperatures for 2002 – 2011

The map depicted in figure 28 details a maximum mean August stream temperature in Camp Creek of 11.1 °C and in the Little Zigzag River of 6.7 °C

In an effort to compare NorWest project stream temperatures to stream temperature standards, the August mean Stream Temperature. (2002 through 2011) from NorWest was compared to the maximum of the 7-day average of the daily maximum at the Zigzag River at the Forest Boundary monitoring site and the mean value of the maximum of the 7-day average was 2.3 °C higher than the August mean modeled stream temperature. Using this relationship, an estimated 7-day average of the daily maximum stream temperature dataset was created and is detailed in the map below.

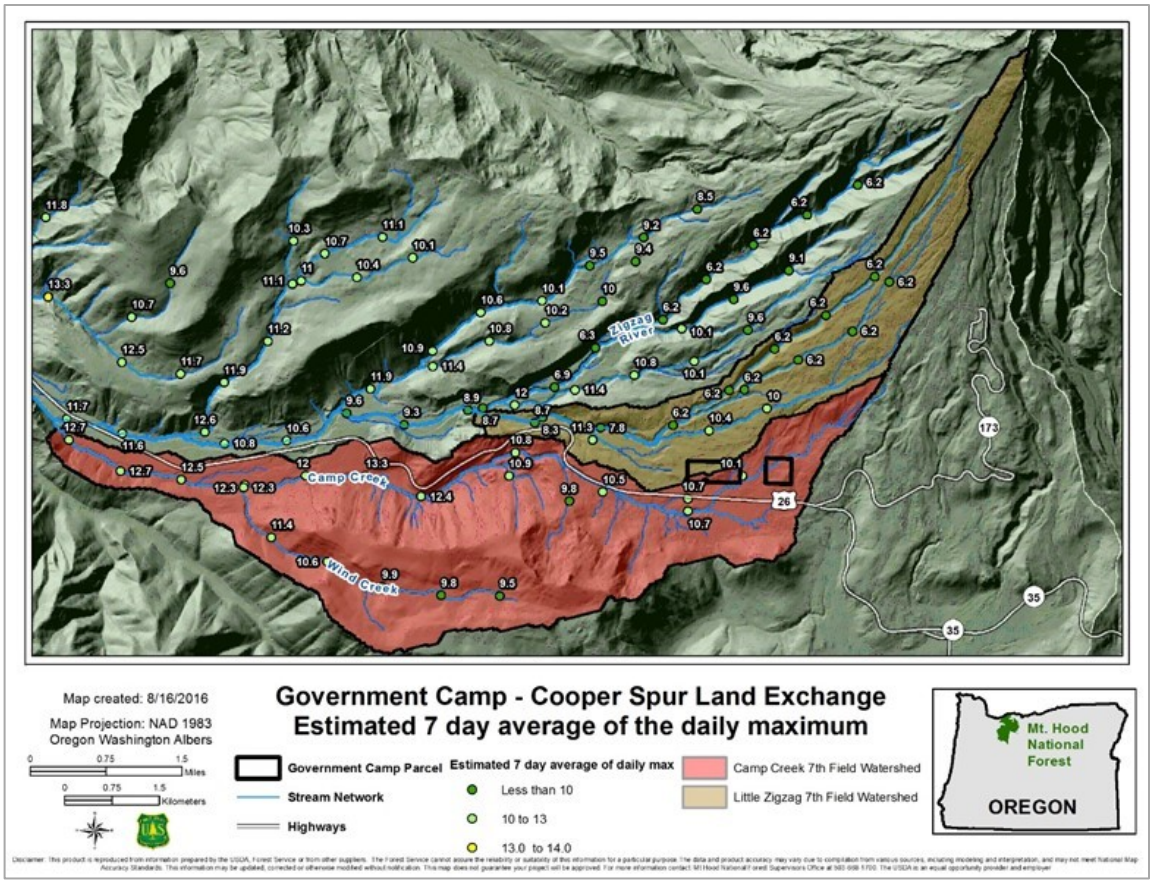

Figure 29. Zigzag Canyon 6th field watershed NorWest stream temperatures adjusted to estimate daily maximum for 2002 through 2011

The map depicted in figure 29 details an estimated 7-day average of the daily maximum with a maximum temperature in Camp Creek of 13.3 °C and in the Little Zigzag River of 8.9 °C, which are both below the 16 °C temperature standard for the period after June 15.

Resource Indicator and Measure: Riparian Shading and Habitat- Aquatic and Riparian Effectiveness Monitoring Program

Riparian conditions play a key role in a number of aquatic processes, including the effect of shading on stream temperatures, roots on bank stability, and the provision of habitat for a number of species. The AREMP model rates the condition of these processes using the average of two indicators: riparian vegetation condition and riparian road density (Miller et al. 2015).

For this indicator, the Zigzag Canyon sub-watershed was rated as Properly Functioning and the Middle East Fork Hood River sub-watershed as Functioning at Risk.

Resource Indicator and Measure: Sediment

For this analysis sediment delivery associated with natural background levels from landslides, wildfires, road surfaces, highway sanding and land use were examined.

Resource Indicator and Measure: Sediment Production and Delivery- Aquatic and Riparian Effectiveness Monitoring Program

High rates of sediment delivery to streams from episodic mass wasting events such as landslides and erosion have been shown to have detrimental effects on salmonids and other aquatic biota. Natural rates for these processes are determined by a variety of factors, including slope, concavity, soils, geology, geomorphology, and precipitation. Within the range of the northern spotted owl, Federal forest management affects these rates primarily through road and vegetation disturbances. To evaluate the process of sedimentation production and transport, the AREMP model used the difference between an estimated background rate of sediment delivery and the rate estimated given the status of road and vegetation disturbances (Miller et al. 2015).

For this indicator, the Zigzag Canyon sub-watershed was rated as Functioning at Risk and the Middle East Fork Hood River sub-watershed was rated as Not Properly Functioning.

Resource Indicator and Measure: Sediment Production and Delivery Mass Wasting

Mass wasting is a natural process that occurs to some extent in most forested basins in the Pacific Northwest. The time scale (relative or absolute) of mass wasting in a basin is important to an understanding of the sediment mass balance of a watershed. Mass wasting events may occur on a return interval of one or two years, decades, centuries, or even millennia. While the smaller, more frequent events may cause the fresh scars to be visible on the landscape, the larger, infrequent events are probably the real shapers of the landscape. Both types of landslides are influential in their impact on physical resources. In a natural, unmanaged forested basin, the dynamic replenishment of material to the channels by mass wasting is essential to the diversity and health of the ecosystem (DNR 2011b).

Not all landslides deposit sediment directly in streams; sediments may be deposited on floodplains, glacial or alluvial terraces, or foot slopes, without reaching a stream. However, as basin area increases, the cumulative probability of either one small landslide entering a stream or one small failure triggering a debris torrent with catastrophic impact on habitat conditions increases (DNR 2011b).

A forestwide map of landslide risk was compiled in 2000, from the geomorphic mapping completed during watershed analysis. Each watershed, and eventually the entire Forest, had been divided into geomorphic map units, primarily based on geologic unit and slope angle. Each geomorphic map unit had then been assigned a qualitative descriptor of its propensity for landslides (high, medium, or low). The assignment of this adjective was based on landslide inventories. The map lumps all landslide types together (USDA Forest Service 2003).

Table 34 identifies the landslide risk in the 7th field watersheds associated with the project based on the forestwide map of landslide risk.

Table 34. Landslide risk percentages by sub-watershed

7th Field Watershed	High	Moderate	Low	Unclassified
Camp Creek	15%	24%	61%	
Little Zigzag	0%	7%	85%	9%
Crystal Springs	1%	26%	74%	
Tilly Jane Creek	9%	16%	75%	
East Fork Hood River	24%	31%	45%	
East Fork Hood River (Lower Reach)	35%	22%	43%	

Using sediment delivery rates from undisturbed forested areas in an area classified as an unstable zone in the H.J. Andrews Experimental Forest (Swanson and Dyrness 1975) sediment delivered from the unstable zones (areas classified as high landslide risk) was estimated for the 7th field watersheds associated with project.

Table 35. Natural background levels of sediment yield from mass wasting

7th Field Watershed	Estimated Natural Background from Slides (cubic yards per year)
Camp Creek	420
Little Zigzag	0
Crystal Springs	6
East Fork Hood River	644
East Fork Hood River (Lower Reach)	497
Tilly Jane Creek	117

Resource Indicator and Measure: Sediment Production and Delivery Wildfires

Besides substantially altering hydrologic processes, wildfire has been shown to affect water quality by increasing rates of erosion and sedimentation and increasing the concentrations of nutrients and other water quality constituents. Generally, the largest effects on water quality are directly or indirectly rated to increases in erosion and sedimentation.

In a recent study (Moody and Martin 2009), measurements of post-fire sediment, erosion, transport, and deposition collected within 2 years of a wildfire were compiled from the published literature (1927 to 2007) for sites across the western United States. Post-fire sediment yields for each method were then grouped into eight different rainfall regimes. Mean sediment yield from channels (approximately 106 tons per acre) was significantly greater than from hillslopes (approximately 36 tons per acre). This indicated that on the time scale of wildfire (10 to 100 years) channels were the primary sources of available sediment. A lack of correlation of sediment yield with topographic slope and soil erodibility further suggested that sediment availability may be more important than slope or soil erodibility in predicting post-fire sediment yields. Based on 80 years of data from the literature, wildfires have been an important geomorphic agent of landscape change when linked with sufficient rainfall. These effects are limited in spatial scale to the immediate burned area and to downstream channel corridors. (Moody and Martin 2009)

There have been no large fires (greater than 5 acres) in the 7th field watersheds associated with the land exchange parcels from 2010 to the present. The Gnarl Ridge fire, which burned 1,266 acres in the Tilly Jane 7th field watershed, was in 2008.

Published sediment yields after wildfires vary from 0.01 to over 110 Mg ha-1 year-1 (0.004 to 48 tons per acre per year) in the first post-fire year, decrease by an order of magnitude the following year, and recover, with no measurable erosion, by the fourth year (Robichaud and Brown 2005). The Gnarl Ridge fire has had eight winter runoff periods, and based on Robichaud and Brown (2005), that would be the timeframe where there would be no measureable erosion associated with the wildfire.

Burned Area Emergency Response (BAER) treatments in conjunction with natural recovery of the area have minimized negative wildfire effects on area streams. Tilly Jane Creek drains the watershed that was the most severely burned by the Gnarl Ridge fire. Major negative effects from higher runoff and high sediment loading were not readily apparent in a 2015 field visit. The most noticeable effect was the increased amount of small limbs in the channel, likely from the wood loading transported from the burned area just upstream (USDA Forest Service 2016).

Resource Indicator and Measure: Hydrologic Sediment Production and Delivery-Roads

Road networks in many upland areas of the Pacific Northwest are the most important source of management-accelerated delivery of sediment to anadromous fish habitats. The sediment contribution to streams from roads is often much greater than that from all other land management activities combined, including log skidding and yarding. Road related land sliding, surface erosion and stream channel diversions frequently deliver large quantities of sediment to streams, both chronically and catastrophically during large storms. Roads may have unavoidable effects on streams, no matter how well they are located, designed or maintained. Many older roads with poor locations and inadequate drainage control and maintenance pose high risks of erosion and sedimentation of stream habitats (USDA Forest Service 1993).

Sediment yield associated with the existing road system was estimated for 7th field watersheds using the Geomorphic Roads Analysis and Inventory Package (GRAIP-Lite) model.

The Geomorphic Roads Analysis and Inventory Package is designed to determine the impacts of road systems on erosion and sediment delivery to streams. As the name implies it couples an inventory with analytical tools to build an approach to roads analysis that can be locally calibrated in a repeatable fashion with minimal effort. The full scope of GRAIP includes methods to inventory roads and analyze the inventory for surface erosion, gully risk, and landslide risk; methods to measure surface erosion from sample sites; and methods to estimate surface erosion where no inventory has been taken (NetMap Tools Technical Help Guide).

GRAIP-Lite is the GIS version of GRAIP and it was designed to quickly prioritize watersheds based on approximated road-related sediment production and delivery. It requires a road layer embedded within a GIS. In NetMap, the road layer is integrated within a digital terrain model. GRAIP-Lite requires calibration datasets to calculate road erosion and they are included in NetMap’s GRAIP interface. Users are encouraged to apply the full GRAIP technology to develop calibration datasets for their own landscapes (NetMap Tools Technical Help Guide).

Road sediment production is predicted by: $E = B*R*S*V$

E is road sediment production (kg/yr), B is the base road surface erosion rate, R is the elevation difference between the road segment end points, S is the road surface factor and V is the vegetation factor. V and therefore E are calculated separately for each combination of road surface type and road maintenance level. V = 1 - 0.86x where x is the fraction of the road where flow path vegetation is greater than 25 percent (NetMap Tools Technical Help Guide).

Once road sediment production is calculated (E), the proportion that is delivered to streams is highly sensitive to the distance of the road to the stream. NetMap calculates the distance of each road segment to the corresponding stream segment that it drains into. Field studies during GRAIP analyses have indicated a significant reduction in sediment delivery with increasing distance of the road from the stream. The average of those curves is used in NetMap's GRAIP tool to predict the fractional proportion of sediment delivery to streams from forested roads. The effect of distance to stream is significant: roads located less than 200 meters from a stream are predicted to deliver greater than 40 percent of sediment to stream channels; roads located greater than 200 meters from streams are predicted to delivery approximately less than 5 percent of sediment (NetMap Tools Technical Help Guide).

Figure 30. Fractional sediment delivery curve used in NetMap's GRAIP tool (NetMap Tools Technical Help Guide)

This model was selected because it allows for standardized and repeatable calculations of road surface erosion using the standard Forest Service road network GIS dataset.

Presentation of the GRAIP-Lite model results are intended to provide a means of comparing existing conditions with the proposed project in which both existing and proposed actions utilize the same assumptions and to give a comparison in broad terms of natural to management related sediment yields within the project area. As with the Washington State Road Surface Erosion Model (Dubé et al. 2004) it is appropriate to look at the relative differences in erosion estimates

when comparing watershed areas or road segments, but the sediment values should always be regarded as estimates not absolute values. Any predicted runoff or erosion value—by any model—will be, at best, within plus or minus 50 percent of the true value. Erosion rates are highly variable, and the models predict only a single value. Replicated research has shown that observed erosion values vary widely for identical plots, and for the same plot from year to year (Elliot et al. 2000).

The road network used to estimate the sediment yield for the existing road system was the Forest Service road network dataset and where it was not available the BLM ground transportation dataset and the Clackamas County roads dataset were used.

Table 36. Estimated sediment yield from the existing road system

7th Field Watershed	Estimated tons of Sediment Delivery per year from the existing road system road surface erosion
Camp Creek	42.4
Little Zigzag	0.6
Crystal Springs	37.9
East Fork Hood River	36.0
East Fork Hood River (Lower Reach)	10.5
Tilly Jane Creek	20.3

The 1995 Zigzag Watershed Analysis characterized sediment sources and sediment delivery to the stream system associated with Highway Sanding that is used to improve vehicle traction. There was 2,102 tons per year of sediment delivery estimated for the Camp Creek 7th field watershed and 406 tons per year of sediment delivery estimated for the Zigzag/Little Zigzag Canyon watershed. There are no highways adjacent to the Zigzag River so it is assumed that all highway sand in this area is delivered to the Little Zigzag River.

The 1996 East Fork Hood River and Middle Fork Hood River Watershed Analyses (USDA Forest Service 1996) did not quantify sediment delivery associated with road sanding but did address the issue.

> The effect of sanding for winter transportation safety within the East and Middle Forks of the Hood River is observed primarily on Highway 35, the access roads to the Mt. Hood Meadows and Hood River Meadows ski areas and their respective parking lots. The Oregon Department of Transportation places approximately 1,000 cubic yards of aggregate a year on the portion of Highway 35 from Parkdale to Bennett Pass. The same amount (1,000 cubic yards) is used to sand the 3.6 miles of access roads to Mt. Hood Meadows Hood River Meadows (Forest Service roads 3555 and 3545) and the 19.3 acres of parking area.
>
> Within the Cooper Spur parcel 7th field watersheds the East Fork of Hood River which parallels Highway 35 has the greatest potential for sediment input from highway sanding. Crystal Springs Creek, Ash Creek and Tilly Jane Creek cross Highway 35 at a 90 degree angle minimizing the area where sand from the highway can enter these creeks.

Resource Indicator and Measure: Sediment Production and Delivery- Land Use

The Geospatial Interface for the Water Erosion Prediction Project (GeoWEPP) is based on the WEPP model, a spatial erosion modeling tool that is widely accepted for soil erosion, runoff and sediment yield prediction in forests, woodlands, shrublands, grasslands, rangelands, and agricultural lands (Renschler and Elliot 2006). GeoWEPP models erosion and sediment yield using site specific spatial information for topography, land use and soils while using local climate data.

For this project GeoWEPP was used to model the Government Camp parcels to establish a baseline for sediment yield in an area where under the proposed action there are changes in land use from forested land to developed areas. In order to isolate the potential impacts associated with the project smaller watersheds were established to focus on the potential changes in land use. The Cooper Spur parcels were not modeled because there are no ground-disturbing activities proposed for the Cooper Spur parcels. The average annual sediment discharge from the outlet includes contributions from hillslope and channel soil loss.

Table 37. Average annual sediment discharge from outlet associated with land use

Modeled Area	Acres	Average annual. sediment discharge from outlet (tons)
Camp Creek Catchment 1	481.7	151.8
Camp Creek Catchment 2	14.0	1.1
Camp Creel Catchment 3	10.3	0.4
Camp Creek Total	506	153.3
Unnamed Tributary to Little Zigzag River Catchment 1	96.4	22.8
Unnamed Tributary to Little Zigzag River Catchment 2	8.7	0.4
Unnamed Tributary to Little Zigzag Total	105.1	23.3

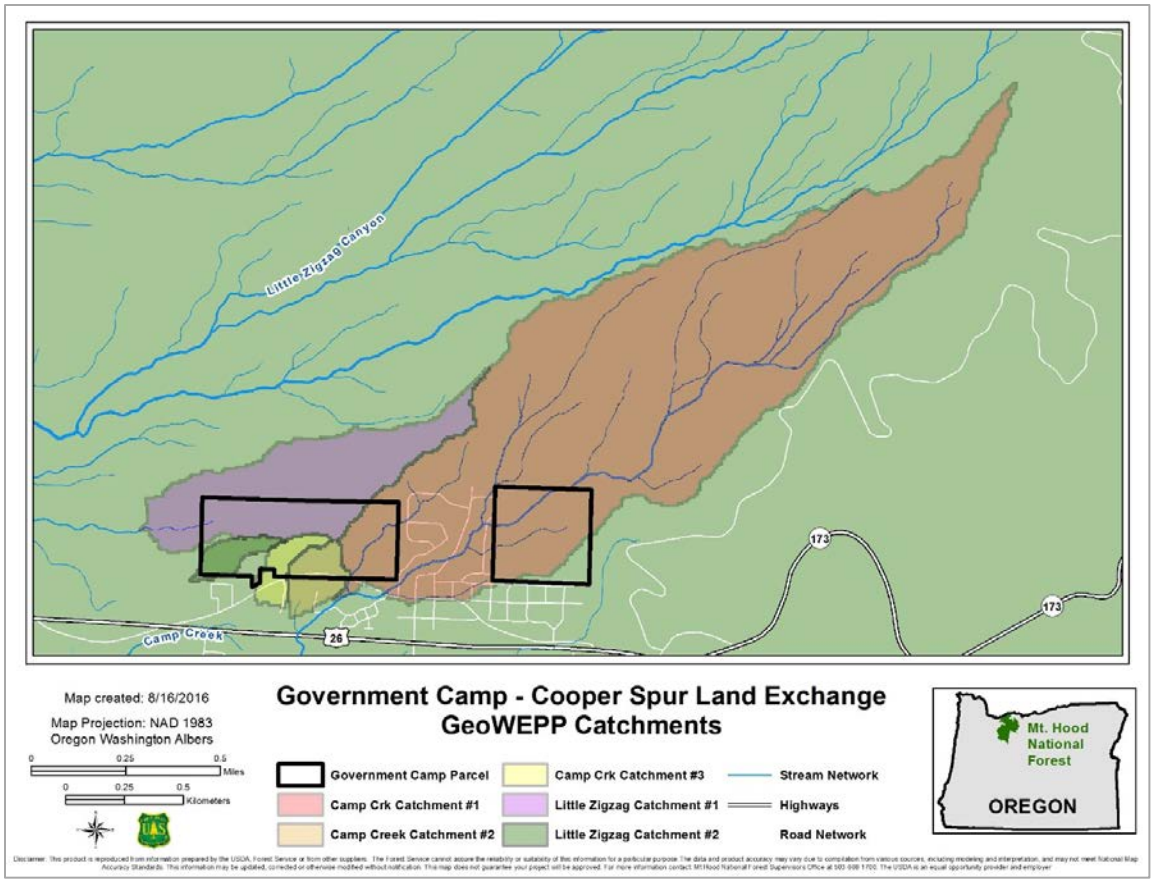

Figure 31. GeoWEPP modeled catchments

Resource Indicator and Measure: Sediment- In-Channel Fine Sediment Levels

In-channel fine sediment was evaluated based on stream surveys. Areas where surface fines (material less than 6 millimeters) exceed 20 percent of the substrate were identified. The threshold of concern for fine sediment is based on the relationship of embryo survival and percentage of substrate particles less than 6.35 millimeters for chinook, kokanee, rainbow, cutthroat and steelhead trout (Bjorn and Reiser in Meehan 1991). Above 20 percent surface fines, the survival of salmonid embryos decreases rapidly in that study.

The Mt. Hood Forest Plan (USDA Forest Service 1990) Standards FW-097 and FW-098 state: “Spawning habitat (e.g., pool tailouts and glides) shall maintain less than 20 percent fine sediments (i.e., particles less than 1.0 millimeter in diameter) on an area-weighted average. The area considered within the average should include only the stream reaches available for vegetative manipulation (e.g., Wilderness areas should not be included).” Stream surveys complete pebble counts in representative riffles (areas not considered “spawning habitat”) so the Mt. Hood Forest Plan Standards FW-097 and FW-098 would not appear to apply in these areas since they are not spawning habitat (e.g., pool tailouts and glides). Mt. Hood Forest Plan Standards FW-099 and FW-100 state: “Riffle areas shall maintain less than 25 percent embeddedness on an area-weighted average. The area considered within the average should include only the stream reaches available for vegetative manipulation,” so this would appear to be the standard used to assess fine sediment levels associated with stream surveys. The smallest material measured during stream surveys is 2 millimeters, so it is used to define fine sediment associated with the Forest Plan standards

Table 38. In-channel fine sediment levels in surveyed streams

Stream Reach	Year Surveyed	% Less than 2mm	% Less than 6mm
Camp Creek Reach 1	2011	14	16
Camp Creek Reach 2	2011	8	11
Camp Creek Reach 3	2011	22	22
Camp Creek Reach 4	2011	23	23
Camp Creek Reach 5	2011	3	3
Camp Creek Reach 6	2011	26	26
Camp Creek Reach 7	2011	23	25
Camp Creek Reach 8	2011	55	78
Little Zigzag River Reach 1	2000	13	17
Little Zigzag River Reach 2	2000	20	26
Little Zigzag River Reach 3	2000	22	26
Tilly Jane Creek Reach 1	1997	23	25
Tilly Jane Creek Reach 2	1997	58	61
Tilly Jane Creek Reach 3	1997	23	26
Doe Creek Reach 1	1997	26	32
Doe Creek Reach 2	1997	58	61
Doe Creek Reach 3	1997	45	57
Doe Creek Trib. Reach 1	1997	49	68
Doe Creek Trib. Reach 2	1997	22	27
Crystal Springs Crk Reach 1	2003	32	33

Forest Service stream surveys as far back as 1984 identify issues with fine sediment in Camp Creek, “A final factor which likely plays a negative role is heavy sedimentation in depositional areas, blanketing potential spawning and rearing habitat with sand.” The 1994 stream survey noted: high accumulations of silt and sand occurred throughout the stream with the highest accumulations observed adjacent to Camp Creek Campground (RM 1.7) and adjacent to Mirror Lake Trailhead (RM 5.8). High accumulations of silt were also noted in areas adjacent to summer homes, bridge crossings, road landings, stream segments running along Highway 26, and the Ski Bowl recreation site. It should be noted that sedimentation was observed even in areas where bank erosion was not evident. Sedimentation could be attributed to heavy road sanding on Highway 26 as well as bank erosion. It was not possible to distinguish between sediment originating from road sanding or eroding stream banks. Issues with fine sediment were noted again in the 2011 stream survey: an abundance of sand was noted mostly in the section from RM 2.2 to RM 5.9 in Camp Creek. Many of the pools had deep sand deposits.

The stream survey of Little Zigzag River in 1992 noted: The most outstanding features affecting the drainage appeared to be the fluctuating flow and the resultant sedimentation. The stream was glacially fed and evidence of flow fluctuations were common. The flashy flow seemed to have caused bank scour and increased siltation. The long stretches of exposed talus slopes above river mile 2.6 increased the sedimentation problem. Cobble substrate was estimated to be more than 35 percent embedded in the surrounding, smaller substrate in all but the lowermost 1.5 miles of stream. At the time of the survey, the turbidity prevented the collection of accurate fish

identification and distribution data. Human management activities appeared to have little impact on this stream. (USDA Forest Service 1992)

With respect to sedimentation the 1997 Tilly Jane Creek stream survey noted: several areas of large bank erosion were encountered during the survey. No immediate cause was determined for these areas of erosion. (USDA Forest Service 1997a)

The 1997 Doe Creek survey (USDA Forest Service 1997b) noted: Bank stability and erosion are not problems in Doe Creek or the tributary. It appears some down cutting was occurring with some slumping banks and undercut banks present. Reaches 1 and 3 had 0 percent unstable banks while Reach 2 had 1.5 percent unstable banks. These are well within the properly functioning conditions for the matrix of pathways and indicators from National Marine Fisheries Service (NMFS) (1996). Spawning gravels were available but sedimentation was a problem in a few areas mostly near roads.

Table 39. Matrix of pathways and indicators to evaluate properly functioning condition from NMFS 1996

Indicators	Properly functioning (PF)	At risk (AR)	Not properly functioning (NPF)
Streambank condition	>90% stable; i.e., on average, less than 10% of banks are actively eroding	80-90% stable	<80% stable

Environmental Consequences

Direct and Indirect Effects

Alternative 1- No Action

Resource Indicator and Measure: Overall Watershed Condition

Under the existing condition the AREMP watershed condition score indicates that both the Zigzag Canyon and Middle East Fork Hood River watersheds are in the functioning at risk categories. This category indicates that watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Under the no-action alternative the land exchange parcels and surrounding landscape would be managed under the same direction as the existing condition so it is expected that the watersheds would remain in the same condition.

Water Quantity

It is likely that past land management activities and wildfires in the 7th field watersheds associated with the Government Camp and Cooper Spur parcels have affected peak and base flows.

All of the subwatersheds, except Tilly Jane Creek are below the threshold of concern from "*The Effects of Forest Practices on Peak Flows and Consequent Channel Response Report*" (Grant et al. 2008). All the subwatersheds are below the threshold associated with the methodology for addressing cumulative watershed effects, watershed sensitivity, and hydrologic recovery associated with the Mt. Hood Forest Plan (USDA Forest Service 1990a). When the combined impacts of vegetation management and roads are examined, all the subwatersheds are rated as properly functioning in the 6th Field Watershed Condition from the "*Northwest Forest Plan–The First 20 Years (1994-2013) Watershed Condition Status and Trend Report*" (Miller et al. 2015).

Tilly Jane Creek watershed is above the threshold of concern from "*The Effects of Forest Practices on Peak Flows and Consequent Channel Response Report*" (Grant et al. 2008) due to vegetation loss from the Gnarl Ridge fire. However, indications of major increased peak flows such as channel bed instability or scour and channel bank erosion were not noted during field visits to Tilly Jane Creek just below the burned area (USDA Forest Service 2016).

Under the no-action alternative, the percentage of the watershed completely hydrologically recovered (in terms of ARP values) would continue to recover in terms of hydrologic recovery as young plantations grow and areas impacted by wildfire recover.

Under the no-action alternative, there would be no land exchange with associated development in the Government Camp parcels. There would not be a residential district with associated infrastructure including roads established in the Government Camp parcel, so there would be no additional risk of peak flow increases due to these activities.

In the Cooper Spur parcel, the Crystal Springs Watershed Special Resources Management Unit would not be established on the existing private lands, and riparian reserves would not be established on existing private land.

Resource Indicator and Measure: Hydrologic Processes Aquatic and Riparian Effectiveness Monitoring Program

The AREMP assessment factors in vegetative disturbance, roads and climate zone. Under the no-action alternative there is no planned vegetation disturbance, road construction or road decommissioning so the indicator would be expected to remain the same as the existing condition.

Since the impacts of vegetative removal though harvest and roads are essentially the same as those described in the existing condition and the climate zone stays the same the hydrologic process indicator is expected to stay the same as the existing condition.

Resource Indicator and Measure Base Streamflows Water Rights

Under the no-action alternative, there are no water uses planned, so this indicator would stay in the same condition as described in the existing condition.

Resource Indicator and Measure: Water Quality- Water Quality Limited 303(d) Streams

Little Zigzag Canyon (Little Zigzag River) from river mile 0 to 5.5 and East Fork Hood River from river mile 0 to 27.4 are 303(d) listed for biocriteria (waters of the state must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities). The biocriteria is based on macroinvertebrate communities in Oregon's perennial, wadeable streams.

The text below is from "*Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in The Pacific Northwest and Alaska*" (MacDonald et al. 1991).

> The effects of forest activities on macroinvertebrate communities vary. Increases in the riparian canopy opening or the amount of organic material in the streams generally enhance aquatic insect populations. An increase in fine sediment usually has the opposite effect. Removing the riparian canopy decreases the input of terrestrial organic material and the number of detritivores. However, this decline often is overwhelmed by the

corresponding increase in primary production and herbivorous insects. Several studies have documented an increase in primary productivity after partial or complete removal of the riparian canopy. However, no increase was found in Carnation Creek in coastal British Columbia, where phosphorus was found to be the limiting factor. Logging-induced increases in aquatic insects have been observed in northern California and the Oregon Cascades. While logging activities may increase total abundance, species diversity is usually reduced.

Invertebrate communities also are affected by management practices on forest lands. Buffer strips 30 meters wide appeared to protect in vertebrate communities from logging induced changes, but buffer strips 10 meters wide still resulted in a decrease in detrital inputs and macroinvertebrate densities. The net effect of logging on aquatic macroinvertebrates depends on the relative balance among all the controlling factors.

Primary shade zones (areas of riparian vegetation directly adjacent to streams) along perennial streams would continue to fill in with understory vegetation. Sediment delivery to streams in the project area would remain at current levels. It is anticipated that the macroinvertebrate community as assessed by Oregon Department of Environmental Qualities PREDictive Assessment Tool for Oregon would remain in the same range as the existing condition because primary shade zones and sediment inputs are anticipated to stay at the current levels.

Resource Indicator and Measure: Water Quality- Stream Temperature

Stream temperatures can be affected by processes that remove stream shade, alter channel structure, or alter the flow regime.

The natural watershed parameters that are most influential in determining stream temperature include: solar radiation, air temperature, stream width, stream depth, shading, and groundwater inflow. Forest practices can affect these parameters. For example, removal of riparian vegetation increases the solar radiation received by a stream reach; logging can alter streamflow, either decreasing or increasing summer low flows depending on local situations, and sedimentation can decrease channel depth and increase channel width (DNR 2011a).

Increased water temperature can often be traced to removal of shade-producing riparian vegetation along fish-bearing streams and along smaller tributary streams that supply cold water to fish-bearing streams. Removal of streambank vegetation has resulted largely from timber harvest in riparian areas (USDA Forest Service 1993).

Stream temperatures are anticipated to remain at current levels. Primary shade zones (areas of riparian vegetation directly adjacent to streams) along perennial streams would continue to fill in with understory vegetation as young plantations grow and areas impacted by wildfire recover. Since these areas are already densely vegetated, it is not anticipated that this component will reduce stream temperatures any great degree within the project area. Increased peak streamflows have the potential to erode the streambed and banks, however it was concluded in the Water Quantity Section of this report that current peak streamflows do appear to be adversely impacting stream channel morphology.

Resource Indicator and Measure: Riparian Shading and Habitat Aquatic and Riparian Effectiveness Monitoring Program

The AREMP model rates the condition of these processes using the average of two indicators: riparian vegetation condition and riparian road density (Miller et al. 2015). Under the no-action

alternative, there would be no land exchange with associated development in the Government Camp parcels that would remove riparian vegetation or create new roads in the riparian area. In the Cooper Spur parcel the Crystal Springs Watershed Special Resources Management Unit would not be established on the existing private lands and riparian reserves would not be established on existing private land. There are no earth-disturbing or vegetation management activities planned in this parcel. As riparian vegetation and road density will stay the same in both parcels the riparian shading and habitat processes rating would stay the same

Resource Indicator and Measure: Sediment

Under the no-action alternative there would be no land exchange with associated development in the Government Camp parcels. There would not be a residential district with associated infrastructure including roads established in the Government Camp parcel so there would be no additional sediment generated from new roads or changes in land use and sediment delivery would be the same as described in the existing condition.

In the Cooper Spur parcel the Crystal Springs Watershed Special Resources Management Unit would not be established on the existing private lands and riparian reserves would not be established on existing private land. There are no earth disturbing or vegetation management activities planned in this parcels so sediment delivery would be the same as described in the existing condition.

Resource Indicator and Measure: Sediment- In-Channel Fine Sediment Levels

Sediment delivery would be the same as that described in the existing condition. Peak streamflows are not at the level where increased bank erosion, channel scour, channel widening, and sedimentation are expected, so in channel fine sediment levels would be expected to remain at the same level as those described in the existing condition.

Table 40. Resource indicators and measures for the no-action alternative Government Camp Parcels

Resource Element	Resource Indicator	Measure	Area Analyzed	No Action
Watershed Condition	Upslope/Riparian Condition	AREMP[22] 6th Field Watershed Assessment	Zigzag Canyon 6th field watershed	Functioning at Risk
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	AREMP 6th Field Watershed Assessment	Zigzag Canyon 6th field watershed	Properly Functioning
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	2-year 24-hour storm event streamflow	Camp Creek 7th field watershed	323
			Little Zigzag 7th field watershed	296
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	Aggregate Recovery Percentage	Camp Creek 7th field watershed	89
			Little Zigzag 7th field watershed	98
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	Road Drainage Stream Network Enhancement	Camp Creek 7th field watershed	6%
			Little Zigzag 7th field watershed	1%
Water Quality, Riparian and Channel Function and Watershed Function	Water yield –base streamflows	Are more water rights allocated that than the D50 lowflow	Camp Creek subcatchment	Yes
			Little Zigzag 7th field watershed	No
Water Quality	Overall Water quality	Water quality limited streams	Camp Creek 7th field watershed	0
			Little Zigzag 7th field watershed	5.5
Water Quality	Stream Temperature	Stream temperature. Compliance with State standard	Camp Creek 7th field watershed	Yes
			Little Zigzag 7th field watershed	Yes
Water Quality	Sediment delivery land use	Tons per year delivered	Camp Creek 7th field watershed	153.3
			Little Zigzag 7th field watershed	23.3
Water Quality	Sediment delivery roads	Tons per year delivered	Camp Creek 7th field watershed	42.4
			Little Zigzag 7th field watershed	2.8
Water Quality	Sediment	In channel fine sediment levels. Number of stream reaches that exceed threshold	Camp Creek 7th field watershed	5
			Little Zigzag 7th field watershed	2
Water Quality	Riparian Processes Indicator	AREMP 6th Field Watershed Assessment	Zigzag Canyon 6th field watershed	Properly Functioning

[22] The NW Forest Plan watershed monitoring module (also known as the Aquatic and Riparian Effectiveness Monitoring Program or AREMP)

Table 41. Resource indicators and measures for the no-action alternative Cooper Spur Parcels

Resource Element	Resource Indicator	Measure	Area Analyzed	No Action
Watershed Condition	Upslope/Riparian Condition	AREMP[23] 6th Field Watershed Assessment	Middle East Fork Hood River 6th Field Watershed	Functioning at Risk
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	AREMP 6th Field Watershed Assessment	Middle East Fork Hood River 6th Field Watershed	Properly Functioning
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	2-year 24-hour storm event streamflow	Not assessed	
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	Aggregate Recovery Percentage	Crystal Springs 7th field watershed	91
			Tilly Jane Creek 7th field watershed	69
			E Fork Hood River 7th field watershed	93
			E Fork Hood River Lower 7th field watershed	93
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	Road Drainage Stream Network Enhancement	Crystal Springs 7th field watershed	7%
			Tilly Jane Creek 7th field watershed	13%
			E Fork Hood River 7th field watershed	12%
			E Fork Hood River Lower 7th field watershed	5%
Water Quality, Riparian and Channel Function and Watershed Function	Water yield –base streamflows	Are more water rights allocated that than the D50 lowflow	Crystal Springs 7th field watershed	Yes
			Tilly Jane Creek 7th field watershed	No
			E Fork Hood River 7th field watershed	No
			E Fork Hood River Lower 7th field watershed	No
Water Quality	Overall Water quality	Water quality limited streams (miles)	Crystal Springs 7th field watershed	0
			Tilly Jane Creek 7th field watershed	0
			E Fork Hood River 7th field watershed	6.4
			E Fork Hood River Lower 7th field watershed	3.4
Water Quality	Stream Temperature	Stream temperature. Compliance with State standards	Crystal Springs 7th field watershed	Yes
			Tilly Jane Creek 7th field watershed	Yes
			E Fork Hood River 7th field watershed	Yes
			E Fork Hood River Lower 7th field watershed	Yes

[23] The NW Forest Plan watershed monitoring module (also known as the Aquatic and Riparian Effectiveness Monitoring Program or AREMP)

Resource Element	Resource Indicator	Measure	Area Analyzed	No Action
Water Quality	Sediment delivery land use	Tons per year delivered	Not assessed	
Water Quality	Sediment delivery roads	Tons per year delivered	Crystal Springs 7th field watershed	37.9
			Tilly Jane Creek 7th field watershed	36.0
			E Fork Hood River 7th field watershed	10.5
			E Fork Hood River Lower 7th field watershed	20.3
Water Quality	Sediment	In channel fine sediment levels. Number of stream reaches	Crystal Springs 7th field watershed	1
			Tilly Jane Creek 7th field watershed	6
			E Fork Hood River 7th field watershed	Not assessed
			E Fork Hood River Lower 7th field watershed	Not assessed
Water Quality	Riparian Process Indicator	AREMP 6th Field Watershed Assessment	Middle East Fork Hood River 6th Field Watershed	Functioning at Risk

Alternative 2- Proposed Action

Resource Indicator and Measure: Overall Watershed Condition

The Government Camp Parcels contain 0.5 percent of the total land area of the Zigzag Canyon watershed and 0.8 percent of the riparian reserve area of the entire watershed. Due to the limited acreage associated with the proposed action it is assumed that the Zigzag Canyon watershed would stay in the functioning at risk category.

The land use in the Cooper Spur parcel would change from county zoning to Forest Service allocations including riparian reserves and the Crystal Springs Watershed Special Resources Management Unit. While these changes could be assumed to provide more protection to riparian resources, in the short term, it is assumed that the Middle East Fork Hood River watershed would stay in the functioning at risk category.

Water Quantity

Resource Indicator and Measure: Hydrologic Processes Aquatic and Riparian Effectiveness Monitoring Program

The AREMP assessment factors in vegetative disturbance, roads and climate zone. As detailed in this section the Aggregate Recovery Percentage is essentially the same as the existing condition and the stream drainage network enhancement is the same as the existing condition so the ratings for this indicator would be expected to remain the same (both the Zigzag Canyon and Middle East Fork Hood River rated as Properly Functioning).

Resource Indicator and Measure: Peak Streamflows- Wildcat5 Modeling

WildCat5 was used in the Government Camp parcel to assess changes in peak streamflows associated with the 2-year 24-hour precipitation event from changes in land use associated with converting the area from the existing condition to a residential district with the associated infrastructure.

Table 42. Predicted peak streamflows for the 2-year 24-hour precipitation event

Analysis Area	Acres	Peak Streamflow (cubic feet per second) Existing Condition	Peak Streamflow (cubic feet per second) Proposed Action	Percent Change
Camp Creek at Highway 26	441	23.8	28.9	21%
Camp Creek at Yocum Falls	2,073	109.5	121.1	11%
Camp Creek 7th Field	5,992	322.7	322.7	0%
Unnamed Tributary to Little Zigzag River below Enid Lake	196	7.1	12.3	73%
Unnamed Tributary to Little Zigzag River at confluence with Little Zigzag River	301	11.9	18.4	55%
Little Zigzag 7th Field	2,735	295.7	318.0	8%
Zigzag River at Lady Creek	6,403	721.4	721.4	0%

It is generally accepted that based on considerations of gage and measurement error at high-flow events, a minimum detectable change in peak flow (detection limit) of ±10 percent for site-scale analysis. Percentage changes in peak flow that fall in this range are within the experimental and

analytical error of flow measurement and cannot be ascribed as a treatment effect (Grant et al. 2008).

Peak streamflow increases above 10 percent have the potential to cause stream channel damage in the form of increased bank erosion, channel scour, channel widening, and sedimentation. (USDA Forest Service 2014). Recent studies (Grant et al. 2008) support the inference that when present, peak flow effects on channels should be confined to a relatively discrete portion of the stream network: stream reaches where channel gradients are less than approximately 2 percent and streambed and banks are gravel and finer material. Peak flow effects on channel morphology can be confidently excluded in high-gradient (slopes greater than 10 percent) and bedrock reaches, and are likely to be minor in most step-pool systems. On the other hand, if channels are gravel or sand-bedded, a more detailed hydrologic and geomorphic analysis may be warranted.

At the site scale both Camp Creek and the unnamed tributary to the Little Zigzag River have predicted peak streamflows increases above 10 percent and based on stream surveys on Camp Creek and the Little Zigzag River the dominant substrate is these areas is gravel and based on stream gradient from NetMap stream datasets there are sections of stream with gradients in the 2 to 4 percent range. Based on predicted increases in peak streamflows, streambed composition and stream gradient there may be impacts in the form of increased bank erosion, channel scour, channel widening, and sedimentation in these areas.

As the watershed size gets larger peak streamflow impacts are reduced in Camp Creek at the confluence with the Zigzag River and the Little Zigzag River at the confluence with the Zigzag River predicted peak flow increases are less than 10 percent.

Resource Indicator and Measure: Peak Streamflows - Aggregate Recovery Percentage
The following table details the change in Aggregate Recovery Percentage (ARP) values associated with project implementation that includes residential district development with associated infrastructure including roads in the Government Camp parcel.

Table 43. Hydrologic recovery proposed action [24]

Subwatershed	ARP (Impact Area) Existing Condition	ARP (Impact Area) Proposed Action
Camp Creek[25]	89 (11)	88 (12)
Little Zigzag River	98 (2)	97 (3)
Crystal Springs	91 (9)	91 (9)
Tilly Jane Creek	69 (31)	69 (31)
East Fork Hood River	93 (7)	93 (7)
East Fork Hood River Lower	93 (7)	93 (7)

The slight changes in ARP associated with the project would not likely cause any additional changes in stream channel stability or increases in peak flows beyond those described for the existing condition.

[24] ARP values for Crystal Springs, Tilly Jane Creek, East Fork Hood River, and East Fork Hood River Lower are from the Polallie Cooper Hazardous Fuels Reduction Project Draft Environmental Assessment (USDA 2016)
[25] The ARP values for Camp Creek and Little Zigzag River were calculated for the year 2018. For the analysis, it was assumed that the project would be implemented in 2018.

Resource Indicator and Measure: Peak Streamflows- Stream Drainage Network Extension
Stream channel network extension would stay the same as the current condition in all the 7th field watersheds. This is due to the limited number of stream crossings associated with implementation of the proposed action in the Government Camp Exchange parcels and that there are no new stream crossing associated with implementation of the proposed action in the Cooper Spur parcels.

Table 44. Percent increase in the length of the stream channel due to roads

Subwatershed[26]	Existing Condition	Proposed Action
Camp Creek	6%	6%
Little Zigzag River	1%	1%
Crystal Springs	7%	7%
Tilly Jane Creek	13%	13%
East Fork Hood River	12%	12%
East Fork Hood River Lower	5%	5%

Impacts associated with the proposed action with respect to stream drainage network extension would be the same as those described in the existing condition.

The effects of vegetation removal through harvest and roads are considered independent from each other and they are roughly additive so they should be integrated when assessing management effects on peak streamflows within a watershed (LaMarche and Lettenmaier 2001).

Since the impacts of vegetative removal though harvest and roads, as assessed by the Aggregate Recovery Percentage model and the stream drainage network extension model at the 7th field watershed scale, are essentially the same as those described in the existing condition the integrated impacts would be considered to be the same as those described in the existing condition (summarized below).

All of the subwatersheds, except Tilly Jane Creek, are below the threshold of concern from "*The Effects of Forest Practices on Peak Flows and Consequent Channel Response Report*" (Grant et al. 2008). All the subwatersheds are below the threshold associated with the methodology for addressing cumulative watershed effects, watershed sensitivity, and hydrologic recovery associated with the Mt. Hood Forest Plan (USDA 1990a). When the combined impacts of vegetation management and roads are examined, all the subwatersheds are rated as properly functioning in the 6th Field Watershed Condition from the "*Northwest Forest Plan–The First 20 Years (1994-2013) Watershed Condition Status and Trend Report*" (Miller et al. 2015).

Tilly Jane Creek watershed is above the threshold of concern from "*The Effects of Forest Practices on Peak Flows and Consequent Channel Response Report*" (Grant et al. 2008) due to vegetation loss from the Gnarl Ridge fire. However, indications of major increased peak flows such as channel bed instability or scour and channel bank erosion were not noted during field visits to Tilly Jane Creek just below the burned area (USDA Forest Service 2016).

[26] Values for Crystal Springs, Tilly Jane Creek, East Fork Hood River, and East Fork Hood River Lower are from the Polallie Cooper Hazardous Fuels Reduction Project Draft Environmental Assessment (USDA Forest Service 2016) and based on 350-foot spacing (the midpoint between the 200-foot and 500-foot culvert spacing values)

Resource Indicator and Measure: Base Streamflows- Water Rights
Water rights for the project were examined by 7th field watershed or in the case of Camp Creek a smaller watershed to focus in on the project area

Table 45. Water rights summary

Area	Acres	Water Rights	D50 Low-Flow[27]
Camp Creek	441	4.56 cubic feet per second (cfs)	2.26 cfs
Little Zigzag River	2,735	0.002 cfs	16.1 cfs
Crystal Springs Creek	1,881	7.16 cfs	5.41 cfs
Tilly Jane Creek	2,860	0.89 cfs	14.9 cfs

Both Camp Creek and Crystal Springs Creek have more water rights than the predicted 50th percentile annual low flow. However after further examination of the Camp Creek water rights it appears that out of the 4.56 cfs of water rights, 1.56 are for consumptive uses; so it appears that Camp Creek is not over allocated.

The Government Camp water system is an unmetered, spring-fed, gravity system. Average demand, peak demand, and pumping capacity figures are unavailable. It has been estimated that the current spring collection system produces a flow of about 720,000 gallons per day (gpd) (approximately 1.11 cfs). The Government Camp Water Company has the right to appropriate up to 969,475 gpd (approximately 1.5 cfs) (Oregon PUC 2002). The 20000 Master Plan for the Government Camp Water Company (citation) estimates daily water demand at 129,250 gpd (0.20 cfs).

Assuming that there would be approximately 250 additional residences in the Government Camp land exchange parcels associated with implementation of the proposed action and that the average American family of four uses 400 gallons of water per day (https://www3.epa.gov/watersense/pubs/indoor.html) this would result in an additional demand on the Government Camp Water system of 100,000 gallons per day or 0.15 cfs per day.

This is consistent with the 2000 Master Plan for the Government Camp Water Company (citation); “Based on existing and projected populations for the Government Camp community and assuming that the water supply facilities should be capable of delivering the maximum daily flow over a 24-hour period, the existing water supply need is 91 gallons per minute (gpm) (0.20 cfs) and the year 2020 water supply need is 247 gpm (0.55 cfs). The estimated water supply available from the existing spring collection system is approximately 500 gpm (1.11 cfs). This indicates that the capacity of the existing spring source and spring collection system is sufficient to meet existing and projected year 2020 water supply needs.”

The Government Camp Water Company has the water rights to 1.5 cfs and it is estimated that the current spring collection system produces 1.1 cfs; so it appears that there is adequate water available and that the implementation of the proposed action will not impact base streamflows in Camp Creek where there is an estimated 2.26 cfs for the D50 event.

Based on the Oregon Water Resources Department output, as with the existing condition there is no water available in Camp Creek at the confluence with the Zigzag River in July, August, September, October or November.

[27] Computed from USGS Oregon Streamstats site

There is a small stream network that is associated with the overflow from the Government Camp Water Companies 100,000-gallon water tank located in the eastern parcel of the Government Camp conveyance. One of the forks of this stream network supplies water to a wetland in the parcel. The current 100,000 gallon tank was installed in the early 1980s (Wentzl email); however, it is unclear if this stream network existed prior to the installation of the water tank. Drawings of the water system prior to the installation of the 100,000-gallon water tank indicate that the stream from the spring that supplies water to Government Camp Water Company flowed on the surface to a water supply pond in very close proximity to the current water tank that appears to feed the same stream network that the water tank does.

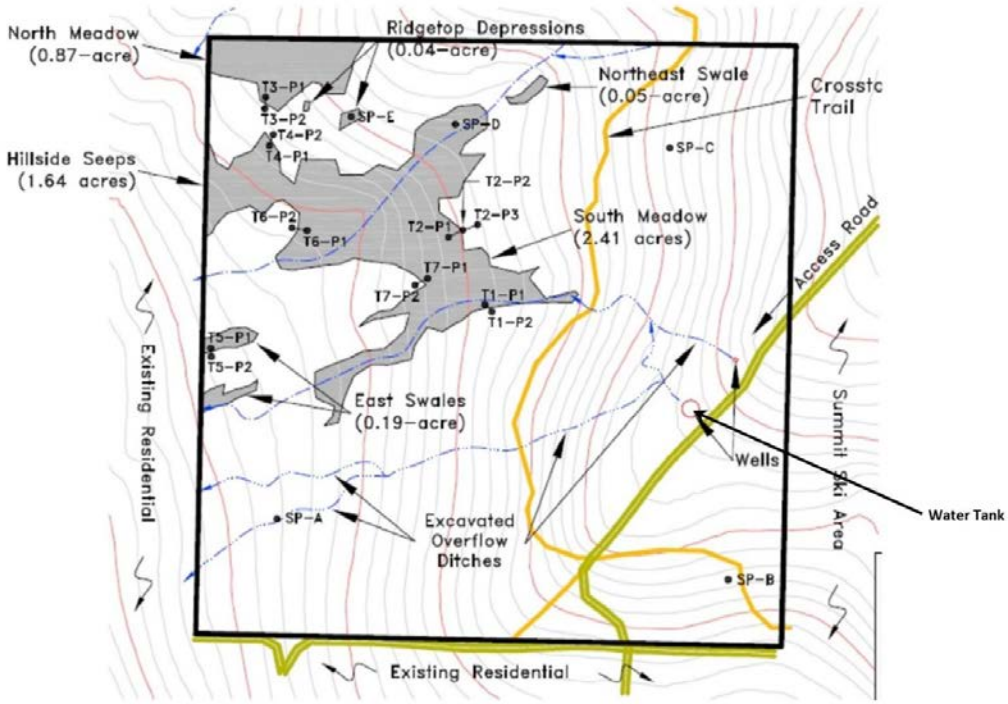

Figure 32. Government Camp conveyance eastern parcel stream network created from overflow of 100,000 gallon water tank (OR DSL 2007)

Figure 33. Overflow outlet of 100,000-gallon water tank

It is unclear how the proposed action may impact the stream network and associated wetlands that are currently supplied water from the overflow from the tank.

Based on the proposed action there would be no additional water demand in the Cooper Spur parcels.

Resource Indicator and Measure: Water Quality- Stream Temperature

The proposed action proposes to remove vegetation that is adjacent to streams. Vegetation removal near water bodies has the potential of increasing solar radiation to surface water which in turn may increase water temperature. Utilizing tools contained within the NW Forest Plan Temperature TMDL Implementation Strategies: Evaluation of the Northwest Forest Plan Aquatic Conservation Strategy (ACS) and Associated Tools (USDA Forest Service 2012) necessary vegetation that is providing shade so that stream temperatures within treatment areas will not increase as a result of the proposed vegetation treatments is identified. The previously mentioned document is the result of work between the USFS and the BLM and identifies how to maintain sufficient stream shading to meet the Clean Water Act Water Quality Objectives while providing the opportunity to treat Riparian Reserve vegetation to improve riparian conditions. The State of Oregon DEQ conditionally approved the Strategy in September 2005, as the temperature TMDL implementation mechanism under the CWA.

The concept of the sufficiency analysis associated with the "*Northwest Forest Plan (NWFP) Temperature TMDL Implementation Strategies: Evaluation of the Northwest Forest Plan Aquatic Conservation Strategy (ACS) and Associated Tools"* (USDA Forest Service 2012) is to maintain a primary shade zone of vegetation next to the stream and identify a secondary shade zone and other areas within the Riparian Reserves further away from the stream that can be treated to reach Riparian Reserve Objectives while maintaining stream temperatures. In order to maintain sufficient shade next to the stream, the primary shade zone is untreated. The size of this zone is dependent on the current height of the trees and the associated hill slope gradient. This relationship is shown in the table below.

Table 46. Width of primary shade zone (feet) based on slope (percent) and tree height (average height of stand in feet). Widths are measured by slope distance.

Tree Height	Hill Slope <30%	Hill Slope 30 to 60%	Hillslope >60%
Trees < 20 feet	12 feet	14 feet	15 feet
Trees 20 to 60 feet	28 feet	33 feet	55 feet
Trees >60 to 100 feet	50 feet	55 feet	60 feet
Trees >100 to 140 feet	70 feet	75 feet	85 feet

For the Government Camp conveyance, there are two perennial streams either in or adjacent to the eastern parcel and there is one perennial stream on the western end of the western parcel. Based on vegetation databases developed by the Landscape Ecology, Modeling, Mapping and Analysis (LEMMA) group at the USFS Pacific Northwest Research Station and Oregon State University, which is based on 2012 imagery, the tallest trees adjacent to the streams in the eastern land exchange parcel are approximately 90 feet tall and the hill slope gradient is less than 30 percent. Based on the width of the primary shade zone table, a 50-foot buffer would be adequate to protect the primary shade zone. Based on Clackamas County zoning ordinances for River and Stream Conservation Areas, the buffer on the eastern most stream in the eastern parcel would be 70 feet and the other stream would have a 50-foot buffer (with essentially a 70-foot buffer in the parcel due to the streams location and adjacent wetlands). These buffers would protect the primary shade zone.

The tallest trees adjacent to the stream in the western parcel are approximately 80 feet tall and the hill slope gradient is less than 30 percent. Based on the width of the primary shade zone table, a 50-foot buffer would be adequate to protect the primary shade zone. If the perennial stream in the western parcel does not have a stream buffer based on Clackamas County zoning ordinance for River and Stream Conservation Areas, in most but not all cases the adjacent wetlands would provide a 50-foot buffer.

With respect to smaller streams, relative to temperature effects, non-fish-bearing streams tend to be narrow channels in steeper constrained valleys. Near-stream vegetation and topographic features often shade the entire channel in such settings. In addition, water temperatures in headwater streams are strongly influenced by in-channel substrate (Reeves et al. 2016).

The perennial stream in the western parcel outside of the area zoned as buffer was assessed with Oregon Department of Environmental Qualities Shade-a-lator model (Boyd and Kasper 2003) for changes in effective shade (a measure of the percentage of total daily direct beam solar radiation that is blocked by vegetation or topography before reaching the stream surface) associated with implementation of the proposed action. Associated with the juxtaposition of the stream and the wetlands in this area, it was assumed that there would be no development on the east side of the stream. The model results indicated a reduction in effective shade from 95 percent to 72 percent in this area.

Due to the reduction in effective shade, there may be some slight increase in stream temperature in the 700-foot reach of stream in the land exchange parcel; however, where this stream joins Camp Creek, it is 7 percent of the flow of Camp Creek (based on NetMap stream reach data). Downstream at the closest stream temperature point associated with the NorWest dataset, the estimated 7-day average of the daily maximum stream temperature is 10.7 °C with the summer stream temperature standard in this area at 16 °C. The slight increase in stream temperature within the land exchange parcel is not expected to impact stream temperature downstream at the

closest point assessed by the NorWest dataset or potentially cause the stream to exceed stream temperature standards in this area.

Resource Indicator and Measure: Riparian Shading and Habitat- Aquatic and Riparian Effectiveness Monitoring Program

Riparian conditions play a key role in a number of aquatic processes, including the effect of shading on stream temperatures, roots on bank stability, and the provision of habitat for a number of species. The AREMP model rates the condition of these processes using the average of two indicators: riparian vegetation condition and riparian road density (Miller et al. 2015).

Associated with the development of the residential district in the Government Camp parcel there would be the loss of approximately 46 acres of Riparian Reserves (wetlands and stream conservation areas totaling approximately 12 acres would be established under Clackamas County zoning). There are approximately 7,272 acres of riparian reserves in the Zigzag Canyon 6th field watershed, so the loss of riparian reserves of 46 acres is 0.6 percent of the total acreage of Riparian Reserves and would not be expected to change the current rating from properly functioning to functioning at risk.

Resource Indicator and Measure: Sediment Production and Delivery- Aquatic and Riparian Effectiveness Monitoring Program

High rates of sediment delivery to streams from episodic mass wasting events such as landslides and erosion have been shown to have detrimental effects on salmonids and other aquatic biota. Natural rates for these processes are determined by a variety of factors, including slope, concavity, soils, geology, geomorphology, and precipitation. Within the range of the northern spotted owl, Federal forest management affects these rates primarily through road and vegetation disturbances. To evaluate the process of sedimentation production and transport, the AREMP model used the difference between an estimated background rate of sediment delivery and the rate estimated given the status of road and vegetation disturbances (Miller et al. 2015).

Under the proposed action, the only areas with road and vegetation disturbances are the Government Camp land exchange parcels where a residential district with associated infrastructure including roads would be built. Based on landslide risk from the forestwide map of landslide risk that was compiled in 2000, from the geomorphic mapping completed during watershed analysis (USDA Forest Service 2003) the Government Camp land exchange parcels are in an area classified as low landslide risk. Since there would be limited development associated with the proposed action and it is in an area of low landslide risk, it is assumed that the sediment production and delivery factor would remain the same as the existing condition.

For this analysis sediment delivery associated with natural background levels from landslides, wildfires, road surfaces, highway sanding and land use were examined.

Sediment delivery associated with natural background levels from landslides is expected to remain the same as that described in the existing condition because there are no earth disturbing activities in the high landslide risk or areas that drain directly into these areas (other than an approximately 600-foot section of Camp Creek approximately 150 feet upstream of the confluence of Camp Creek and the Zigzag River).

Sediment yield from wildfires is also expected to remain the same as that described for the existing condition.

Resource Indicator and Measure: Hydrologic Sediment Production and Delivery- Roads
GRAIP-Lite is used to quantify road-related sediment production and delivery. It requires a road layer embedded within a GIS. In NetMap, the road layer is integrated within a digital landscape. GRAIP-Lite requires calibration datasets to calculate road erosion and they are included in NetMap's GRAIP interface (NetMap Tools Technical Help Guide).

Presentation of the GRAIP-Lite model results are intended to provide a means of comparing existing conditions with the proposed action in which both existing and proposed actions utilize the same assumptions and to give a comparison in broad terms of natural to management related sediment yields within the project area.

As with the Washington Road Surface Erosion Model (Dubé et al. 2004) it is appropriate to look at the relative differences in erosion estimates when comparing watershed areas or road segments, but the sediment values in tons per year should always be regarded as estimates not absolute values.

Any predicted runoff or erosion value—by any model—will be, at best, within plus or minus 50 percent of the true value. Erosion rates are highly variable, and the models predict only a single value. Replicated research has shown that observed erosion values vary widely for identical plots, and for the same plot from year to year (Elliot et al. 2000).

Table 47. Estimated sediment yield from the existing road system

7th Field Watershed	Estimated tons of Sediment Delivery per year from the existing road system road surface erosion	Estimated tons of Sediment Delivery per year from the proposed road system road surface erosion
Camp Creek	42.4	42.8
Little Zigzag	2.8	3.1
Crystal Springs	37.9	37.9
East Fork Hood River	36.0	36.0
East Fork Hood River (Lower Reach)	10.5	10.5
Tilly Jane Creek	20.3	20.3

Table 48. Estimated changes in sediment yield from roads associated with the proposed action

Analysis Watershed	Proposed Action Change from No Action (tons/year)	Proposed Action Percent Change from No Action
Camp Creek	0.4	1%
Little Zigzag	0.3	11%
Crystal Springs	0	0%
East Fork Hood River	0	0%
East Fork Hood River (Lower Reach)	0	0%
Tilly Jane Creek	0	0%

Resource Indicator and Measure: Sediment Production and Delivery- Land Use
Changes in land use associated with the residential district with associated infrastructure including roads in the Government Camp land exchange parcels was used in GeoWEPP to determine any changes in average annual sediment output from the watershed outlet.

As with the Washington Road Surface Erosion Model (Dubé et al. 2004) it is appropriate to look at the relative differences in erosion estimates when comparing watershed areas, but the sediment values in tons per year should always be regarded as estimates not absolute values.

Any predicted runoff or erosion value—by any model—will be, at best, within plus or minus 50 percent of the true value. Erosion rates are highly variable, and the models predict only a single value. Replicated research has shown that observed erosion values vary widely for identical plots, and for the same plot from year to year (Elliot et al. 2000).

Table 49. Average annual sediment discharge from outlet associated with land use

Modeled Area	Acres	Existing Condition Average annual sediment discharge from outlet (tons/year)	Proposed Action Average annual sediment discharge from outlet (tons/year)
Camp Creek Catchment 1	481.7	151.8	177.9
Camp Creek Catchment 2	14.0	1.1	24.3
Camp Creel Catchment 3	10.3	0.4	20.8
Camp Creek Total	506	153.3	223.0
Unnamed Tributary to Little Zigzag River Catchment 1	96.4	22.8	28.8
Unnamed Tributary to Little Zigzag River Catchment 2	8.7	0.4	6.9
Little Zigzag Total	105.1	23.3	35.7

Table 50. Estimated changes in sediment yield from land use associated with the proposed action

Modeled Area	Change in annual sediment discharge from outlet (tons/year) associated with the proposed action	Percent change in annual sediment discharge from outlet associated with the proposed action
Camp Creek Catchment 1	26.1	17%
Camp Creek Catchment 2	23.2	2,109%
Camp Creel Catchment 3	20.4	5,100%
Camp Creek Total	69.7	45%
Unnamed Tributary to Little Zigzag River Catchment 1	6	26%
Unnamed Tributary to Little Zigzag River Catchment 2	6.5	1,625%
Little Zigzag Total	12.4	53%

Sediment Production and Delivery Summary

The table below compares all quantified sources of sediment that were estimated (these comparisons should only be used in a broad sense to understand the differences in scale between the different sources).

Table 51. Sediment yield

Analysis Watershed	Estimated Natural Background from Slides (tons per year)[28]	Estimated tons of Sediment Delivery per year from highway sanding	Estimated tons of Sediment Delivery per year from the existing road system	Estimated Increase in Sediment Yield from roads associated with implementation of the proposed action (tons per year)	Estimated Increase in Sediment Yield from land use associated with implementation of the proposed action (tons per year)
Camp Creek	504	2,102	42.4	0.4	69.7
Little Zigzag	0	406	2.8	0.3	12.4
Crystal Springs	7		37.9	0	0
East Fork Hood River	773		36.0	0	0
East Fork Hood River (Lower Reach)	596		10.5	0	0
Tilly Jane Creek	140		20.3	0	0

[28] Assumes 1.2 tons per cubic yard (the same ratio as was used for the 36 Pit Fire Burned Area Report)

Table 52. Comparison of background sediment yield to sediment yield associated with the proposed action

Analysis Watershed	Estimated Sediment Yield Current Condition (landslides, highway sanding, and roads)	Increased sediment yield from changes in the road network and land use associated with implementation of the proposed action	Percent increase in sediment yield from changes in the road network and land use associated with implementation
Camp Creek	2,648	70.1	3%
Little Zigzag	409	12.7	3%
Crystal Springs	45	0	0%
East Fork Hood River	809	0	0%
East Fork Hood River (Lower Reach)	607	0	0%
Tilly Jane Creek	161	0	0%

Implementation of the proposed action would result in a 3 percent increase in sediment yield from background levels in both the Camp Creek and Little Zigzag 7th field watersheds. The increase in sediment yield will be used to assess water quality limited 303(d) streams and in-channel fine sediment levels.

Resource Indicator and Measure: Water Quality- Water Quality Limited 303(d) Streams

Little Zigzag Canyon (Little Zigzag River) from river mile 0 to 5.5 and East Fork Hood River from river mile 0 to 27.4 are 303(d) listed for biocriteria (waters of the state must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities). The biocriteria is based on macroinvertebrate communities in Oregon's perennial, wadeable streams.

The text below is from "*Monitoring Guidelines To Evaluate Effects Of Forestry Activities On Streams In The Pacific Northwest And Alaska"* (MacDonald et al. 1991).

> The effects of forest activities on macroinvertebrate communities vary. Increases in the riparian canopy opening or the amount of organic material in the streams generally enhance aquatic insect populations. An increase in fine sediment usually has the opposite effect. Removing the riparian canopy decreases the input of terrestrial organic material and the number of detritivores. However, this decline often is overwhelmed by the corresponding increase in primary production and herbivorous insects. Several studies have documented an increase in primary productivity after partial or complete removal of the riparian canopy. However, no increase was found in Carnation Creek in coastal British Columbia, where phosphorus was found to be the limiting factor. Logging-induced increases in aquatic insects have been observed in northern California and the Oregon Cascades. While logging activities may increase total abundance, species diversity is usually reduced.
>
> Invertebrate communities also are affected by management practices on forest lands. Buffer strips 30 meters wide appeared to protect in vertebrate communities from logging induced changes, but buffer strips 10 meters wide still resulted in a decrease in detrital inputs and macroinvertebrate densities. The net effect of logging on aquatic macroinvertebrates depends on the relative balance among all the controlling factors.

For the Little Zigzag River peak flows at the 7th field level assessed with WildCat5, ARP, stream channel network extension, and the AREMP hydrologic processes indicator are all at a level where there were no adverse impacts that would result in bank erosion, channel scour, channel widening, and sedimentation. With respect to base streamflows there are no impacts anticipated from water withdrawals in the 7th field watershed. Stream temperatures are expected to remain at current levels. Sediment generation associated with the proposed action have the potential to impact the Little Zigzag River. Integrating the potential impacts to peak streamflows, base streamflows, temperature and sediment it is anticipated that the macroinvertebrate community as assessed by Oregon Department of Environmental Qualities PREDictive Assessment Tool for Oregon would remain in the same range as the existing condition or be slightly degraded because water quality conditions are anticipated to stay at the current levels or be slightly degraded.

The proposed action in the Cooper Spur parcels is not anticipated to have an impact on peak streamflows, base streamflows, temperature or sediment. Since there are no impacts anticipated to channel form or structure, stream temperature or sediment associated with implementation of the proposed action in the Cooper Spur parcel, it is anticipated that the macroinvertebrate community, as assessed by Oregon Department of Environmental Qualities PREDictive Assessment Tool for Oregon, would remain in the same range as the existing condition in the East Fork of Hood River.

Resource Indicator and Measure: Sediment- In-Channel Fine Sediment Levels

The table below details stream segments with fine sediment concerns and if the stream segment has the potential to be impacted by implementation of the proposed action. Both Camp Creek and Little Zigzag River have sediment inputs that may impact in channel fine sediment levels. Camp Creek has a potential of 70 tons per year delivery of sediment to the stream system in reach 8. Due to the existing high levels of sediment input into Camp Creek associated with highway sanding (2,102 tons per year) it is assumed that stream segments that are currently impacted will remain impacted and that the reaches that are not impacted will remain in that state because they most likely have high sediment transport capacity. Camp Creek reaches 2 and 5 that currently have lower levels of in-channel fine sediment are both classified as Rosgen B3a stream types (Rosgen 1996). The B3 stream types are moderately entrenched systems with channel gradients of 2 to 4 percent. B3 stream types are typically developed in very coarse alluvial fans, lag deposits from stabilized slide debris, rock- fall, talus, and very coarse colluvial deposits and structurally controlled drainage ways. The channel bed morphology is dominated by cobble materials and characterized by a series of rapids with irregular spaced scour pools. The channel materials are composed primarily of cobble with a few boulders, lesser amounts of gravel and sand. B3a stream types meet the criteria of a B3 channel, however, the stream gradient is greater than 4 percent. B3 stream types are characterized with a low sensitivity to disturbance (including increases in streamflow magnitude and timing and/or sediment increases). In the case of Camp Creek, it appears that the gradient greater than 4 percent is helpful in transporting the fine sediments through these stream reaches.

Currently, reach 1 of the Little Zigzag River is not at a level where fine sediment is a concern based on the 6-millimeter threshold from Bjorn and Reiser in Meehan 1991 or the 2-millimeter threshold associated with the Mt. Hood Land and Resource Management Plan standards. The subcatchment that is generating the most sediment (6.5 tons per year out of the total 12.5 tons per year) flows through two wetland complexes before it reaches the Little Zigzag River, so it is assumed that the 6.5 tons of sediment from this subcatchment would be deposited in the wetlands and not make it to the Little Zigzag River. Using the stream gradient associated with NetMap, there are no depositional reaches (stream reaches with less than a 2 percent gradient) between the catchment and reach 1 of the Little Zigzag River, so there is potential for additional fine sediment deposition in this reach that would cause fine sediment levels to exceed the 6-millimeter threshold from Bjorn and Reiser in Meehan 1991.

Table 53. In-channel fine sediment levels in surveyed streams

Stream Reach	Year Surveyed	% Less than 2 mm	% Less than 6 mm	Potential to be impacted by Project (reach is in or downstream of project activities)
Camp Creek Reach 1	2011	14	16	Yes
Camp Creek Reach 2	2011	8	11	Yes
Camp Creek Reach 3	2011	22	22	Yes
Camp Creek Reach 4	2011	23	23	Yes
Camp Creek Reach 5	2011	3	3	Yes
Camp Creek Reach 6	2011	26	26	Yes
Camp Creek Reach 7	2011	23	25	Yes
Camp Creek Reach 8	2011	55	78	Yes
Little Zigzag River Reach 1	2000	13	17	Yes
Little Zigzag River Reach 2	2000	20	26	No
Little Zigzag River Reach 3	2000	22	26	No
Tilly Jane Creek Reach 1	1997	23	25	Yes
Tilly Jane Creek Reach 2	1997	58	61	No
Tilly Jane Creek Reach 3	1997	23	26	No
Doe Creek Reach 1	1997	26	32	Yes
Doe Creek Reach 2	1997	58	61	Yes
Doe Creek Reach 3	1997	45	57	No
Doe Creek Trib. Reach 1	1997	49	68	Yes
Doe Creek Trib. Reach 2	1997	22	27	No
Crystal Springs Crk Reach 1	2003	32	33	Yes

Table 54. Resource indicators and measures for the proposed alternative Government Camp Parcels

Resource Element	Resource Indicator	Measure	Area Analyzed	No Action	Proposed Action
Watershed Condition	Upslope/Riparian Condition	AREMP[29] 6th Field Watershed Assessment	Zigzag Canyon 6th field watershed	Functioning at Risk	Functioning at Risk
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	AREMP 6th Field Watershed Assessment	Zigzag Canyon 6th field watershed	Properly Functioning	Properly Functioning
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	2-year 244hour storm event streamflow	Camp Creek 7th field watershed	323	323
			Little Zigzag 7th field watershed	296	318
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	Aggregate Recovery Percentage	Camp Creek 7th field watershed	89	88
			Little Zigzag 7th field watershed	98	97
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	Road Drainage Stream Network Enhancement	Camp Creek 7th field watershed	6%	6%
			Little Zigzag 7th field watershed	1%	1%
Water Quality, Riparian and Channel Function and Watershed Function	Water yield –base streamflows	Are more water rights allocated that than the D50 lowflow	Camp Creek subcatchment	Yes	Yes
			Little Zigzag 7th field watershed	No	No
Water Quality	Overall Water quality	Water quality limited streams	Camp Creek 7th field watershed	0	0
			Little Zigzag 7th field watershed	5.5	5.5
Water Quality	Stream Temperature	Stream temperature. Compliance with State standard	Camp Creek 7th field watershed	Yes	Yes
			Little Zigzag 7th field watershed	Yes	Yes
Water Quality	Sediment delivery land use	Tons per year delivered	Camp Creek 7th field watershed	153.3	223
			Little Zigzag 7th field watershed	23.3	35.7
Water Quality	Sediment delivery roads	Tons per year delivered	Camp Creek 7th field watershed	42.4	42.8
			Little Zigzag 7th field watershed	2.8	3.1
Water Quality	Sediment	In channel fine sediment levels. Number of stream reaches that exceed threshold	Camp Creek 7th field watershed	5	5
			Little Zigzag 7th field watershed	2	2
Water Quality	Riparian Processes Indicator	AREMP 6th Field Watershed Assessment	Zigzag Canyon 6th field watershed	Properly Functioning	Properly Functioning

[29] The NW Forest Plan watershed monitoring module (also known as the Aquatic and Riparian Effectiveness Monitoring Program or AREMP)

Table 55. Resource indicators and measures for the proposed action alternative Cooper Spur Parcels

Resource Element	Resource Indicator	Measure	Area Analyzed	No Action	Proposed Action
Watershed Condition	Upslope/Riparian Condition	AREMP[30] 6th Field Watershed Assessment	Middle East Fork Hood River 6th Field Watershed	Functioning at Risk	Functioning at Risk
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	AREMP 6th Field Watershed Assessment	Middle East Fork Hood River 6th Field Watershed	Properly Functioning	Properly Functioning
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	2-year 24-hour storm event streamflow	Not assessed		
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	Aggregate Recovery Percentage	Crystal Springs 7th field watershed	91	91
			Tilly Jane Creek 7th field watershed	69	69
			E Fork Hood River 7th field watershed	93	93
			E Fork Hood River Lower 7th field watershed	93	93
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	Road Drainage Stream Network Enhancement	Crystal Springs 7th field watershed	7%	7%
			Tilly Jane Creek 7th field watershed	13%	13%
			E Fork Hood River 7th field watershed	12%	12%
			E Fork Hood River Lower 7th field watershed	5%	5%
Water Quality, Riparian and Channel Function and Watershed Function	Water yield – base streamflows	Are more water rights allocated that than the D50 lowflow	Crystal Springs 7th field watershed	Yes	Yes
			Tilly Jane Creek 7th field watershed	No	No
			E Fork Hood River 7th field watershed	No	No
			E Fork Hood River Lower 7th field watershed	No	No
Water Quality	Overall Water quality	Water quality limited streams (miles)	Crystal Springs 7th field watershed	0	0
			Tilly Jane Creek 7th field watershed	0	0
			E Fork Hood River 7th field watershed	6.4	6.4
			E Fork Hood River Lower 7th field watershed	3.4	3.4
Water Quality	Stream Temperature	Stream temperature. Compliance with State standards	Crystal Springs 7th field watershed	Yes	Yes
			Tilly Jane Creek 7th field watershed	Yes	Yes
			E Fork Hood River 7th field watershed	Yes	Yes
			E Fork Hood River Lower 7th field watershed	Yes	Yes

[30] The NW Forest Plan watershed monitoring module (also known as the Aquatic and Riparian Effectiveness Monitoring Program or AREMP)

Resource Element	Resource Indicator	Measure	Area Analyzed	No Action	Proposed Action
Water Quality	Sediment delivery land use	Tons per year delivered	Not assessed		
Water Quality	Sediment delivery roads	Tons per year delivered	Crystal Springs 7th field watershed	37.9	37.9
			Tilly Jane Creek 7th field watershed	36.0	36.0
			E Fork Hood River 7th field watershed	10.5	10.5
			E Fork Hood River Lower 7th field watershed	20.3	20.3
Water Quality	Sediment	In channel fine sediment levels. Number of stream reaches	Crystal Springs 7th field watershed	1	1
			Tilly Jane Creek 7th field watershed	6	6
			E Fork Hood River 7th field watershed	Not assessed	Not assessed
			E Fork Hood River Lower 7th field watershed	Not assessed	Not assessed
Water Quality	Riparian Processes Indicator	AREMP 6th Field Watershed Assessment	Middle East Fork Hood River 6th Field Watershed	Functioning at Risk	Functioning at Risk

Proposed Action with Wetland Conservation Easements

The 2009 Omnibus Act prescribed as a mandatory condition to the land exchange that the Forest Service reserve wetland and trail easements on the Federal parcels to be exchanged. More specifically, the Omnibus Act required the Forest Service to reserve a conservation easement on the Federal land to protect existing wetlands, as identified by the Oregon Department of State Lands that allows equivalent wetland mitigation measures to compensate for minor wetland encroachments necessary for the orderly development of that land following the exchange. The Clarification Act (which is now the Proposed Action) changed this provision from "shall reserve" to "may mutually agree to reserve." Table 56 details the ratings for the resource elements at the 7th field watershed scale for no action, proposed action and an alternative that includes the wetland conservation easements. The Cooper Spur parcels were not assessed because the wetland conservation easements would have no effect on those parcels. The only resource element that is different between the proposed action and the wetland conservation easement alternatives at the 7th field watershed scale is the sediment delivery associated with land use. Implementation of the proposed action would result in an estimated 3 percent increase in sediment yield in the Camp Creek and Little Zigzag 7th field watersheds and implementation of the wetland conservation easement alternative would result in an estimated 2 percent increase in sediment yield in the Camp Creek and Little Zigzag 7th field watersheds.

Table 56. Resource indicators and measures for the proposed alternative Government Camp Parcels

Resource Element	Resource Indicator	Measure	Area Analyzed	No Action	Proposed Action	Wetland Conservation Easements
Watershed Condition	Upslope/Riparian Condition	AREMP[31] 6th Field Watershed Assessment	Zigzag Canyon 6th field watershed	Functioning at Risk	Functioning at Risk	Functioning at Risk
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	AREMP 6th Field Watershed Assessment	Zigzag Canyon 6th field watershed	Properly Functioning	Properly Functioning	Properly Functioning
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	2-year 24-hour storm event streamflow	Camp Creek 7th field watershed	323	323	323
			Little Zigzag 7th field watershed	296	318	318
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	Aggregate Recovery Percentage	Camp Creek 7th field watershed	89	88	88
			Little Zigzag 7th field watershed	98	97	97
Water Quality, Riparian and Channel Function and Watershed Function	Water yield Peak Streamflows	Road Drainage Stream Network Enhancement	Camp Creek 7th field watershed	6%	6%	6%
			Little Zigzag 7th field watershed	1%	1%	1%
Water Quality, Riparian and Channel Function and Watershed Function	Water yield –base streamflows	Are more water rights allocated that than the D50 lowflow	Camp Creek subcatchment	Yes	Yes	Yes
			Little Zigzag 7th field watershed	No	No	No

[31] The NW Forest Plan watershed monitoring module (also known as the Aquatic and Riparian Effectiveness Monitoring Program or AREMP)

Resource Element	Resource Indicator	Measure	Area Analyzed	No Action	Proposed Action	Wetland Conservation Easements
Water Quality	Overall Water quality	Water quality limited streams	Camp Creek 7th field watershed	0	0	0
			Little Zigzag 7th field watershed	5.5	5.5	5.5
Water Quality	Stream Temperature	Stream temperature. Compliance with State standard	Camp Creek 7th field watershed	Yes	Yes	Yes
			Little Zigzag 7th field watershed	Yes	Yes	Yes
Water Quality	Sediment delivery land use	Tons per year delivered	Camp Creek 7th field watershed	153.3	223	218
			Little Zigzag 7th field watershed	23.3	35.7	29.8
Water Quality	Sediment delivery roads	Tons per year delivered	Camp Creek 7th field watershed	42.4	42.8	42.8
			Little Zigzag 7th field watershed	2.8	3.1	3.1
Water Quality	Sediment	In channel fine sediment levels. Number of stream reaches that exceed threshold	Camp Creek 7th field watershed	5	5	5
			Little Zigzag 7th field watershed	2	2	2
Water Quality	Riparian Processes Indicator	AREMP 6th Field Watershed Assessment	Zigzag Canyon 6th field watershed	Properly Functioning	Properly Functioning	Properly Functioning

At the scale of the analysis areas used for Wildcat5 streamflow modeling and the catchments used for GeoWEPP sediment modeling there are some differences in peak streamflows and sediment yield between implementation of the proposed action and implementation of the proposed action with wetland conservation easements.

WildCat5 modeling of peak streamflows associated with the 2-year 24-hour precipitation event indicates that there is no difference between analysis areas between the proposed action and implementation of the proposed action with wetland conservation easements, except for the unnamed tributary to Little Zigzag River at confluence with Little Zigzag River where there is a 55 percent increase in peak streamflows under the proposed action and a 39 percent increase in peak streamflows when wetland conservation easements are added.

Table 57. Predicted peak streamflow for the 2-year 24-hour precipitation event with and without wetland conservation easements

Analysis Area	Acres	Peak Streamflow (cubic feet per second) Existing Condition	Peak Streamflow (cubic feet per second) Proposed Action	Peak Streamflow (cubic feet per second) Proposed Action with Wetland Conservation Easements
Camp Creek at Highway 26	441	23.8	28.9	28.9
Camp Creek at Yocum Falls	2,073	109.5	121.1	121.1
Camp Creek 7th Field	5,992	322.7	322.7	322.7
Unnamed Tributary to Little Zigzag River below Enid Lake	196	7.1	12.3	12.3
Unnamed Tributary to Little Zigzag River at confluence with Little Zigzag River	301	11.9	18.4	16.6
Little Zigzag 7th Field	2,735	295.7	318.0	318.0
Zigzag River at Lady Creek	6,403	721.4	721.4	721.4

Table 58. Percent change in the predicted Peak Streamflow for the 2-year 24-hour precipitation event with and without wetland conservation easements

Analysis Area	Percent Change Associated with Implementation of the Proposed Action	Percent Change Associated with Implementation of the Proposed Action with Wetland Conservation Easements
Camp Creek at Highway 26	21%	21%
Camp Creek at Yocum Falls	11%	11%
Camp Creek 7th Field	0%	0%
Unnamed Tributary to Little Zigzag River below Enid Lake	73%	73%
Unnamed Tributary to Little Zigzag River at confluence with Little Zigzag River	55%	39%
Little Zigzag 7th Field	8%	8%
Zigzag River at Lady Creek	0%	0%

GeoWEPP modeling of average annual sediment output from the watershed outlet indicates slight differences in sediment output when conservation easements are added in the Camp Creek catchments and larger differences in the Little Zigzag River catchments associated with unnamed tributary to Little Zigzag River catchment 1 where there is a 26 percent increase in sediment yield under the proposed action and no increase in sediment yield when the conservation easements are added to the proposed action.

Table 59. Average annual sediment discharge from outlet with and without wetland conservation easements

Modeled Area	Acres	Existing Condition Average annual sediment discharge from outlet (tons/year)	Proposed Action Average annual sediment discharge from outlet (tons/year)	Proposed Action with wetland conservation easements average annual sediment discharge from outlet (tons/year)
Camp Creek Catchment 1	481.7	151.8	177.9	173.4
Camp Creek Catchment 2	14.0	1.1	24.3	24.3
Camp Creel Catchment 3	10.3	0.4	20.8	20.8
Camp Creek Total	506	153.3	223.0	218.5
Unnamed Tributary to Little Zigzag River Catchment 1	96.4	22.8	28.8	22.8
Unnamed Tributary to Little Zigzag River Catchment 2	8.7	0.4	6.9	6.9
Little Zigzag Total	105.1	23.3	35.7	29.8

Table 60. Percent change in average annual sediment discharge from outlet with and without wetland conservation easements

Modeled Area	Percent change with the proposed action	Percent change with the proposed action with wetland conservation easements
Camp Creek Catchment 1	17%	14%
Camp Creek Catchment 2	2,109%	2,109%
Camp Creel Catchment 3	5,100%	5,100%
Camp Creek Total	45%	43%
Unnamed Tributary to Little Zigzag River Catchment 1	26%	0%
Unnamed Tributary to Little Zigzag River Catchment 2	1,625%	1,625%
Little Zigzag Total;	53%	28%

The major difference between the proposed action and the wetland conservation easements alternative is that currently reach 1 of the Little Zigzag River is not at a level where fine sediment is a concern based on the 6-millimeter threshold from Bjorn and Reiser in Meehan 1991 or the 2-millimeter threshold associated with the Mt. Hood Forest Plan standards. Under the wetland conservation easement alternative, it is assumed it would remain that way because the subcatchment that is generating sediment under this alternative flows through 2 wetland complexes before it reaches the Little Zigzag River, so it is assumed that the sediment from this subcatchment would be deposited in the wetlands and not make it to the Little Zigzag River.

Forest Plan Amendment Summary

A forest plan amendment is required to assign land use allocations to the acquired lands, and change the land use allocations for the new Tilly Jane Wilderness Addition and Crystal Springs Watershed Special Resource Management Unit.

The land use allocation for the acquired Cooper Spurs parcels would be Crystal Springs Watershed Special Resource Management Unit. Existing allocations for the Tilly Jane Wilderness Addition and the Crystal Springs Watershed Special Resource Management Unit are detailed in the tables below.

Tilly Jane Wilderness Addition

Current Mt. Hood Land and Resource Management Plan Dominant Allocation	Acres
Winter Recreation Area (A11)	1,109
Special Interest Area, Cloud Cap-Tilly Jane Historic District (A4)	492
Scenic Viewshed (B2)	108

Crystal Springs Watershed Special Resource Management Unit

Current Mt. Hood Land and Resource Management Plan Dominant Allocation	Acres
Winter Recreation Area (A11)	236
Special Interest Area, Cloud Cap-Tilly Jane Historic District (A4)	660
Scenic Viewshed (B2)	1,160
Timber Emphasis (C1)	34

The purposes of the Crystal Springs Watershed Special Resources Management Unit are to ensure the protection of the quality and quantity of the Crystal Springs watershed as a clean drinking water source for the residents of Hood River County, Oregon; and to allow visitors to enjoy the special scenic, natural, cultural, and wildlife values of the Crystal Springs watershed.

The goal of the lands in the Tilly Jane Wilderness Addition is to promote, perpetuate and preserve the wilderness character of the land; protect watersheds and wildlife habitat; preserve scenic and historic resources; and promote scientific research, primitive recreation, solitude, physical and mental challenge, and inspiration (forest plan, page 4-136).

Changing from land management allocations where watershed protection is not one of the primary goals to the new allocations where watershed protection is the primary or one of the primary goals would provide for the protection of water quantity and water quality in these areas.

Cumulative Effects

According to the Council on Environmental Quality's (CEQ) regulations for implementing NEPA, an action may cause cumulative impacts on the environment if its effects overlap in space and/or time with the effects of other past, present, or reasonably foreseeable future actions, regardless of what agency or person undertakes the action. Cumulative effects can result from individually minor, but collectively significant actions, taking place over a period of time (FERC 2006).

The Government Camp – Cooper Spur Land Exchange proposed action includes the conveyance of two parcels totaling approximately 109 acres of NFS lands currently within the Forest that are adjacent to Government Camp in exchange for the acquisition of approximately 769 acres of land owned by Mt. Hood Meadows Oregon, LLC. In this analysis, the parcels are referred to as the Government Camp parcel and the Cooper Spur parcel. There were no direct or indirect effects identified with the proposed action in the Cooper Spur parcel so cumulative effects in that area were not assessed.

The Government Camp parcel includes project activities in the Zigzag Canyon subwatershed (6th field watershed) and the Camp Creek and Little Zigzag River 7th field watersheds. The 7th field watersheds were selected as the area to assess cumulative effects. The boundaries for the cumulative effects analysis areas should be far enough downstream that direct effects from the Government Camp – Cooper Spur Land Exchange project would not likely be measurable.

The time frame used to include or exclude actions varies by the type of action. Some impacts are considered permanent with no modeled recovery including permanent roads, quarries and the power line right-of way. Some impacts such as regeneration harvest would recover gradually over approximately 35 years.

Table 61 provides a qualitative summary of potential cumulative watershed effects. It shows existing and potential projects, effects from those projects that may result in cumulative effects with the Government Camp – Cooper Spur Land Exchange Project, whether these projects overlap in time and space and a brief description of expected impacts from the project. Findings of this summary are supported by the analysis which utilizes pertinent research, design features and applicable management standards and guidelines.

Table 61. Cumulative Effects Summary for Hydrology

Project	Potential Effects	Overlap in		Extent, Detectable?
		Time	Space	
Mirror Lake Trailhead Relocation and Connector Trail	Sediment	Yes	Yes	The new trailhead is located outside the riparian reserves and designed to address storm water from the newly created impervious surfaces (less than 1 acre) with catch basins and sediment traps so there is no sediment delivery anticipated with the new trailhead and parking lot. The new connector trail crosses Camp Creek and 9 tributaries to Camp Creek and there will be channel spanning bridges at all the crossings, however the trail surface has potential to deliver sediment to Camp Creek and the 9 tributaries. Impacts would be at the site scale.
	Stream Temperature	Yes	Yes	The new trailhead is located outside the riparian reserves and is not expected to impact stream shade. The stream crossings with bridges of Camp Creek and the 9 tributaries will require some vegetation removal, however the removal of understory vegetation is not expected to impact stream shade. There is no expected increase in width/depth ratios for heavily used streamside recreation sites because of the bridges.
	Water Quantity	Yes	Yes	No effects anticipated associated with this activity
ODOT Highway 26 Safety Widening Project	Coarse and Fine Sediment	Yes	Yes	Ongoing work adjacent to Camp Creek and the small tributary to Camp Creek in the vicinity of Mirror Lake trailhead has the potential to directly delivery small amounts of sediment to the stream system at the site scale.
	Stream Temperature	Yes	Yes	A small intermittent tributary to Camp Creek has been rerouted and in the process is exposed to solar radiation and there is the potential for increased stream temperatures at the site scale.
	Water Quantity	Yes	Yes	No effects anticipated associated with this activity
Ongoing ODOT road maintenance, including snowplowing on NFS lands, Government Camp, and Highway 26	Coarse and Fine Sediment	Yes	Yes	Highway 26 is directly adjacent to and runs parallel to Camp Creek in this area. There is the potential for sediment delivery from highway sanding (both through the ditch lines and direct delivery through snowmelt and snowplows). The 1996 Zigzag Watershed Analysis (USDA Forest Service 1996) estimated highway sanding to deliver 2,102 tons per year of sediment to Camp Creek.
	Stream Temperature	Yes	Yes	Road brushing is ongoing adjacent to Camp Creek in this area, however topographic shading prevents any increases in intercepted solar radiation.
	Water Quantity	Yes	Yes	There is the potential for increased peak streamflows associated with the impervious highway surface directly routing runoff into Camp Creek

Project	Potential Effects	Overlap in		Extent, Detectable?
		Time	Space	
Skibowl and Summit ski areas winter recreation activities, operation and maintenance	Coarse and Fine Sediment	Yes	Yes	Ski run clearing, slope grading, and developing access routes, ski lift and towline facilities, ski lodges and infrastructure and similar actions can expose and compact soils, resulting in accelerated runoff and erosion. Increased runoff can increase instream sediment from channel erosion (USDA Forest Service 2012a). Impacts would be at the site scale.
	Stream Temperature	Yes	Yes	Historical clearing for ski runs and hazard tree removal in riparian areas and increased width/depth ratios associated with accelerated runoff and erosion have the potential to increase stream water temperatures at the scale of the stream reach.
	Water Quantity	Yes	Yes	Changes in land use and impervious surfaces can alter temporarily or permanently storm water runoff resulting in increased peak streamflows (USDA Forest Service 2012a). Created openings associated with ski runs were assessed with ARP.
Skibowl and Summit ski areas summer recreation activities, operation and maintenance (such as bike parks, bike trails, equestrian use, bike race events and concerts)	Coarse and Fine Sediment	Yes	Yes	Trail construction, maintenance, and use by bicycles, humans, or stock can adversely affect water quality by increased sediment delivery. Compaction of the trail surface limits water infiltration, which can lead to concentrated runoff on the trail surface. Concentrated runoff on trails lacking adequate drainage causes erosion of the trail surface and can transport sediment and other pollutants directly into waterbodies if not filtered. Heavy tread, foot, or hoof traffic can loosen some trail surface materials, making them more susceptible to erosion (USDA Forest Service 2012a). Impacts would be at the site scale.
	Stream Temperature	Yes	Yes	Hazard tree removal in riparian areas and increased width/depth ratios associated with accelerated runoff and erosion have the potential to increase stream water temperatures at the scale of the stream reach.
	Water Quantity	Yes	Yes	Where roads and trails are in-sloped to a ditch, the drainage network can become extended, collecting surface water from the road and trails tread and in places intercepting subsurface water exposed by cut slopes, potentially transporting this water more rapidly to the drainage network than the norm. However, the number of road stream intercepts in this area is not expected to have an impact on peak streamflows.

Project	Potential Effects	Overlap in		Extent, Detectable?
		Time	Space	
Skibowl Ski Area Snowmaking Infrastructure Improvements Project (water withdrawal from Camp Creek	Coarse and Fine Sediment	Yes	Yes	The construction, operations and maintenance associated with the snowmaking infrastructure improvements at Skibowl are not expected to have any impact on coarse and fine sediment delivery to the stream system.
	Stream Temperature	Yes	Yes	This additional water in spring runoff from snow created from snowmaking may result in cooler water during the snowmelt season at the site scale.
	Water Quantity	Yes	Yes	This additional water from the snowmaking could melt in a rain on snow event impacting peak streamflows.
Timberline Ski Area Mountain Bike Trails and Skills Park Project, including watershed restoration activities	Coarse and Fine Sediment	Yes	Yes	Trail construction, maintenance, and use by bicycles can adversely affect water quality by increased sediment delivery. Compaction of the trail surface limits water infiltration, which can lead to concentrated runoff on the trail surface. Concentrated runoff on trails lacking adequate drainage causes erosion of the trail surface and can transport sediment and other pollutants directly into waterbodies if not filtered. Heavy bike traffic can loosen some trail surface materials, making them more susceptible to erosion (USDA Forest Service 2012a).
	Stream Temperature	Yes	Yes	There are no impacts anticipated from this activity.
	Water Quantity	Yes	Yes	Where roads and trails are in-sloped to a ditch, the drainage network can become extended, collecting surface water from the trails tread and in places intercepting subsurface water exposed by cut slopes, potentially transporting this water more rapidly to the drainage network than the norm. However, the number of road stream intercepts in this area is not expected to have an impact on peak streamflows.

Project	Potential Effects	Overlap in		Extent, Detectable?
		Time	Space	
Government Camp Sewer Treatment Plant Operations and Maintenance	Coarse and Fine Sediment	Yes	Yes	Under a National Pollutant Discharge Elimination System (NPDES) permit, treated wastewater is discharged to Camp Creek. The outfall is a single port diffuser with a six-inch orifice located in a shallow rapidly moving section of Camp Creek. The outfall location is about a mile above Yocum Falls. Monthly average flow measurement in Camp Creek upstream of the discharge location ranged from 6 cfs (September 2001) to 24 cfs (June 2002). Under design flow, this facility would discharge about 0.5 cfs. Current plant discharge flow has been measured at <0.4 cfs (0.17 cfs in September 2008 and 0.36 cfs in June 2008) (Oregon DEQ 2008)). There are no impacts to coarse and fine sediment anticipated.
	Stream Temperature	Yes	Yes	The site has a maximum effluent temperature of 20.8 °C and a waste load allocation of 2.91x 10^6 kilocalories per day (Oregon DEQ 2005)). This would have an impact on stream temperature at the site scale.
	Water Quantity	Yes	Yes	There are no impacts anticipated from this activity.
Government Camp Water Company Operations and Maintenance	Coarse and Fine Sediment	Yes	Yes	The intake is at a spring collection site that is stable so there are no impacts anticipated to coarse and fine sediment.
	Stream Temperature	Yes	Yes	The removal of 0.1 cfs out of the 1.1 cfs produced at the spring collection site is not anticipated to have an impact on stream temperature.
	Water Quantity	Yes	Yes	There is a slight impact on base streamflows that is assessed in the direct and indirect effects section for this project.
Mazama Lodge Parking Area Expansion Project	Coarse and Fine Sediment	Yes	Yes	Runoff from these areas can create rills or gullies and carry sediments to nearby surface waters (USDA Forest Service 2012a).
	Stream Temperature	Yes	Yes	There are no impacts to stream temperature anticipated.
	Water Quantity	Yes	Yes	This area is small enough (~0.5 acre) so there are no impacts to peak streamflow anticipated associated with runoff from the impervious surface.

Project	Potential Effects	Overlap in		Extent, Detectable?
		Time	Space	
Forest Service Recreational Residences-Camp Creek Tract	Coarse and Fine Sediment	Yes	Yes	User trails for the recreational residences to access Camp Creek and picnic and campfire sites adjacent to the stream have the potential to create bank erosion and deliver sediment from the disturbed areas adjacent to the stream. Impacts would be at the site scale.
	Stream Temperature	Yes	Yes	Falling of hazard trees may open the canopy along the stream and subject the stream to increased solar radiation. Typically, the number of trees that need falling at any particular site is small (often only 1-2). Due to the scattered location of summer homes, and because tree falling only occurs sporadically, the effect of this activity will often be negligible (USDA Forest Service and USDI BLM 2008).
	Water Quantity	Yes	Yes	There are no impacts anticipated
Operation and maintenance of Kiwanis Camp	Coarse and Fine Sediment	Yes	Yes	Developed areas adjacent to the Little Zigzag River including the ropes course have the potential to create bank erosion and deliver sediment for the disturbed areas adjacent to the stream.
	Stream Temperature	Yes	Yes	Falling of hazard trees and parking lot development has removed vegetation along the Little Zigzag River, however is does not appear to be at the level where stream shade is impacted.
	Water Quantity	Yes	Yes	There are no impacts anticipated.
Hazard Trees	Coarse and Fine Sediment	Yes	Yes	There may be very small amounts of sediment delivered to the stream system over widely scattered areas associated with deposition of fine sediment into road ditch lines that are connected to the stream system during storm events (2011 Programmatic).
	Stream Temperature	Yes	Yes	Reductions of stream shade are reasonably certain to occur in a small number of areas scattered throughout the action area where multiple shade-producing trees are removed within 150 feet of a perennial stream, causing minor increases in water temperatures at the reach scale (2011 Programmatic)
	Water Quantity	Yes	Yes	Hazard trees are widely scattered so their removal would not impact ARP values because canopy cover of stands would not be impacted.
Ongoing Road Maintenance Activities	Coarse and Fine Sediment	Yes	Yes	Associated with this activity localized, short-lived increases in fine sediment in stream substrates or along channel margins may occur. However, proper road maintenance is likely to reduce chronic sediment inputs from roads over the long term (NMFS 2011).
	Stream Temperature	Yes	Yes	With road maintenance activities there are potential increases in stream temperature widely scattered over time and space associated with road brushing (NMFS 2011).
	Water Quantity	Yes	Yes	No effects anticipated associated with this activity.

Project	Potential Effects	Overlap in		Extent, Detectable?
		Time	Space	
PGE Powerline Corridor Maintenance	Coarse and Fine Sediment	Yes	Yes	There is the potential for widely scattered and small amounts of sediment to be delivered to the stream system associated with the use of secondary roads and powerline pole maintenance and replacement (NMFS 2011)
	Stream Temperature	Yes	Yes	There is the potential to raise average and maximum stream temperatures for short reaches of streams associated with vegetation removal (NMFS 2011).
	Water Quantity	Yes	Yes	No effects anticipated associated with this project. The powerline corridor is maintained in an early seral condition impacting ARP values and is assessed in the ARP analyses.
Recreation Site, Trail, and Administrative Structure Maintenance and Associated Public Use	Coarse and Fine Sediment	Yes	Yes	The heavy use of certain recreation sites along streambanks is likely to result in significant bank erosion, delivery of sediment, and increased channel width (NMFS 2011). Impacts would be at the site scale.
	Stream Temperature	Yes	Yes	Depending on site specific conditions, the combination of suppressed vegetation and increased width/depth ratios for heavily used streamside recreation sites are likely to increase stream water temperatures for heavily used stream sides at the scale of the stream reach (NMFS 2011).
	Water Quantity	Yes	Yes	No effects anticipated associated with this activity.

Cumulative Effects – Water Quantity

The Mt. Hood Forest Plan states under standard FW-066 that "*Cumulative effects analyses of management activities on water quality and/or stream channel stability (e.g., watershed impact analyses) shall include lands in all ownerships within the watershed*" so that is the focus of this analysis.

The 7th field watersheds used earlier in the document are used as the analysis area for cumulative effects.

The time frame used to include or exclude actions varies by the type of action. Some impacts are considered permanent with no modeled recovery including permanent roads, quarries and the power line right-of way. Some impacts such as regeneration harvest would recover gradually over approximately 35 years.

Harvest that has occurred on private land is included. Foreseeable future projects were listed in the activities with potential cumulative effects summary table earlier in this section. While there may be future logging or other management within the watershed, there are no current proposals with sufficient site specificity to conduct an analysis.

Past disturbances within the action area are the most substantial contribution to cumulative effects, and include fires, timber harvest, road construction and private land development.

The following table details the cumulative recovery of all stands in the watershed combined with the cumulative impact of all actions that have affected hydrologic recovery. It is a weighted average of the modeled recovery status of thousands of stands.

Table 62. Hydrologic recovery proposed action[32]

Subwatershed	Hydrologic Recovery
Camp Creek[33]	88
Little Zigzag River	97
Crystal Springs	91
Tilly Jane Creek	69
East Fork Hood River	93
East Fork Hood River Lower	93

The slight changes in ARP associated with the project would not likely cause any additional changes in stream channel stability or increases in peak flows beyond those described for the existing condition.

The following discussion summarizes the material from the existing condition and direct and indirect effects section from this document.

[32] ARP values for Crystal Springs, Tilly Jane Creek, East Fork Hood River, and East Fork Hood River Lower are from the Polallie Cooper Hazardous Fuels Reduction Project Environmental Assessment (USDA Forest Service 2016).
[33] The ARP values for Camp Creek and Little Zigzag River were calculated for the year 2018. For the analysis it was assumed that the project would be implemented in 2018.

All of the subwatersheds, except Tilly Jane Creek, are below the threshold of concern from "*The Effects of Forest Practices on Peak Flows and Consequent Channel Response Report*" (Grant et al. 2008). All the subwatersheds are below the threshold associated with the methodology for addressing cumulative watershed effects, watershed sensitivity, and hydrologic recovery associated with the Mt. Hood Forest Plan (USDA Forest Service 1990a). When the combined impacts of vegetation management and roads are examined, all the subwatersheds are rated as properly functioning in the 6th Field Watershed Condition from the "*Northwest Forest Plan–The First 20 Years (1994-2013) Watershed Condition Status and Trend* Report" (Miller et al. 2015).

Tilly Jane Creek watershed is above the threshold of concern from "*The Effects of Forest Practices on Peak Flows and Consequent Channel Response Report*" (Grant 2008) due to vegetation loss from the Gnarl Ridge fire. However, indications of major increased peak flows such as channel bed instability or scour and channel bank erosion were not noted during field visits to Tilly Jane Creek just below the burned area (USDA Forest Service 2016).

ODOT Highway 26 operations and maintenance, Skibowl snowmaking activities, and Timberline Bike Park construction and maintenance all have the potential to cause increases to peak streamflows at the site scale. These activities would be dispersed in time and space. No detrimental cumulative effects to peak streamflows are expected as a result of activities within the cumulative effects analysis area. Project design features associated with all activities are aimed at controlling impacts to peak streamflows.

Stream Temperature

Activities associated with the Government Camp – Cooper Spur Land Exchange Project are not expected to increase water temperature outside the land exchange parcels. As described in the direct and indirect effects section, this project would maintain existing water temperatures outside the land exchange parcels.

ODOT Highway 26 safety widening, Skibowl and Summit ski areas winter and summer recreation activities, operation and maintenance, Government Camp sewer treatment plant operations and maintenance, hazard tree removal, ongoing road maintenance activities, PGE powerline corridor maintenance, recreation site maintenance and use, all have to potential to impact stream shade and associated stream temperature. However, these activities would be dispersed in time and space and all these activities would have water quality protection Best Management Practices in place to control impacts to stream temperature. No detrimental cumulative effects to stream temperature are expected as a result of activities within the cumulative effects analysis area. Project design features associated with all activities are aimed at controlling impacts to stream temperature.

Sediment

Implementation of the proposed action would result in an estimated 3 percent increase in sediment yield over the current condition in the Camp Creek and Little Zigzag 7th field watersheds.

Table 63. Sediment yield (estimated tons per year)

Analysis Watershed	Natural Background from Slides)[34]	Sediment Delivery from highway sanding	Sediment Delivery from the existing road system	Increase in Sediment Yield from roads with implementation of the proposed action	Increase in Sediment Yield from land use with implementation of the proposed action
Camp Creek	504	2,102	42.4	0.4	69.7
Little Zigzag	0	406	2.8	0.3	12.4

Mirror Lake trailhead relocation and connector trail, ODOT Highway 26 safety widening, Skibowl and Summit ski areas winter and summer recreation activities, operation and maintenance, Timberline Ski Area mountain bike trails and skills park, Mazama Lodge parking area expansion, recreational residences-in the Camp Creek Tract, hazard tree removal, ongoing road maintenance activities, PGE powerline corridor maintenance, and recreation site maintenance and use all have the potential to introduce small amounts of sediment that would be dispersed in time and space (and all these activities would have water quality protection Best Management Practices in place to control erosion and sedimentation). No additional detrimental cumulative effects to instream sediment outside of those described in the direct and indirect effects are expected as a result of activities within the cumulative effects analysis area. Project design features associated with all activities are aimed at controlling erosion and sedimentation reducing the potential of erosion and delivery of material to adjacent surface water.

Oregon State Drinking Water Source Areas

Amendments made in 1996 to the Federal Safe Drinking Water Act provide the means to protect drinking water at its source. In developing the amendments, Congress recognized the need to go beyond traditional emphasis on treatment to address new challenges to provide clean drinking water. The act's amendments mandated that states conduct "source water assessments" for all public water systems. These assessments include delineating contribution zones or source areas for all groundwater and surface water- supplied public water systems and identifying potential sources of contamination for drinking water in each state. Source water assessments are required for all systems with at least 15 hookups or that serve more than 25 people year-round.

The process for developing a Drinking Water Protection Plan includes an Assessment Phase and a Protection Phase. The Assessment Phase includes delineating the area that serves as the source of the public water supply, inventorying the potential risks or sources of contamination and determining the areas most susceptible to contamination. The Assessment Phase has been completed. The development of a protection plan associated with the protection phase is voluntary and has not been completed for the Drinking Water Source Areas within the project area and therefore, no management guidelines or protection standards have been established.

569 acres of the Cooper Spur parcels are located in the Crystal Springs Water District Drinking Water Protection Area (DWPA). The entire DWPA is 4,282 acres. A source water assessment report was prepared by Oregon Department of Human Services and DEQ in June 2005. The report delineated the DWPA and identified potential risks by risk type and location. Within the Cooper Spur land exchange parcels there are 2 identified potential contaminant sources. The first potential contaminant source is in the intermediate-term recharge area and is identified as Future Land Development-Residential with the comment "PWS contact indicates site is under

[34] Assumes 1.2 tons per cubic yard (the same ratio as was used for the 36 Pit Fire Burned Area Report)

consideration for development as a destination resort, including a golf course & resort village. PWS contact indicates concern about additional traffic on Cooper Spur Rd & the impact of development." Since this area is not planned to be developed under any alternative it would appear that this should no longer be listed as a potential contaminant source. The other listed potential contaminant source is identified as "Parking Lots/Malls (over 50 spaces)" and the site is in the long-term recharge area. The comment for this site is "Risk Reduced to Moderate because Inn is located just outside of delineated DWPA."

Table 64. Cooper Spur parcels in Crystal Springs DWPA

Zone	Total Acres	Acres in Cooper Spur Parcels	% of Area in Cooper Spur Parcels
Long-term recharge area (spring)	2,131	30	1%
Intermediate-term recharge area (spring)	1,752	521	30%
Short-term recharge area (spring)	399	19	5%

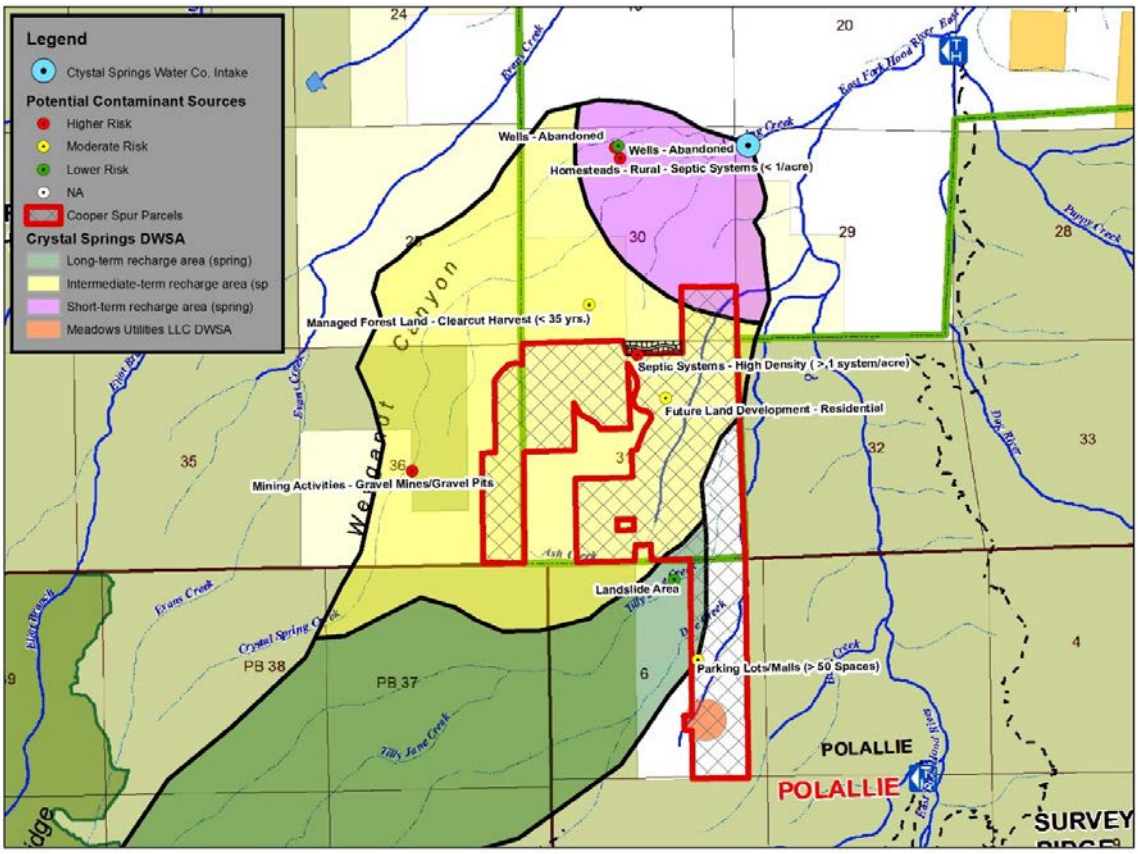

Figure 34. Crystal Springs drinking water source area (DWSA)

The Cooper Spur Mountain Resort transient non-community groundwater drinking water system is also within the Cooper Spur land exchange parcels. Seventeen of the 18 acres of the system are within the land exchange parcels. There are no identified potential contaminant sources identified for this system.

The Government Camp parcel has less than a tenth of an acre in the 18-acre DWSA for the Mt. Hood Inn, so this area was not assessed.

Recreation

Introduction

Recreation did not drive the purpose and need for the project, however, the unique recreation environment provided by the Mt. Hood National Forest has attracted a robust recreation community. The settings of this recreation environment are nationally iconic as well as cherished by an established constituency. Recreation on the national forest has a large base.

The primary focus of the recreation analysis was qualitatively analyzing effects to the Mt. Hood National Forest recreation setting. The recreational setting is measured in acres of Recreation Opportunity Spectrum (ROS) classes. The subsequent use and management of the Government Camp parcels conveyed to Mt. Hood Meadows and the following connected actions were also analyzed:

- Trail easements held by the Mt. Hood National Forest on the Government Camp parcels to be conveyed, and resulting effects to Government Camp Trail System's administration, opportunities, and settings
- Expansion of the Mt. Hood Wilderness by approximately 1,710 acres that would change existing land use allocations, and the resulting effects to recreation administration, opportunities, and settings; and the general change in management direction
- The creation of the Crystal Springs Watershed Special Resources Emphasis Unit that would change the existing land use allocations and the resulting effects to recreation administration, opportunities, and settings

Recreation Opportunity Spectrum

Since the early 1980s, the Recreation Opportunity Spectrum (ROS) has been used as a framework to identify, classify, plan, and manage a range of recreation settings for both existing and desired conditions. ROS is defined as land delineations that identify a variety of recreation experience opportunities categorized into six classes on a continuum from primitive to urban. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs. This is measured based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use. The six classes are: urban (U), rural (R), roaded natural (RN), semi-primitive motorized (SPM), semi-primitive non-motorized (SPNM), and primitive (P). The Mt. Hood Forest Plan uses the class of Roaded Modified and does not use the class of Semi-primitive Motorized. Definitions for each are:

- **Primitive:** Area is characterized by an essentially unmodified natural environment of fairly large size. Interaction between users is very low, and evidence of other users is

minimal. The area is managed to be essentially free from evidence of management restrictions and controls. Motorized use within the area is not permitted.

- **Semi-primitive Non-motorized:** Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but subtle. Motorized recreation use is not permitted, but local roads used for other resource management activities may be present on a limited basis. Use of such roads is restricted to minimize impacts on recreational experience opportunities.
- **Roaded Modified:** A subclass of the Roaded Natural ROS class. Involves areas that are characterized by predominantly natural appearing environments with high evidence of the sights and sounds of humans. Such evidence may not harmonize with the natural environment Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident and may not harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.
- **Roaded Natural**: Area is characterized by approximately natural-appearing environments with moderate evidence of the sights and sounds of man. Such evidence usually harmonize with the natural environment. Interaction between users may be moderate to high, and evidence of other users prevalent. Resource modification and utilization practices are evident but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.
- **Rural**: Area is characterized by a natural environment that has been substantially modified by development of structures, vegetative manipulation, or pastoral agricultural development. Resource modification and utilization practices may be used to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate user densities are present away from developed sites. Facilities for intensified motorized use and parking are available.
- **Urban:** Area is characterized by a substantially urbanized environment, although the. Background may have natural-appearing elements. Renewable resource modification and utilization practices are often used to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans are predominant on site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

To analyze effects of the land exchange, the primary action of the conveyance of land was evaluated by the gain/loss of ROS class acres. Each connected action was also analyzed for effects to ROS class.

Affected Environment

Existing Condition

Government Camp Area

The community of Government Camp is located along Highway 26 on the south side of Mt. Hood. It is a key destination for both summer and winter visitors. The community has a small resident population that swells with seasonal visitors. Forest recreation is the major economic engine that sustains the community.

Government Camp Trail System

The Government Camp Trail System Area encompasses a range of recreation opportunities, from highly developed ski areas and lodges, to semi-primitive untrailed areas. Ski areas and lodges include Timberline Lodge and Ski Area, Summit Ski Area, Ski-Bowl and Multorpor Ski Areas. All but Summit have both winter and summer recreational activities. There are three national forest campgrounds in the area: Trillium Lake, Still Creek, and Alpine Campgrounds. There are several summer and winter trails in the project area.

Regularly groomed Nordic trails, outside of developed ski area, are limited on the Mt. Hood National Forest to the Teacup Lake Trail system and the Trillium Lake trails. Both areas are at capacity on peak weekends.

Government Camp Parcels Land Use Allocation

There are two parcels to be conveyed to private ownership, west and east. The two parcels' land use allocation is primarily A11, Winter Recreation. The goal of this MA is to provide areas for high quality winter recreation (and associated summer) opportunities including: downhill skiing, Nordic skiing, snowmobiling, and snowplay within a natural-appearing forest environment.

Trail Segments Located in and near West and East Parcels

Crosstown Trail and Wally's Tie were constructed in 1995, as a hike/bike/ski trail. They receive a high amount of use year-round and have held up remarkably well to mountain bikes and other uses.

Maggie's Tie was constructed after the Government Camp Trails Project Environmental Analysis (USDA Forest Service 2005). The purpose and need of this project was to provide a safe, low maintenance, trail system designed for year-round recreation that links Government Camp to key destinations in the Mt. Hood National Forest that surround the community. The trail system and trailhead parking were designed to reduce conflicts with local businesses, ski areas, and residences. During this project, bridge crossings along the existing Crosstown Trail were upgraded for winter grooming to enhance Nordic skiing and snowshoeing. Grooming as an operation has yet to commence on the Crosstown Trail, but it is still the intent of future management.

The Alpine and Glade Trails were historic downhill runs from Timberline to Government Camp. They are also where utility lines to Timberline are located. They are used in the winter by downhill and telemark skiers and snowboarders; and in the summer by the more adventurous mountain bikers for access to Timberline Lodge. Approximately 250 feet of roadside parking was added along Government Camp Loop Road near Thunderhead Lodge as a part of the 2005 Government Camp Trails Project. The Skiway Trail was constructed before 2005.

Table 65. Trails with segments inside Government Camp parcels

Government Camp Parcel	Trails with Segments Located within Parcels	Trail Number	Approximate Mileage Inside Parcels
West Parcel	Skiway	755B	0.3 mi
	Maggie's Tie	753	0.25 mi
	Wally's Tie	755A	0.07 mi
East Parcel	Crosstown	755	0.25 mi
	Alpine	660	0.13 mi

Summit Ski Area

The east Government Camp Parcel shares a boundary with Summit Ski Area that operates under a special use permit.

Annual winter ski area operations range widely from zero days of operation to approximately 40 days. The ski area opens when it has adequate snow coverage (varies annually) and closes in late March or early April. This schedule is dictated by the sheer fact that Summit Ski Area does not have snowmaking infrastructure – making it totally dependent on natural snow pack. It is largely a Saturday/Sunday/winter holiday operation. The day lodge has a much longer operating season (operations during the winter and summer months). The day lodge, which shares a parking lot with the Highway 26 rest area, is open outside of the winter operating schedule. It serves beverages and a limited menu for breakfast and lunch.

Summit Ski Area is largely a "drop in" area for forest visitors that are new to snow sports. There are a limited number of special use events held annually. The ski area has a popular tubing program.

Many skiers climb Summit's ski trails and descend without purchasing a lift ticket. Also, Timberline guests ski back to Government Camp—and ultimately ski through the Summit Ski Area—to get back to their vehicles.

Cooper Spur Area

A variety of recreational activities occur within the Cooper Spur area. State Highway 35 is a scenic byway. Cooper Spur Road, also known as Forest Road 3512, takes visitors from Highway 35 to Cooper Spur Ski Area and Resort, and to the Cloud Cap area. Both roads offer scenic views and many people drive them for pleasure throughout the year. The Cloud Cap Road is one of the most popular roads on the Mt. Hood National Forest due to its terminus at Cloud Cap Inn, its access to several trails including the Timberline Trail, and the view of Mt. Hood from the top of the road. There are numerous trailheads for popular non-motorized trails within the planning area. Recreation use is popular during both the summer and the winter. Groomed snowmobile routes and dispersed use are also prevalent within the greater area. Due to numerous recreation opportunities, and proximity to the large recreation community of Hood River, recreation is thriving in the area.

Developed Recreation Facilities

Developed recreation sites within the Cooper Spur area include several trailheads, two campgrounds, five historic buildings, and the Cooper Spur Ski Area. Trailheads include Tilly Jane Trailhead and Snopark, and Cloud Cap Trailhead. Both trailheads are day use areas and primary trailheads.

Tilly Jane Trailhead and Snopark is located off of Forest Road 3512. It serves as a trailhead in the summer and a Snopark in the winter. Tilly Jane Snopark is plowed by the Oregon Department of Transportation in the winter. The trailhead provides parking as well as interpretive and directional signing. Tilly Jane Trail (#643) is a hiking trail in the summer and a cross-country ski trail in the winter. The trail enters the Tilly Jane Historic District and passes several developed recreation facilities: Tilly Jane A-Frame, Tilly Jane Guard Station, Tilly Jane Campground, and Cloud Cap Campground.

Tilly Jane A-Frame and Tilly Jane Guard Station are recreation rentals that are managed under special use permits with two chapters of the Oregon Nordic Club. They are historic buildings.

Tilly Jane Campground is a primitive campground providing parking, an outhouse, and numerous tent sites with picnic tables and fire rings. The campground is operated by a concessionaire.

Cloud Cap Saddle Trailhead is located close to the top of Cloud Cap Road. It is a Northwest Forest Pass Trailhead providing designated parking, bulletin boards, interpretive signage, picnic tables, water, an outhouse, and access to trails. The site is also a concessionaire-operated day-use site, as it is the parking for Cloud Cap Campground as well as a trailhead and day-use site.

Cloud Cap Campground is a primitive campground similar to Tilly Jane Campground. The campground operates under a concessionaire permit. Cloud Cap is smaller than Tilly Jane Campground, but more popular due to its proximity to the Timberline Trail. In addition to an outhouse and designated sites with picnic tables and fire rings, Cloud Cap Campground also has water.

Cloud Cap Inn and the Snowshoe Club Cabin are located near Cloud Cap Saddle Trailhead at the end of Cloud Cap Road. Both historic buildings are managed by special use permits. The area surrounding these two buildings provides a spectacular view of the north side of Mt. Hood.

The Cooper Spur Warming Shelter is a historic warming shelter near Forest Road 3512. The Shelter has been maintained in the past by the Oregon Nordic Club. A primitive trail accesses the hut, which is used by dispersed recreationists including hikers and cross-country skiers.

The Cooper Spur Ski Area falls within the A11 portion of the planning area. The small ski area operates under a special use permit. The ski area usually sees relatively light usage during winters when snow levels allow it to open.

Dispersed Recreation Use

Dispersed recreation occurs throughout the project area. Activities include driving for pleasure, hunting, camping, rock climbing, and ski-touring.

Driving for pleasure can occur on any open road within the area, but is most heavily concentrated along Highway 35, Forest Road 3512 (Cooper Spur Road), and Cloud Cap Road (also Forest Road 3512 after the gate adjacent to Tilly Jane Trailhead). Highway 35 is one of the most popular scenic routes on the Mt. Hood National Forest. The road offers spectacular views of Mt. Hood when driving south and beautiful views of the Hood River Valley and its many orchards when headed north. Motorists driving along Highway 35 can see steep, rocky canyon walls, the East Fork of the Hood River, hillsides with large, yellow-barked yellow pine and many hillsides covered with thick, dense firs. Forest Road 3512 (Cooper Spur Road) is very popular for drivers as well as road bikers, who enjoy the road that provides access from Highway 35 to

Parkdale, which is North of the Cooper Spur area. Cloud Cap Road accesses the Cloud Cap-Tilly Jane Historic Area and leads to stunning views of Mt. Hood.

Dispersed camping occurs in various locations throughout the area. Most dispersed camping occurs off of secondary routes. Hunters use parts of the Cooper Spur area and use dispersed campsites during hunting season.

Ski touring occurs near the Tilly Jane Trail #643, Cloud Cap Inn, and the area burned by the Dollar Lake Fire. These locations receive the most snowfall in the planning area and provide adequate slopes for people to tour up and ski down. Depending on snow levels, ski touring could occur in other locations within the Cooper Spur area. The area burned by the Dollar Lake Fire has no overstory, and receives a lot of snow most years, making some of the steeper aspects desirable for some skiers.

Cooper Spur Trails

System trails within the Cooper Spur Area are designed for non-motorized use. These trails are close to the city of Hood River and relatively close to Portland, and draw large numbers of visitors annually. The Tilly Jane trails are some of the most popular trails on the Hood River Ranger District. District trail crews maintain a portion of these trails, but they are also maintained by multiple volunteer groups, who assist with needs such as log out, brushing, and tread work.

Table 66. Cooper Spur area trails

Trail Name	Trail Number	Season of Use	Segments Within Mt. Hood Wilderness Expansion	Segments Within Crystal Springs
Tilly Jane	643	Winter and Summer	Yes	Yes
	643A	Winter and Summer	Yes	Yes
Wagon Road	642	Mostly Cross-country Ski in Winter but also Summer Use	Yes	Yes
	600 SPUR	Winter and Summer	No	Yes
Timberline	600	Winter and Summer	No	Yes
Tilly Jane	600A	Winter and Summer	No	Yes

In addition to the trails listed above, groomed snowmobile routes are located within the Cooper Spur area. These routes are roads in the summer, but become part of a system of snowmobile trails during the winter. Snowmobiles are permitted for cross-country travel on National Forest System lands, except where they are specifically prohibited, such as within wilderness areas. Within the Cooper Spur area, snowmobiles are not permitted off road in the Tilly Jane Cloud Cap Historic District.

User-created trails are also found in locations within the Cooper Spur area, especially in areas bordering private homes. These trails are not condoned or maintained by the Forest Service, but they are a method some individuals use to access the Forest.

Wild and Scenic Rivers

East Fork Hood River is a designated wild and scenic river that flows northeast of the Cooper Spur area. The Omnibus Public Land Management Act of 2009 designated 13.5 miles of the river from State Highway 35 to the Mt. Hood National Forest boundary. This Wild and Scenic River corridor is administered by the Secretary of Agriculture as a recreational river. Under the Forest Plan, this land is designated as B1 – Designated Wild, Scenic, and Recreational Rivers lands. The goal for B1 lands is to protect and enhance the resource values for which a river was designated into the Wild and Scenic River System, to provide opportunities for recreation activities, and to maintain the visual quality of river corridors.

Designated Wild and Scenic Rivers are evaluated to identify and protect their outstanding and remarkable values (ORVs). Geologic/Hydrologic ORVs have been identified for East Fork Hood River. The East Fork flows along the edge of a complex series of glacially and fluvial derived deposits before entering a narrower bedrock canyon. Recent debris flows from Newton, Clark, and Polallie Creek drainages continue to shape the valley floor and influence the river's free-flowing nature. These attributes are deemed ORVs because they are an easily observable example of active glacial and geologic processes at the national level.

Special Use Permits

There are several recreation-related special use permits issued within the planning area. Tilly Jane A-Frame, Cloud Cap Inn, the Snowshoe Club Cabin and the concessionaire campgrounds were mentioned under Developed Recreation Facilities.

Cooper Spur Ski Area

The Cooper Spur Ski Area operates under a special use permit that is currently set to expire at the end of 2021. Its 3-year average skier days is 4,666 per year. Its 10-year average is 9,681 per year. Its season of operation is solely winter. Its operating calendar is dependent on snow coverage and typically closes the day after spring break (late March). The number of days it is open fluctuates annually between 0 and 60. Some drought years it has not opened.

The current area permitted by the special use permit is 1,172 acres. There are 20 skiable acres.

The ski area's origins dates back to the 1920s, and historically had a ski jumping program. Now, it is a "feeder area." It functions as a learning area for people to ski/snowboard. When Cooper Spur customers outgrow the area (it only has 350 feet of vertical), skiers are fed into larger ski areas. It is a beginner's hill, but also has limited intermediate terrain for parents and older siblings. It has a night skiing program, but typically only on Friday and Saturday nights in January and February. Other ski areas on Mt. Hood also offer night skiing.

It annually hosts special use events such as ski race events and various community celebrations (small in numbers and limited by the size of the parking facility).

The Cooper Spur Race Team is affiliated with the Cooper Spur Ski Area. The winter sports portion of the team probably averages between 50 and 65 children. The mountain bike program is smaller. See www.cooperspurraceteam.org for information about the team. Founded in 1978, the organization supports alpine, freeride, and mountain bike programs. In 2010, freestyle/freeride and mountain biking was added to the program. It attracts children from the mid-Columbia Gorge region (Cascade Locks to The Dalles and White Salmon to Parkdale). It is largely a volunteer-operated organization (coaches and parents). When Cooper Spur isn't

operational, the program operates from Mt. Hood Meadows. The team is open for children from 5 to 18 years of age.

Cooper Spur Parcels

The lands to be acquired include approximately 251 acres located within and 514 acres outside of the current NFS administrative boundary. Three diverse property types comprise the non-Federal estate situated in the vicinity of the Cooper Spur Ski Area on the northeast flank of Mt. Hood. The three types are: the structures and personal property at the Cooper Ski Area, land and all development at the Cooper Spur Mountain Resort, and mostly vacant forest land. As the underlying land at the ski area is already federally owned and administered, only the following described infrastructure is considered in the estate to be conveyed: ski lifts, a day lodge, A-frame cabin, first-aid station, four multi-purpose buildings, instructor's hut, and pump house. There is also a private well water system, irrigation system, and septic system.

The Cooper Spur Mountain Resort is located about 2 miles east of the Cooper Spur Ski Area at the intersection of Cooper Spur and Cloud Cap roads. The resort site consists of 11 different structures. The registration desk portion of the restaurant building and the Homestead Cabin were built in 1942. The restaurant addition and all other structures were added in 1985–1986. Also, there are five 1,200-square-foot log cabins, each with a kitchen area, living room and fireplace, two bedrooms and one bath on the main floor. The resort also includes spas, storage, tennis court, equipment storage and shop, and a single-family residence.

In addition to the cabins and restaurant, there are several septic tanks that lead to a single leach field northeast of the improvements. A well with well house and another small building are located on Tax Lot 401. Another recently installed well is located on Tax Lot 102.

The remaining property contains a mixture of pre-merchantable plantations covering about 60 percent of the area with the balance in second-growth timber stands. The plantations range from approximately 10 to over 25 years old—composed of mixed species including both planted and naturally regenerated Douglas-fir , ponderosa pine, white fir, western hemlock, western white pine and lodge pole pine. Timber stands contain merchantable trees dominated by Douglas-fir and white fir mixed with trace amounts of western red cedar, western white pine and western hemlock.

Recreation Opportunities provided by the resort include but are not limited to the following:

- Gathering of People
- Special Events
- Modest sized trail system for hiking, mountain biking and cross-country skiing
- Spa
- Tennis Courts
- Weight Room
- Swimming Pool

Crystal Springs Watershed Special Resources Management Unit Land Use Allocation

The Crystal Springs Watershed Special Resource Management Unit would be composed of 769 acres of the lands to be acquired and an additional 2,090 NFS acres that are currently in the

A4, A11, B2, and C1 land use allocations (LUAs). The Omnibus Act states that the purposes of the Crystal Springs Watershed Special Resource Management Unit are to ensure the protection of the quality and quantity of the Crystal Springs watershed as a clean drinking water source for the residents of Hood River County, Oregon; and, to allow visitors to enjoy the special scenic, natural, cultural, and wildlife values of the Crystal Springs watershed.

Mt. Hood Wilderness Expansion Land Use Allocation

Approximately 1,709 acres would be incorporated in, and considered to be a part of, the Mt. Hood Wilderness, as designated under the Wilderness Act (16 U.S.C.1132(a)). As a result, 492 acres of the A4 LUA, 1,109 acres of the A11 LUA, and 108 acres of the B2 LUA would become Wilderness (A2 LUA).

Recreation Opportunity Spectrum (ROS) Class

Both the east and west parcels of the lands to be conveyed (Government Camp) are currently classified as Rural.

The Cooper Spur Parcels are currently classified as a mix of Roaded Natural and Roaded Modified.

The area to be newly designated as Mt. Hood Wilderness is currently classified as Roaded Natural on the northern boundary, adjacent to the Cloud Cap Road and Cooper Spur Ski Area. The remainder of the area, to the south, is classified as Semi-primitive Non-motorized.

The area to be designated the Crystal Springs Watershed Special Resources Management Unit is currently a mix of Roaded Natural and Roaded Modified.

Environmental Consequences

Direct and Indirect Effects

The spatial boundaries for analyzing the direct and indirect effects to recreation are the Government Camp parcels and Government Camp Trail System, and, the combined Crystal Springs watershed protection area and wilderness addition because these areas are predicted be most affected by the proposed action.

The temporal boundaries for analyzing the direct and indirect effects are 1 to 5 years (short-term) and 5 to 30 years (long-term). The short-term reflects time to finalize the land exchange. The long-term reflects time for full build-out of the Government Camp parcels and the subsequent change of management of the Cooper Spur parcels.

Alternative 1

Government Camp

The ROS at the Government Camp parcels would continue to be Rural.

The Government Camp Trail System would continue to serve as a flexible network of high-quality trails. Trails would continue to link major community and recreation nodes of the Government Camp community such as Timberline Lodge and Ski Area, Summit Ski Area, Ski-Bowl and Multorpor Ski Areas. Trails would continue to be used for recreation and transportation. Trail upgrades made during the Government Camp Trails Project would continue to make it possible to groom select trails of the system, such as Trail # 755, Crosstown.

Trails within the Government Camp parcels (segments of Crosstown, Alpine, Maggie's Tie, Wally's Tie and Skiway) would remain in their current location solely on NFS lands. The trails would remain connected with only existing infrastructure crossings such as utilities and roads. Bridge improvements made during the Government Camp Trails Project would remain in their current location and relevant to future potential grooming. The trailhead near Thunderhead Lodge would continue to provide modest parking and function as a portal for the community of Government Camp to access the trail network. Trails would still access semi-primitive untrailed areas. Administration and maintenance would continue to operate under the same regimen and frequency.

NFS lands (Government Camp parcels) proposed to be conveyed would continue to be managed in compliance with the A11 LUA.

Cooper Spur Area

The ROS at the Cooper Spur parcels would remain Roaded Natural.

The Cooper Spur Resort facilities would remain open to the public on a fee basis and located on private lands. The maintenance and operation of the resort facilities and equipment would continue to be performed by the Cooper Spur Resort owners. The maintenance and administration of the trail system would continue to be performed by the Cooper Spur Resort owners. Visitors to the resort would continue to abide by the rules and regulations of the Cooper Spur Resort.

The Cooper Spur Ski Area would continue to be operated by a permittee under a special use permit until 2021 when the permit is set to expire. Responsibility for maintenance and administration of ski area facilities would continue to belong to Cooper Spur Ski Area permittee until this time. Facilities and equipment would continue to be owned by Cooper Spur Area permittee.

NFS lands in the proposed Mt. Hood Wilderness Expansion would continue to be managed in compliance with the Mt. Hood LRMP standards and guidelines for A4, A11, B2, and A2 LUAs. Trails would be non-motorized and provide opportunities for mountain biking. Trail maintenance would continue to be facilitated by power equipment such as chainsaws. The social setting for trail visitors would continue to allow groups of 12 or more. The biophysical setting for trail visitors would continue to be in compliance with LUA Standards and Guidelines.

The ROS for NFS Lands proposed for inclusion in the Mt. Hood Wilderness would remain a mix of Roaded Natural and Semi-primitive Non-motorized.

NFS lands in the proposed Crystal Springs Watershed Special Resource Management Unit would continue to be managed in compliance with the Mt. Hood LRMP standards and guidelines for A4, A11, B2, and C1 LUAs.

The ROS for NFS lands proposed for the new LUA of Crystal Springs Watershed Resource Management Unit would continue to be Roaded Natural and Roaded Modified.

Table 67. Existing condition ROS classes for Government Camp parcels

Parcel/ Designation	ROS Class	Acres	Total
Government Camp West Parcel	Rural	68	**109 acres Rural**
Government Camp East Parcel	Rural	41	

Table 68. Existing condition ROS classes for Cooper Spur Area

Parcel/ Designation	ROS Class	Acres
Cooper Spur Parcels	Roaded Natural	684
	Roaded Modified	85
Mt. Hood Wilderness Expansion	Roaded Natural	845
	Semi-primitive Non-motorized	864
Crystal Springs Watershed Special Resource Management Unit	Roaded Natural	1,621
	Roaded Modified	1,184
	Semi-primitive Non-motorized	54

Alternative 2- Proposed Action

Lands to be conveyed (Government Camp)

The proposed action would have direct and indirect effects to the recreation resource in the Government Camp area. The primary proposed action, the land exchange, was analyzed by the loss and gain of acres of ROS classes. Both of the Government Camp parcels are classified as Rural.

A direct effect of the proposed action is the loss of 109 acres of NFS lands classified as Rural to the Mt. Hood National Forest.

The assumption is made that more people will be inhabiting or visiting the Government Camp area. An indirect effect would be an increase in demand for recreation with the increase of population.

Government Camp Trail System

A direct effect of the connected action of the reservation of non-exclusive trail easements would be the likely change of location of the following trails that are located in the parcels proposed for conveyance. Only segments of the trails would be potentially relocated by the new property owner. The total of all trail segments subjected to a non-exclusive trail easement is approximately 1 mile.

Table 69. Direct effects to trail locations by proposed action

Government Camp Parcel	Trails with Segments Located within Parcels	Trail Number
West Parcel	Skiway	755B
	Maggie's Tie	753
	Wally's Tie	755A
East Parcel	Crosstown	755
	Alpine	660

While trail easements would be reserved, the easements would be non-exclusive in nature. Meaning they could be relocated to facilitate development by the land owner. The assumption was made that the location of trails outside of proposed parcels would not change. Subsequently, this assumes that while trails may be relocated within the proposed parcels, their location would remain fixed at the parcel boundaries.

The width of the easement would be 24 feet total or 12 feet on either side of the center line of the trail alignment. The width of the easement would indirectly affect the future management of the trail system. The intent of the Government Camp Trails Project (2009) was to increase the amount of groomed trail on the Mt. Hood National Forest outside of developed ski areas for Nordic skiing. The width of the proposed trail easement would likely be insufficient to accommodate the appropriate equipment for the grooming operations. Because the Government Camp Trail System is a connected network, changes on a part of the network can potentially affect the whole. If trail managers are unable to use the preferred grooming equipment on a portion of the network, it could potentially affect their ability elsewhere in the network.

An indirect effect is the expected loss of ability by trail managers to use the preferred equipment for future grooming.

The non-exclusive nature of the proposed trail easement also renders it more likely to be frequently crossed by infrastructure, i.e., utilities and roads. This would directly affect the connectivity of the trail which affects the safety and welfare of trail users. Trail crossings would put trail users at risk to collisions with motor vehicles. The recommended mitigation of using trail underpasses at road crossings would reduce this effect.

If trails are crossed by development, an indirect effect would be the increased exposure of trail users to dangerous road crossings.

Exclusive Easement Option

As described in chapters 1 and 2, the trail easement aspect of the proposal has not yet been fully determined. Elements of an exclusive trail easement and their resultant effects are described below.

The connected action of the reservation of exclusive trail easement held by Mt. Hood National Forest. Easements allow non-motorized use of existing trails by the public; roads, utilities, and infrastructure facilities to cross the trails; and improvement or relocation of the trails to accommodate development of the Federal land. The Regional Forester reserves the right to terminate the right-of-way and easement if it is deemed no longer needed. Easements would comply by the following conditions.

- Easement shall be 16 feet on each side of the centerline with such additional width as required for adequate protection of cuts and fills, maintenance, and snowplowing.
- The trails shall be under the control and jurisdiction of the United State and the United States alone shall have the right to extend rights and privileges for use of the trails to other Federal departments and agencies, State agencies, and local subdivisions thereof, and to other users including members of the public.
- The United States shall have the right to use motorized equipment for administrative use including but not limited to: trail construction, maintenance, and emergency access. Motorized use by the public is prohibited.
- Roads, utilities, and infrastructure facilities shall be allowed to cross the trails at any place by any reasonable means and for any purposes in such manner as will not interfere unreasonably with use of the trail.
- Improvement or relocation of the existing trails to accommodate development of the Federal land after conveyance shall be in such manner as will not interfere with use of the

trails and shall be subject to review and approval by the United States prior to any construction. Mt. Hood Meadows Oreg., LLC, its successors, heirs, and assigns ("Landowner") shall bear all costs associated with such improvement or relocation of trails, including the cost of construction or replacement of bridges and other trail infrastructure necessary for trail use as determined by the Forest Service.

- Relocated trails or portions of trails shall be subject to the same terms and conditions as the existing trails reserved herein. Landowner shall bear responsibility for developing legal descriptions and producing recordable plats for any relocated trails subject to Forest Service standards, review and approval. Relocated trails shall be acknowledged in the form of legal easements granted to the United States and shall be recorded in County records at landowner's expense. The United States shall execute termination documents for those trails or portions of trails being abandoned due to relocation.
- The United States shall have the right to fell hazardous trees within or adjacent to the easement area that are deemed a safety risk by knowledgeable Forest Service personnel, and the right to manage vegetation within the trail easement areas, including the removal of those portions of downed trees lying within the easement areas, provided however that the landowner retains ownership of the woody material and may remove any portion in a manner that does not damage the trails or interfere with public use of the trails.
- The United States shall have the right to establish and maintain appropriate signage for marking trails and providing directions or other appropriate information in connection with the trails.
- The total width of the easement would be 32 feet, which would adequately allow for future grooming by the preferred equipment.

Cooper Spur Area

The proposed action would have direct and indirect effects to the recreation resource in the Cooper Spur Area. The primary proposed action, the land exchange, was analyzed by the loss and gain of acres of ROS classes. The Cooper Spur parcels proposed to be conveyed to the Mt. Hood National Forest have been classified as Roaded Natural and Roaded Modified.

A direct effect of the proposed action is the gain of 684 acres of NFS lands classified as Roaded Natural and 85 acres classified as Roaded Modified to the Mt. Hood National Forest. 1,708 acres would also be added to the Mt. Hood Wilderness.

A direct effect is the loss 1,012 acres of the permitted area under the special use permit for operation of the Cooper Spur Ski Area.

The reduction of the area permitted would modify the special use permit for the Cooper Spur Ski Area. However, the entire 1,012 acres is outside the "skiable acres" accessed by existing lift facilities and considered "out of bounds" in nature. This "out of bounds" area would continue to be accessible to adventurous back country skiers by non-motorized means (skiing).

A direct effect would be the shift of 845 acres of Roaded Natural and 865 acres of Semi-primitive Non-motorized ROS classes to more a Primitive ROS class. As management reflects the primitive nature of wilderness designation, the setting would be increasingly more primitive. Future management would also employ the Wilderness Resource Spectrum (similar to ROS), which is applied in Mt. Hood National Forest wilderness areas.

A direct effect to recreation would be the loss of the opportunity to mountain bike in the area proposed as wilderness, and the gain of more opportunities for solitude and wilderness experience.

A direct effect would be the required use of primitive tools for maintenance on portions of trails listed below. A minimum tool analysis would be required for the use of power tools.

A direct effect would be that the group size of visitors to the wilderness area would have to comply with A2 standards and guidelines.

A direct effect would be the prohibition of mountain bikes on portions of the Tilly Jane, Wagon Road and 643A trails.

A direct effect would be the change of 1,109 acres of A11, 492 acres of A4, and 108 acres of B2 LUAs to 1,708 acres A2 LUA (Wilderness).

The change in LUA would change how the 1,708 acres are managed. The overarching management goal is to promote, perpetuate, and preserve the wilderness character of the land; protect watersheds and wildlife habitat; preserve scenic and historic resources; and promote scientific research, primitive recreation, so1itude, physical and mental challenge, and inspiration.

The complete list of Goals, and Standards and Guidelines for the A2 LUA is provided in appendix A of the Recreation Specialist Report. Select changes in management direction relevant to recreation are also highlighted in that report.

The LUA of Crystal Springs Watershed Special Resource Management Unit (CSWSRMU)

A direct effect to the creation of CSWSRMU would be recreation management direction that would comply with the newly created LUA of A14. A full list of Standards and Guidelines for this new LUA appears in chapter 2 of the EIS.

ROS Classes

Table 70 summarizes the gain and loss of ROS classes resulting from the land exchange.

Table 70. Comparison of acres of ROS class gained and lost

Parcels	Gain/ Loss	ROS Class	Acres
Government Camp Parcels	**Loss**	Rural	109
Cooper Spur Parcel	**Gain**	Roaded Natural	684
		Roaded Modified	85

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The expansion of the Mt. Hood Wilderness would restrain the types of recreational outfitters and guides that could operate under a special use permit in this management area. Management area standards would preclude some uses such as the operation of bicycles. Social setting standards for group size would restrict the number of visitors.

The Land Use Allocation of A14 would have no changes that would alter the long-term relationship between levels of multiple-use goods and services. The management area would continue to provide the spectrum of recreational opportunities as the no action alternative.

The expansion of the Mount Hood Wilderness would have important effects on the 1,708 acres to be managed as A2 LUA but not on the entire planning area or land management plan. Important in the context that the area would be lost to bicycling. Maintenance would be restricted to use of primitive tools.

The Land Use Allocation of A14 would have no important effect on the entire land management plan or affect land and resources throughout a large portion of the planning area during the planning period. The management area would continue to provide the spectrum of recreational opportunities as the no action alternative.

Cumulative Effects

The spatial boundaries for analyzing the cumulative effects to recreation are the Government Camp parcels and Government Camp Trail System, and, the combined Crystal Springs watershed protection area and wilderness addition because these areas are predicted be most affected by the land exchange and connected actions.

The temporal boundaries for analyzing the cumulative effects are 1 to 5 years (short-term) and 5 to 30 years (long-term). The short-term reflects time to finalize land exchange. The long-term reflects time to full build-out of Government Camp parcels and subsequent change of management of Cooper Spur parcels.

Alternative 1- No Action

Since there would be no direct or indirect effects, there can be no cumulative effects.

Alternative 2- Proposed Action

Government Camp Area

The following projects were analyzed for cumulative effects to the recreation resource:

- Mirror Lake Trailhead Relocation Project
- Ongoing ODOT road maintenance, including snowplowing on NFS lands, Government Camp, and Highway 26
- Skibowl and Summit ski areas' winter recreation activities, operation and maintenance
- Skibowl and Summit ski areas' summer recreation activities, operation and maintenance (such as bike parks, race events and concerts)
- Ongoing Forest Service trail use and maintenance (winter and summer uses) for the Glade, Alpine, Timberline to Town, Mirror Lake, and Government Camp area trails
- Timberline Ski Area Mountain Bike Trails and Skills Park Project, including watershed restoration activities
- Camp Creek Summer Home Tract
- Collins Lake Resort operations
- Mazama Lodge Parking Area Expansion Project
- Operation and maintenance of Kiwanis Camp

The listed projects have shaped and continue to shape the ROS classes in the Government Camp area. Opportunities for recreation, such as ski areas, lodges, camps, residences, trails, and semi-primitive untrailed areas, continue to attract a large user base to the Government Camp area. Transportation improvements continue to facilitate access to recreation resources. The Government Camp Trail Network is a shared transportation and recreation resource by the Government Camp community. The Network functions as a flexible connected system where trailheads are access portals.

The proposed action(s), when considered with the listed projects, would continue to shape the Recreation Opportunity Spectrum, but cumulatively, there would be no change in ROS class.

Cooper Spur Area

The following projects were considered for cumulative effects to the recreation resource:

- Ongoing Oregon Department of Transportation (ODOT) road maintenance, including snowplowing on both NFS lands and Highway 35
- Cooper Spur Ski Area activities, operation and maintenance
- Development of private land (past and current)
- Ongoing recreation and trail use and maintenance (winter and summer uses) for the Tilly Jane and Cloud Cap areas
- Ongoing ODOT road maintenance and sanding, including snowplowing on Road 3510 (Cooper Spur Road) and Road 3512 (Cloud Cap Road)
- Ongoing or upcoming Forest Service road closures
- Timberline Trail - Eliott Crossing Relocation Project
- Wilderness additions from the 2009 Omnibus Act (not including the Mt. Hood Wilderness addition, which is included in the proposed action for this project)
- Existing Cloud Cap and Tilly Jane special use permits

The listed projects have shaped and continue to shape the ROS classes in the Cooper Spur area. Recreation opportunities, such as skiing, trails, semi-primitive un-trailed areas, lodging, and the Cloud Cap-Tilly Jane Historic District attract a large user base. The transportation network continues to facilitate access to recreation resources.

The wilderness additions move the ROS class toward the primitive setting. Otherwise, the proposed action(s), when considered with the listed projects, will continue to shape the Recreation Opportunity Spectrum, but cumulatively, there would be no change in ROS class.

Silviculture

Introduction

The purpose of the silvicultural analysis is to summarize the forested habitat types and structures for the lands being exchanged and received in the Government Camp – Cooper Spur Land Exchange (GCCSLEX) Project, and to assess the lands for suitability in accordance with 36 CFR 219.13, timber resource land suitability. Field reconnaissance and existing Geographic Information System (GIS) database information was used to inform the analysis of silvicultural effects. GIS analysis of the Mt. Hood NF's timber suitability layer was conducted to make a determination of suitability (in regard to management for timber production).

Additional information regarding the Silvicultural requirements of the National Forest Management Act and applicable Forest Plan direction is available in the Silvicultural Specialist Report (Project Record).

Affected Environment

Existing Condition

Lands to be Conveyed

The forest habitat types on the lands to be conveyed are considered to be productive or highly productive[35] (McCain and Diaz 2002). While the forest types are considered very productive, the majority of the acres being given up in the land exchange are considered unsuitable for timber production.

Stand ages in the lands to be conveyed range from 85 to 145 years. All of the lands to be conveyed are either in the moist or montane[36] mixed conifer or lodgepole pine habitat types. There are 72 total acres classified as moist mixed conifer in the western and eastern parcels. There are 36 acres of lodgepole pine habitat in the eastern parcel. None of the lands to be conveyed are in Later Successional Reserves nor do they meet the age and structural requirements for old growth.

Topography is gentle. The soil is rocky, with occasional large boulders. It varies from well-drained to areas of overland flow.[37] All of the lands to be conveyed are classified as non-suitable for timber production by management direction. This is because all of the lands to be exchanged are either in A11 or A4.

Moist mixed conifer habitat is a forest, or rarely woodland, dominated by evergreen conifers, deciduous broadleaf trees, or both. Late seral stands typically have an abundance of large coniferous trees, a multi-layered canopy structure, large snags, and many large logs on the ground. Early seral stands typically have smaller trees, single-storied canopies, and may be dominated by conifers, broadleaf trees, or both. Coarse woody debris is abundant in early seral stands after natural disturbances, but much less so after clearcutting. Forest understories are structurally diverse: evergreen shrubs tend to dominate on nutrient-poor or drier sites; deciduous shrubs, ferns, and/or forbs tend to dominate on relatively nutrient-rich or moist sites. Shrubs may be low, medium-tall, or tall. Almost all structural stages are represented in the successional

[35] Field guide to the forested plant associations of the Westside central cascades of northwest Oregon
[36] Productivity in the montane mixed conifer is only slightly lower than in the moist mixed conifer habitat type. As such, for the purposes of this analysis, acres of moist and montane conifer habitat types will be aggregated together.
[37] Northwest Forestry Services, Timber Cruise Report 2016

sequence within this habitat. Mosses are often a major ground cover. Lichens are abundant in the canopy of old stands.

The lodgepole pine habitat is composed of open to closed evergreen conifer tree canopies. Vertical structure is typically a single tree layer. Reproduction of other more shade-tolerant conifers can be abundant in the undergrowth. Several distinct undergrowth types develop under the tree layer: evergreen or deciduous medium-tall shrubs, evergreen low shrub, or graminoids with few shrubs. On pumice soils, a sparsely developed shrub and graminoid undergrowth appears with open to closed tree canopies.

The western land parcel to be exchanged (approximately 68 timbered acres[38]) is all in the Pacific silver fir habitat types with ABAM/VAME/XETE[39] being the most prolific (Lebo 2016). This forest type; as seen in figure 35, is considered to be moderately productive. Average site index for Douglas-fir in this forest type is 90. Species other than Pacific silver fir in the overstory consist of Douglas-fir, mountain hemlock, western hemlock, western red cedar, Alaska yellow cedar and western white pine. Estimated age of the average sized tree is 130 to 145 years old. However, the stand contains many young seedlings and saplings, as well as scattered relic trees that are estimated to be around 400 years old. Most of the trees fall into the 16- to 25-inch diameter breast height (d.b.h.) range. A few being 25 inches d.b.h. or larger. Canopy cover averages 77 percent with a range of 52 to 82 percent. Average tree height is 112 feet. Figure 35 shows the typical tree cover in the western parcel.

Figure 35. Typical moist mixed conifer area in Government Camp

The eastern parcel (approximately 41 acres[40]) is dominated by lodgepole pine habitat types with smaller inclusions of moist mixed conifer (ABAM/VAME/XETE). Species other than lodgepole pine in the overstory include: Douglas-fir, western red cedar, and Pacific silver fir. The average tree is 85 to 95 years old, but the stand contains many young seedlings and saplings as well as old growth that is estimated to be around 400 years. Most of the trees fall into the 11- to 18-inch

[38] Approximately 55.2 timbered acres, 4.3 acres of improvements, 2.6 acres of riparian reserves, 2.6 acres of powerline right-of-way, and 2.4 acres of brush.
[39] Pacific silver fir/huckleberry/bear grass
[40] Approximately 37.2 acres of timbered lands, 2.8 acres of wetlands, and 1 acre of riparian reserve.

d.b.h. range; a few being 21 inches d.b.h. or larger. Canopy cover averages 63 percent with a range of 41 to 76 percent. Average tree height is 110 feet. Figure 36 shows the typical tree cover in the eastern parcel.

Figure 36. Typical lodgepole pine area in Government Camp

There are individual trees or clumps of trees that meet the standards for old growth. According to the Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (2001 Survey and Manage ROD) “old-growth” is defined as an ecosystem distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics, which may include tree size, accumulations of large dead woody material, number of canopy layers, species, composition, and ecosystem function. More specific parameters applicable to various species are available in the U.S. Forest Service, Region 6, 1993 Interim Old Growth Definitions (USDA Forest Service 1993). The Northwest Forest Plan Supplemental EIS and FEMAT (Forest Ecosystem Management Assessment Team) describe old-growth forest as a forest stand usually at least 180 to 220 years old with moderate-to-high canopy closure; a multi-layered, multi-species canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood; numerous large snags; and heavy accumulations of wood, including large logs on the ground. The two Government Camp parcels to be conveyed lack key components of the old growth definitions. Mainly stand age and the large-diameter snags and down wood are missing (USDA Forest Service and USDOI BLM 1994).

Table 71. Resource indicators and measures for the existing condition Government Camp Lands

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Existing Condition[41]
Productivity of Forested Lands being Exchanged	Highly Productive Plant Associations	Acres	101
Timber Production	Suitable for timber Production	Acres	0

Resource Indicator and Measure 1 - Productivity of Forested Lands

Analysis of the Government Camp area illustrates that 101 of the 108 acres of the lands to be exchanged are of moderate productivity.

Resource Indicator and Measure 2 - Suitable or Unsuitable for Timber Production

Analysis of the Government Camp area indicates that the 101 forest acres of land will be exchanged. None of the 101 acres is suitable for timber production because they all fall under LUAs A4 and A11. Regulated timber harvest is prohibited under management direction for both LUAs.

Lands to be Acquired

The large majority of the lands to be acquired are in the moist mixed conifer habitat types and can generally be categorized as plantations less than 80 years old and lightly entered stands over 80 years of age. The lands that are being acquired under this exchange have been managed more intensely than those lands to be conveyed. The acquired lands include areas with many buildings and other infra-structural improvements such as: ski slopes, parking lots, tennis courts, etc. In addition to these developed acres, the bulk of the acquired lands are timbered acres that the Forest Service will take under management. These timbered lands consist of plantations as well as second-growth managed stands.

Of the acres being received in the land exchange, 452 are classified as moist mixed conifer. An additional 244 acres are considered to be dry mixed conifer. The remaining 67 acres[42] are other less productive forest types. The moist and dry conifer lands being received are considered very productive forest habitats (ABGR/MANE2 and ABGR/HODI)[43]. While these two forest types are in the grand fir series, the dominant tree is Douglas-fir. Average site indices for Douglas-fir in the ABGR/MANE2 and HODI types are 128 and 125, respectively. These are well above the site index of 90 for Douglas-fir in the Government Camp lands to be exchanged. As well as being productive, the vast majority of the acres to be acquired are considered suitable for timber production; 732 acres are considered suitable for timber production and 33 acres are unsuitable.

The predominant stand structures of these acquired lands can best be described as immature plantations less than 80 years old and lightly entered stands over 80 years (figure 37 and figure 38).

The majority of the plantations are in the stem exclusion stage dominated by small to medium size material with a quadratic mean diameter (QMD) ranging from 5 to 8 inches, an average of

[41] The lands being exchanged.
[42] Mixed conifer-deciduous 30 acres, interior Douglas-fir 14 acres, ponderosa pine –Douglas-fir 13 acres, and lodgepole pine 9 acres.
[43] ABGR/MANE2 – grand fir/dwarf Oregon grape; ABGR/HODI – grand fir/ocean spray.

800 TPA and an average height of 65 feet (figure 35 and figure 36). Canopy cover averages approximately 80 percent with a range of 60 to 100 percent (Olesker 2014).

Figure 37. Plantation less than 25 years old

Figure 38. Overstocked plantation over 25 years old

The areas that have been lightly entered range in age from 80 to 120 years old and are dominated by stands in the re-initiation stage (figure 39). Canopy cover averages approximately 70 percent with a range of 50 to 90 percent. The QMD within these stands range from 9 to 12, an average of 900 TPA and have an average height of 75 feet. Regeneration in these stands are dominated by shade-tolerant species like grand fir and western hemlock. These stands have an abundance of ladder fuels built up in the understory with very little to no shrub component.

Figure 39. Typical dense stand with ladder fuels in Cooper Spur

On average, the lands being received are below Forest Plan standards for snags. Currently, within plantations there are roughly 1 snag per acre and in lightly entered stands there are 3 snags per acre

Under the proposed action, in the Cooper Spur area 249 acres of matrix lands that are being proposed to become wilderness or the new Crystal Springs LUA are classified as suitable for timber production; 1,092 acres are currently classified as unsuitable for timber production. Lands under A2 Wilderness or the new A14 Crystal Springs Watershed Special Resources Management Unit LUAs are by management direction unsuitable for timber production.

Resource Indicator and Measure 1- Productivity of Forested Lands

The 696 acres being acquired in the Cooper Spur area are considered to be highly productive from a biomass production standpoint[44] (table 72).

Resource Indicator and Measure 2- Suitable or Unsuitable for Timber Production

Currently, for the lands to be acquired in the Cooper Spur, there is no decision as to whether they are suitable or unsuitable for timber production. This is due to them being held privately. On existing Forest Service lands near Cooper Spur there are 249 acres suitable for timber production. After the land exchange, all of the acquired acres will be unsuitable per management direction (table 72).

Table 72. Resource indicators and measures for the existing condition Cooper Spur lands

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Existing Condition[45]
Productivity of Forested Lands being Exchanged	Highly Productive Plant Associations	Acres	696
Timber Production	Suitable for timber Production	Acres	249

Environmental Consequences

One of the characteristics of forest types is how “productive” they are. A standard indicator of productivity is “site index.” Site index is a species-specific measure of the site quality or productivity expressed in terms of the average height of dominant or co-dominant trees at a specific age (Helms 1998). Essentially, the higher the site index at a common age, the higher the productivity. Site quality; because it is directly related to “how fast can we grow a ‘large’ tree,” directly affects a variety of resources (timber, wildlife, hydrology, etc.). The measure for site index will be the number of acres lost or gained with higher site index levels.

A complementary resource indicator to productivity is: are the lands to be exchanged suitable for timber production? The measurement indicator for this will be whether areas are considered suitable or unsuitable for timber production or from vegetation management. The measure will be the net loss or gain in the acres suitable for timber production. Table 73 illustrates both resource indicators and measures.

[44] The lands being acquired are generally in the grand fir habitat types, and approximately 41 percent more productive than the predominantly Pacific silver fir and lodgepole habitat types of the lands being conveyed.
[45] The lands being acquired.

Table 73. Resource indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure (Quantify if possible)	Used to address: P/N, or key issue?	Source (LRMP S/G; law or policy, BMPs, etc.)?
Productivity of Forested Lands being Exchanged	Forest Habitat Types	Acres	No	None
Timber Production	Timber Suitability	Acres	No	NFMA

The change in the number of productive acres and acres considered to be suitable for timber production in the lands being lost and gained will be used to measure the effect to the silvicultural resource.

Lands are considered to be either suitable or unsuitable for timber production based on an analysis of their intrinsic physical values such as: are they naturally forested or not, are they in areas prone to landslides and mass-wasting, or are the soils highly compactable? These are a few of the physical characteristics that either singly or together indicate an area's suitability or unsuitability. Management decisions also govern suitability/unsuitability. Management direction for designated wilderness or special emphasis areas automatically make them unsuitable for timber production. Suitable for timber production means "regulated" timber production. Unsuitable for timber production still allows for management actions like timber salvage or other vegetation manipulation projects in certain LUAs.

Direct and Indirect Effects

Alternative 1

By definition, direct and indirect effects (40 CFR 1508.8), and cumulative effects (40 CFR 1508.7) result from the proposed action, and thus, are not germane to the no-action alternative.

The effect of adopting alternative 1 would be no change in the existing acres suitable for timber production nor in the acres of highly productive timber stands, and 1,700 acres of Matrix lands would not be converted into a wilderness or designation (table 74).

Under the no-action alternative, the existing condition, as described earlier, of the proposed lands to be exchanged would continue to persist under the auspices of natural succession. There would be no change in the number of acres that are either increasing or decreasing in site productivity. There would be no change to the number of existing acres that are suitable or unsuitable for timber production. No forested lands would be removed. Regulated timber harvest and salvage, as well as other non-regulated vegetation treatments, would still be allowed in the LUAs where they are currently allowed.

Table 74. Resource indicators and measures for alternative 1

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	(+/-) Number of acre change from the existing condition
Productivity of Forested Lands being Exchanged	Highly Productive Plant Associations	Acres	0
Timber Production	Suitable for timber Production	Acres	0

Alternative 2

Resource Indicator and Measure 1 - Productivity of Forested Lands

The direct effect of adopting the proposed action on resource measure one is that the Forest Service would add 657 more productive acres in the A14 LUA, when compared to the existing condition (table 74). There are no indirect effects because productivity is a constant metric.

Resource Indicator and Measure 2 - Suitable or Unsuitable for Timber Production

The number of acres considered as suitable for timber production will decrease by approximately 249 acres (table 75). This is due to 249 acres of suitable lands in both the B2 and the C1 LUAs being re-classified as either A2 or A14 after the land exchange. A2 and A14 are unsuitable for timber production by management direction. There are no indirect effects because timber suitability is a constant metric.[46]

Table 75. Resource indicators and measures for alternative 2 direct and indirect effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	(+/-) Number of acre change from the existing condition
Productivity of Forested Lands being Exchanged	Highly Productive Plant Associations	Acres	+ 657
Timber Production	Suitable for timber Production	Acres	- 249

Summary of Effects

Table 76 illustrates that implementation of the proposed action would increase the productivity of the Mt Hood National Forest while at the same time it would also lower the number of acres suitable for timber production across the Forest.

The inherent value of a more productive acre of timber is desirable by more resources than just timber. The ability to grow larger trees faster is desirable to the wildlife resource in areas that might lack larger-diameter forest structures or larger coarse woody debris, and hydrology and fisheries resources would benefit from increased canopy cover in areas where it may be limited

Table 76. Summary comparison of environmental effects to silvicultural resource

Resource Element	Indicator/Measure	Alt 1	Alt 2
Productivity of Forested Lands being Exchanged	Highly Productive Plant Associations	0	+ 657
Timber Production	Suitable for timber Production	0	- 249

Cumulative Effects

Alternative 1

Since there are no direct or indirect effects, there can be no cumulative effects.

[46] Unless management direction changes. This cannot be predicted.

Alternative 2

There are no cumulative effects to resource indicator and measure 2: timber production. That effect is direct and immediate. However, the cumulative effect from the proposed action to resource element 1: timber productivity, is that, over time trees will grow larger, faster on the lands acquired than was occurring on the lands conveyed.

Socioeconomics

Introduction

The land exchange, connected actions, and subsequent uses of the lands after exchange have the potential to have social and economic effects to local communities. This socioeconomic analysis is an evaluation of how the proposed action would affect quality of life, human uses and values, environmental justice, and economic efficiency. The social and economic analysis area consists of the two Oregon counties where the proposed exchange would takes place—Clackamas and Hood River counties.

This analysis does not address the land appraisal or process. The appraisal process is governed by a strict set of rules and guidelines. In addition, the appraisal is assumed to be accurate and represents the real market value of the lands and properties. This analysis does address the assumed uses of the land after the proposed exchange and the social and economic impacts of this on the communities.

This analysis generally describes the economic impacts of the acquisition of the Cooper Spur Mountain Resort which would require development of a new special use permit. Special use permit(s) would be issued for the concession operation and maintenance of the Cooper Spur Ski Area and Cooper Spur Mountain Resort. This analysis does not discuss detailed effects to the existing Cooper Spur Ski Area special use permit nor does it address all potential permutations of options available for the new permit(s).

The purpose and need is to comply with the congressional direction and conditions in the Omnibus Public Land Management Act of March 30, 2009 (123 Stat. 991, P.L. 111-11). As such, social or economic issues are not driving the purpose and need. However, the unique environment provided by the Mt. Hood National Forest and the conditions of the proposed action impact the quality of life and welfare of the surrounding communities. In addition, the project environment is nationally iconic and therefore the welfare effects may extend beyond the local communities to additional communities of users, as well as non-users.

Affected Environment

Existing Condition

Existing social and economic conditions are necessary to establish the baseline from which to estimate potential consequences of the proposed land exchange. This section analyzes the current conditions and trends related to the social and economic environment of the planning area, including: population and demographics, human uses and values, local government taxes and revenues, and Forest Service revenues and expenses. Environmental justice is also addressed.

Social Conditions

Population Size, Growth and Density

This section highlights population trends in the two county study area. Population is an important consideration in managing natural resources. In particular, population structure (size, composition, density) and population dynamics (how the structure changes over time) are essential to describing the consequences of changes to the forest on the social environment (Seesholtz et al. 2006).

Population Size and Growth

The study area was home to 398,338 people as of the 2010 Census of population (U.S. Census Bureau 2010). Table 77 displays population data for the two counties in the study area, as well as state and national population figures for census years 2000 and 2010.

Table 77. Population, population change, and population density

	Population Count, 2000	Population Count, 2010	Percent Change in Population, 2000–2010	Population Density, People per Square Mile, 2000	Population Density, People per Square Mile, 2010
Clackamas County	338,391	375,992	11.1	181.1	201.0
Hood River County	20,411	22,346	9.5	39.1	42.8
Oregon	3,421,399	3,831,074	12.0	35.6	39.9
United States	281,421,906	308,745,538	9.7	79.6	87.4

Source: U.S. Census Bureau, 2010 and 2000 census.

Clackamas County is considerably more populated than Hood River County. As of the 2010 census it was the third most populous county in the State of Oregon (U.S. Census Bureau 2010). Clackamas County is situated immediately southwest of the city of Portland, Oregon, and the county is part of the Portland-Vancouver-Hillsboro, Oregon-Washington metropolitan statistical area. Oregon City, the county seat, contains 8 percent of the county population.

Government Camp, an unincorporated community within Clackamas County, is adjacent to the project area. Government Camp is a community of 193 residents as of the 2010 census. However, these residents occupy only 16 percent of the housing units located within the community. Over 75 percent of the housing units are for seasonal, recreational, or occasional use (U.S. Census Bureau 2010). The owners and users of these housing units are not included in the population count. Government Camp is entirely surrounded by National Forest lands and is the closest community to the larger Mt. Hood area ski resorts of Timberline Ski Area, Mt. Hood Meadows Ski Resort, and Mt. Hood Skibowl. Summit Ski Area, a smaller ski area, is located adjacent to the Government Camp community.

Hood River County is considerably less populated than Clackamas County. Hood River County is delineated as a micropolitan statistical area—an area with an urban cluster greater than 10,000 but less than 50,000 population, or socially or economically integrated with the core (Office of Management and Budget 2015). Hood River County contains the city of Hood River where over 35 percent of county residents live (U.S. Census Bureau 2010). The county also contains several

unincorporated communities, Parkdale, Odell, and Mt. Hood are closest to the portion of the project area located in Hood River County with populations of 311, 2,255, and 286, respectively (U.S. Census Bureau 2010).

Both counties saw steady growth in population between 2000 and 2010 decennial census estimates. According to the American Community Survey (U.S. Census Bureau 2006–2014) population growth has continued in a similar upward trend growing at an average 0.9 and 1.0 percent annually in Clackamas and Hood River Counties, respectively, from 2010 to 2014. Population growth signals continued economic opportunity, desirable amenities, or both (McGranahan 1999).

Population Density

Population density can serve as an indicator of a number of socioeconomic factors of interest—urbanization, availability of open space, socioeconomic diversity, and civic infrastructure (Horne and Haynes 1999). More densely populated areas are generally more urban, diverse, and offer better access to infrastructure. In contrast, less densely populated areas provide more open space, which may offer natural amenity values to residents and visitors. Table 77 displays the number of people per square mile for each of the counties of interest.

Clackamas County is the fourth most density populated county in the State of Oregon with more than 200 people per square mile in the county (U.S. Census Bureau 2010). Hood River County is considerably less densely populated, with 42.8 people per square mile, but still slightly above statewide average density levels. Often low population density points to high levels of public ownership. However, both counties have above average population density and still contain a majority of land area as federally managed—53 and 62 percent in Clackamas and Hood River county, respectively, in 2010 (U.S. Department of the Interior 2016). The majority of this public land is managed by the Forest Service.

Human Uses and Values

An assessment of values, beliefs, and attitudes provides insight into the relationship between the public and the proposed project area. Members of the public submitted scoping comments on the Mt. Hood Land Exchange. These comments were evaluated to identify values, beliefs, and attitudes related to the proposed project activities. This section forms the basis of the subsequent social effects analysis.

As of 2010, Hood River County had 62 percent of total land area federally administered—99 percent of which is the Mt. Hood National Forest—spanning from the Columbia River Gorge past Mt. Hood itself (U.S. Department of the Interior 2016). Clackamas County had over 52 percent of its total land area federally administered—87 percent of which is by the Forest Service (U.S. Department of the Interior 2016). The majority of this is Mt. Hood National Forest. These lands provide a significant resource for recreation and the proximity to populations, including Portland, Oregon’s largest city, which means many people are able to enjoy this resource. The national visitor use monitoring finds that 10 of the top 15 reported zip codes for visitors to the Mt. Hood National Forest are in Multnomah County—the county containing Portland (USDA Forest Service 2016b). Zip codes from Hood River and Clackamas County also appear in this list (USDA Forest Service 2016b).

Highlighting the economic contributions of this resource the National Forest Economic Contributions (USDA Forest Service 2016c) estimates local recreation visitors (traveling 50 miles or less for activities including picnicking, backpacking, skiing, snowmobiling) to the

Mt. Hood National Forest generated $14.1 million (in 2014 dollars) in gross regional product—the market value of all final goods and services produced within the region. Another $31 million (in 2014 dollars) in gross regional product is generated by non-local recreation users.

Public scoping highlighted the appreciation of this resource as comments included statements regarding the use and enjoyment of the Forest. Public scoping comments highlighted the recreation value of the "historic backcountry" found on the Cooper Spur parcel as some commenters began their submissions with statements such as "a frequent user of this back-country area" or "a long-time visitor and use.r. The project is believed by many commenters to enhance recreation values due to both the Mt. Hood National Forest acquisition of new lands on the Cooper Spur side of the Forest and the new wilderness designation also proposed in that area.

Government Camp

Both Government Camp parcels are boarded on one side by low-density residential development providing nearby residents amenities such as beauty and scenery of the forest, wildlife viewing, and a sense of solitude, as well as recreational opportunities. The parcels include two segments of a non-motorized trail system. These trails are used for hiking and biking in summer and for Nordic skiing, winter fat biking, and snowshoeing. Scoping comments supported the value of these trails for year-round recreation. Other comments stated residents and visitors "use this trail to ski home from Timberline Ski Area," and "it is a very popular snowshoe and cross-country ski trail." In the summer they becomes the "most popular hiking and mountain biking trails."

All users of these recreation trails are demonstrating value; however, value can also be measured though the price of nearby homes. Indeed, a scoping comment encapsulates this by saying proximity to the trails is "often a consideration when purchasing a unit". Studies have shown that homes in neighborhoods with trails sell at a premium (for example, Asabere and Huffman [2009]). More specifically, one such study found that proximity to trail entrances positively impacts property values (Parent and von Hofe 2013).

Cooper Spur

The easterly slope of the Cooper Spur project area contains historic recreation opportunities in the Tilly Jane and is highly valued wilderness recreation opportunities for the counties in the study area, but also the nearby urban population centers and visitors from farther away. Tilly Jane Ski Trail is historically significant because it was built to provide direct access to the structures in the Cloud Cap/Tilly Jane Historic District and the northeast side of Mt. Hood during the snow season. As a result, the area became immensely popular with backcountry recreational enthusiasts. A significant portion of the public submitted scoping comments relate to the value and special attachment the public has for the recreational use of both project areas, but with special emphasis on the Tilly Jane recreation area. For example, one individual states "This part of Mt. Hood is one of my favorite places to snowshoe, camp and climb precisely because it is remote and not developed." The recreation opportunities of the proposed project areas are discussed in more detail in the Recreation Specialist Report.

The acquisition of the Cooper Spur parcels by the Forest Service remove the land from private ownership and as one commenter states "removes the possibility of development." Commenters "value the assurance of no development in area," "value remote and not developed," and "protect the historic backcountry on the North side of Mt. Hood from further commercial development." One commenter believes the project would "ensure the quality remains high for everyone's visit."

One business also noted the prevention of development in these locations as a positive aspect of the project, but for reasons outside of the effects on recreation and forest users. They note the positive effects of the lack of development as it relates to off-forest activities such a "fewer uses and people in the area that are incompatible with our farm and forest practices; Less traffic to interfere with farm operations and slow moving tractors on highways. Less competition for water so that we can irrigate our crops."

While the comments were largely in support of the project related to recreation and access, one commenter noted concerns stating that "closing roads and trails and adding to Wilderness makes additional land inaccessible to the general public (unless you are a hiker)."

The project area is also contains tribal ceded lands. These lands provide traditional uses to tribes in the region. This is outlined in the "Environmental Justice" section below and in greater detail in the Cultural Resources and Treaty Rights Specialist Report.

Non-market Values

The economic value of U.S. forests are not entirely captured in market transactions. Much of the value of National Forests is "non-market" in nature—meaning that many of the benefits that forests provide to humans are not bought and sold in a market transactions and therefore assigning a price is more problematic. The lack of a price, however, should not be conflated with an absence of value. Indeed, non-market values from forests provide economic benefits to adjacent communities and forest visitors. One example is provided by a scoping comment, "removing the possibility of development will help keep this side of the mountain wild for the sustainability of watersheds, wildlife, and traditional human-powered recreation." Another commenter stated "This is an opportunity to protect some still undeveloped sections of the forest, for use by future generations."

Ecosystem services are "components of nature, directly enjoyed, consumed, or used to yield human well-being" (Boyd and Banzhaf 2007). Healthy forests provide numerous ecosystem services, including clean water and air, biodiversity, forest products, and many other goods and services. Numerous commenters addressed their desire to see the proposed action implemented due to the potential water quality benefits that would be provided. Consistent with direction provided in 40 CFR 1502.23 and Forest Service Handbook 1909.15 (July 6, 2004) and 22.35 January 14, 2005), the analysis of environmental consequences will consider non-market goods and services primarily in qualitative terms. Where appropriate, discussion of how the alternatives may affect non-market values will be presented. However, due to the qualitative nature of these discussions, direct comparisons between changes in market and non-market values are generally not possible.

Economic Benefits

Local Government Taxes and Revenues

State and local government in Oregon receive revenue from both privately owned and federally managed lands through several types of payment mechanisms. These are Federal Payments In-Lieu of Taxes (PILT), the Secure Rural Schools Act, Federal 25 Percent Fund, and property taxes paid on private lands.

Forest Service County Payments. Counties receive revenue sharing payments from commercial activities on Federal lands, such as oil and gas leasing, livestock grazing, and timber harvesting. Beginning in 1908 the payment was 25-percent of the moneys received annually. Since 2008 the

payments are based on 25-percent of the 7-year rolling average annual receipts. These payments are commonly called 25-percent payments. However, in 2000, the Secure Rural Schools and Community Self-determination Act was passed which offered a guaranteed source of payments that was not tied to annual commercial revenue on National Forests. Clackamas and Hood River Counties both elected to receive the Secure Rural Schools Act State Payment share in 2015 and not the 25-percent payments. Table 78 shows the county total and per-acre revenue from Forest Service payments in fiscal year 2015.

Table 78. Forest Service county payments, fiscal year 2015

	Total Acres	Total Payments	Average Payment per Acre
Hood River County	209,303	$735,579.47	$3.51
Clackamas County	508,440	$1,289,828.64	$2.54

Source: USDA Forest Service (2016)

Payments In-Lieu of Taxes (PILT). PILT are Federal payments to local governments that help counties offset losses in property taxes associated with nontaxable Federal land located within a county's boundary. PILT payments are distributed by the Department of the Interior (DOI) for tax-exempt Federal land administered by the BLM, the Forest Service, the National Park Service, U.S. Fish and Wildlife Service, and for Federal water projects and some military installations. These payments are designed to supplement other Federal land receipt-sharing payments that local governments may receive, including timber receipts from national forests, grazing fee receipts, mineral material sales receipts, and some receipts collected on wildlife refuges. PILT payments traditionally helped balance the uneven distribution of Federal 25 Percent Fund payments between counties with Forest Service land and counties with other types of Federal land that do not generate timber revenues. PILT has historically been a more stable and dependable revenue source than Federal 25 Percent Fund payments because it is a flat per-acre payment that is not tied to levels of revenue generated by Forest Service land.

Both Clackamas and Hood River Counties receive PILT payments for Federal lands. Table 4 shows total and per-acre payments made to the two counties in fiscal year 2015 for all PILT-eligible lands. As mentioned above, a majority of Federal lands in both counties which the payments are based is administered by the Forest Service.

Table 79. Payments in-lieu of taxes, 2015

	Total PILT Payments	Payments per Acre	PILT Acres Administered by Forest Service
Hood River County	$74,152	$0.36	99.9%
Clackamas County	$616,512	$0.98	87.4%

Source: U.S. Department of the Interior (2016)

County Property Taxes. The local property tax system is one of the most important sources of revenue for local taxing districts in Oregon. Property taxes are based on county assessed value of privately owned real property (land, buildings and fixed machinery and equipment), manufactured homes and personal property used in a business. Tax rates are established based on the amount of property taxes a district needs to support the budget for a fiscal year. Property taxes are specified in the form of a rate per $1,000 of assessed value. These rates vary within counties by the locality. The tax rate in Government Camp was 14.9306 (as of August 2016)

(personal communication with Clackamas County Department of Assessment and Taxation). The tax rates for the project area in Clackamas County are 12.0096 and 11.8873 (as of August 2016), varying by the location of the parcels (personal communication with Micaela Keller, Compliance Planner, Hood River County).

Forest Service Revenue and Expenses

There are several recreation-related special use permits issued within the project area. Tilly Jane A-Frame, Cloud Cap Inn, the Snowshoe Club Cabin, and the concessionaire campgrounds are discussed in the Recreation Specialist Report. These special use permits are not affected by the proposed project and are not discussed in this report. See the Recreation Specialist Report for additional details.

Cooper Spur Ski Area

The Cooper Spur Ski Area operates under a special use permit that currently is set to expire at the end of 2021. The current area permitted by the special use permit is 1,172 acres. There are 20 skiable acres. All structures and facilities are privately owned. It is a solely winter operation and its operating calendar is dependent on adequate snow coverage, but typically closes the day after spring break (late March). The number of days it is open fluctuates annually between 0 and 60. Some drought years it has not opened. Its 3-year average skier days is 4,666 per year. Its 10-year average is 9,681 per year. (Details on operation and use were obtained through personal communication with Scott Kaden, Special Use Permit Administrator and Artillery Program Manager, Mt. Hood National Forest.)

Special use permits holders are assessed fees by the Forest Service. The Cooper Spur Ski Area pays an annual land use fee based on revenues from the operation. Because this is an annual operation which is highly weather dependent, the annual fees paid by Cooper Spur have ranged widely from a minimum $110.00 to $6,500.00 (personal communication with Scott Kaden, Special Use Permit Administrator and Artillery Program Manager, Mt. Hood National Forest). These fees are paid directly to the U.S. Treasury and are not available to the Forest for use.

The public expressed concern over the ability of the Forest Service to care for and manage the facilities associated with this ski area which would be acquired under the proposed action. One commenter stated “acquisition of the Cooper Spur ski area and its aging infrastructure is substantially counter to the public interest.” Commenters generally were interested in the plans the Forest Service has for the future use and management of the ski hill, and the financial implications of such.

The facilities associated with the ski area as well as the currently privately owned Cooper Spur Mountain Resort, which would also be acquired under the proposed action, have undergone a comprehensive property condition assessment by Miller Consulting Engineers, Inc. and PAE Consulting Engineers (USDA Forest Service 2012). The assessment finds the facilities in need of “urgent corrective action” and “immediate upgrade,” as well as maintenance that can be deferred for 3 to 10 years or more. Table 80 shows the estimated costs of repairs to the ski area and resort by the indicated urgency level. The sum of the recommended urgent repairs is just over $6,000 for the ski area (in 2015 dollars). The Cooper Spur Inn and Resort is an additional $34,000 (in 2015 dollars) for urgent repairs. Based on the property condition assessment report, total repairs needed at the ski area (excluding ski lifts) within the next 10 years is $90,940 (in 2015 dollars). Including the Cooper Spur Resort, needed repairs increases the 10-year total to $331,228 (in 2015 dollars). The Facilities Specialist Report discusses the structures and their condition in greater detail.

Table 80. Estimated repair totals for Cooper Spur Ski Area and Resort facility deficiencies, by timeframe required (in 2015 dollars)

	Urgent Corrective Action	Immediate Upgrade (1–3 years)	Deferred Maintenance (3–10 years)	Action Required Beyond 10 years	Structure Decom-missioning
Ski Area	$6,123.79	$65,976.27	$18,840.04	$0.00	$24,331.01
Resort	$34,028.73	$177,420.53	$28,838.17	$2,719.16	$134,365.10
Total Repair Costs	$40,152.51	$243,396.81	$47,678.21	$2,719.16	$158,696.11

Note: Repair and structure decommissioning estimates exclude ski lifts.
Source: USDA Forest Service (2012). Updated with 2015 dollars using Bureau of Labor Statistics Consumer Price Index.

Environmental Justice

Executive Order 12898 directs Federal agencies to focus attention on the human health and environmental conditions in minority and low-income communities. The purpose of EO 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations.

Environmental justice is the fair treatment and meaningful involvement of people of all races, cultures, and incomes, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. The goal of environmental justice is for Federal agency decision-makers to identify impacts that are disproportionately high and adverse with respect to minority and low-income populations and identify alternatives that will avoid or mitigate those impacts. According to USDA DR5600-002 (USDA 1997), environmental justice, minority, minority population, low-income, and human health and environmental effects, are defined as follows.

> Environmental Justice means that, to the greatest extent practicable and permitted by law, all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner by, government programs and activities affecting human health or the environment.
>
> Minority means a person who is a member of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.
>
> Minority Population means any readily identifiable group of minority persons who live in geographic proximity to, and, if circumstances warrant, migrant farm workers and other geographically dispersed/transient persons who will be similarly affected by USDA programs or activities.
>
> Low-income Population means any readily identifiable group of low-income persons who live in geographic proximity to, and, if circumstances warrant, migrant farm workers and other geographically dispersed/transient persons who will be similarly affected by USDA programs or activities. Low-income populations may be identified using data collected, maintained and analyzed by an agency or from analytical tools such as the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty.

> Human Health and/or Environmental Effects as used in this departmental regulation include interrelated social and economic effects.

The emphasis of environmental justice is on health effects and/or the benefits of a healthy environment. The CEQ has interpreted health effects with a broad definition: "Such effects may include ecological, cultural, human health, economic or social impacts on minority communities, low-income communities or Indian Tribes…when those impacts are interrelated to impacts on the natural or physical environment" (CEQ 1997).

Race and Ethnicity

According to the U.S. Census Bureau, American Community Survey (2014) data, the two counties are reasonably similar in their racial composition (table 81). Both counties have nearly 90 percent white populations. Clackamas County has a higher share of Asian population, 3.9 percent compared to 1.3 percent in Hood River County. However, Hood River County has a substantially higher share of Hispanic or Latino persons—30.3 percent—which is about twice the share found at the state and national level.

Table 81. Race and ethnicity (%)

	Clackamas County	Hood River County	Oregon	United States
White	89.5	89.6	85.1	73.8
Black or African American	0.9	0.3	1.8	12.6
American Indian and Alaska Native	0.7	0.6	1.2	0.8
Asian	3.9	1.3	3.9	5.0
Native Hawaiian and Other Pacific Islander	0.3	0.3	0.4	0.2
Some other race	1.5	4.8	3.7	4.7
Two or more races	3.3	3.0	3.9	2.9
Hispanic or Latino (of any race)	8.0	30.3	12.1	16.9

Source: U.S. Census Bureau, 2010–2014 American Community Survey 5-Year Estimates, table DP05.

The communities located closest to the proposed project area are predominately white. Government Camp was 95 percent white as of the 2010 Census. Parkdale, Odell, and Mount Hood in Hood River County had lower share of white populations at 65, 76 and 75 percent, respectively. This is driven primarily by the relatively larger share of Hispanic or Latino populations in these three communities which identify as non-white (some other race) (U.S. Census Bureau 2010).

A 2013 study found that Hood River and Clackamas counties had the third and fourth highest population of migrant and seasonal farm workers in the state (Larson 2013). The degree which this population is already accounted for in the U.S. Census Bureau estimates is unknown. Migrant and seasonal farm workers may be undocumented and therefore less willing to participate in government-sponsored survey for fear of deportation or other repercussions, so estimates may be under representing this population.

Low-income Populations

The percentage of residents in both Clackamas and Hood River County with income below the poverty level are below statewide levels (table 82). The incidence of poverty is often not evenly distributed among racial and ethnic groups. For example, nationally, 13 percent of the white population was below the poverty level in 2014, while 27 percent of the Black or African American population was below poverty levels. At a state-level, Oregon showed similar discrepancy with 15 percent of the white population and 36 percent of the Black or African American population below the poverty level. The Hispanic and Latino population had equally high levels of poverty—25 percent nationally and 28 percent in Oregon—in 2014 (U.S. Census Bureau 2014). While county-level estimates of poverty by race and ethnicity have very low levels of reliability due to small sample size, this pattern appears to hold and the higher rate of poverty in Hood River County relative to Clackamas County is driven by a larger share of minority populations—notably Hispanic or Latino.

Table 82. Percentage of people with Income below poverty level

	People Below Poverty Level
Clackamas County	9.7
Hood River County	15.7
Oregon	16.7
United States	15.6

Source: U.S. Census Bureau, 2010–2014 American Community Survey 5-Year Estimates, table DP03

The study area satisfies criteria for identifying environmental justice communities. It has a meaningfully greater share of Hispanic or Latino residents than the state. In addition, Hispanic or Latino residents appear to have higher rates of poverty than other groups in the study area.

Environmental Consequences

Direct and Indirect Effects

Alternative 1 - No Action

The cost of project planning and environmental analysis would be the same under both alternatives. There would be no change to the Forest costs and revenues as a result of the alternative because existing management plans and land use allocations do not change, existing Forest boundaries remain intact, and management strategies are not altered under the no-action alternative.

The 109 acres north of the village of Government Camp would remain under Forest Service ownership, and in the Forest Plan the land use allocation is “A11 Winter Recreation Area.” The community of Government Camp would not see any growth due to development on the Forest Service parcels. There would be no changes to Clackamas County revenues as no new lands would enter or leave public ownership. Residents and visitors to Government Camp would continue to use and enjoy the existing trail system. There would be no adverse impact to tribal activities and access.

Under this alternative the Mt. Hood National Forest would not acquire the Cooper Spur Ski Area and its infrastructure, and therefore not acquire the uncertainty about the financial implications

of management or decommissioning of these facilities. The existing 1,172-acre Cooper Spur Ski Area Special Use Permit area and boundary would remain the same. The nine structures and ski lifts on the ski hill (Forest Service land) would remain under private ownership. No new special use permit prospectus would be advertised. The current nonexclusive permit expires in 2021, and may be extended an additional 20 years if it is in compliance with the site development schedule in the Master Development Plan. The no-action alternative would continue to generate variable revenue for the U.S. Treasury under the existing special use permit for the Cooper Spur Ski Area.

The Cooper Spur Mountain Resort, including the land and 15 buildings would remain under private ownership. No special use permit prospectuses would be advertised. This land is zoned C-1 (Commercial Zone). Additional lands would remain under private ownership. These lands are currently zoned as F-2, and F-1 (Primary Forest and Forest Zones) (personal communication with John Roberts, AICP, Community Development Director, Hood River County). Therefore, there is the potential for development on some of these lands. Scoping comments suggested development was undesirable in this area and could adversely affect quality of life due to changing the character or quality of the area for recreation users and potential increases in traffic. Therefore, this alternative would result in decreased welfare of the local community relative to the proposed action, should development occur at these sites. Development on this private property would impact county tax revenues as development would increase the market value of the property and therefore the taxable value. Correspondingly, development could also increase the costs of county services if development required additional law enforcement activity or road maintenance, for example.

The 1,709 acres within land use allocations A4 (492 acres), A11 (1,109 acres) and B2 (108 acres) would not be re-allocated as wilderness (land use allocation A2) and the Crystal Springs Watershed Special Resources Management Unit would not be created. Summer and winter recreation would continue in the current manner, under the current land use allocations. As a result, this alternative would contribute less toward enhancing the remote backcountry experience some user's value. Therefore, this alternative would contribute less to the range of cultural, social, and spiritual needs of wilderness recreationists. Hence, contributions to their well-being and sustainability would be less than Alternative 2. However, without a wilderness designation the area would continue to provide motorized and mechanized forms of access (for example, mountain biking) and therefore would offer higher well-being for this user group than under Alternative 2.

Because the Crystal Springs Watershed Special Resources Management Unit would not be created in this alternative, these acres would not be managed to meet to specific needs for the protection of the quality and quantity of the Crystal Springs Watershed. As a result, Alternative 2 would contribute more toward ecosystem services, specifically a clean drinking water source for the residents of Hood River County. Hood River residents would continue to benefit from the proximity of the National Forest and the existing ecosystem services, including water quality protection. However, they would not benefit from the targeted resource management provided under the proposed action.

Alternative 2 – Proposed Action

The proposed action includes the conveyance of two parcels totaling approximately 109 acres of NFS lands adjacent to Government Camp in exchange for the acquisition of approximately 769 acres of land owned by Mt. Hood Meadows Oregon, LLC. Once the Federal parcels are conveyed, the land would be available for development subject to the requirements in the Government Camp Village Revitalization Plan and the Clackamas County Comprehensive Land

Use Plan. The original legislation requires trail easements, while the Clarification Act specifies the Forest Service to reserve a 24-foot-wide, non-exclusive trail easement at the existing trail locations on the Government Camp parcels. The Clarification Act has not yet been passed by Congress, but both actions are discussed below.

The Omnibus Act identifies approximately 769 acres located in Hood River County as the non-Federal estate. Approximately 514 acres are located outside the current Forest Service administrative boundary. The non-Federal estate is comprised of three diverse property types situated in the vicinity of the Cooper Spur Ski Area on the northeast flank of Mt. Hood. The three types are: the structures and personal property at the Cooper Ski Area, land and all development at the Cooper Spur Mountain Resort, and mostly vacant forest land. Because the underlying land at the ski area is already federally owned and administered, only the infrastructure, including lifts, is considered in the estate to be conveyed. The special use permit area would be reduced from 1,172 acres to about 60 acres.

Mt. Hood Wilderness and the Crystal Springs Watershed Special Resources Management Unit (Forest Plan land use allocation A14) would be created.

The proposed action involves issuing a special use permit(s) for the concession operation and maintenance of the Cooper Spur Ski Area and Cooper Spur Mountain Resort. The term of the permit(s) would be for 20 years with an option to extend the permit(s) another 20 years non-competitively if the permittee operates at a sustained satisfactory level. However, if there is no interest expressed for concessionaire operation and maintenance of the Cooper Spur Ski Area and Cooper Spur Mountain Resort, a prospectus would be developed to consider the need to keep the structures administratively. If the buildings are determined to be in excess to the government's need, a disposal process would be triggered.

Social Conditions

Population Size, Growth and Density

As mentioned in the "Affected Environment" section, a portion of population growth in this region can be attributed to the scenic beauty and outdoor recreation supported by the Mt. Hood National Forest. Communities surrounding the Mt. Hood National Forest are attractive as places to live due in part to their proximity to open spaces and natural settings which provide residents with easy access to recreational opportunities year round. Under all the alternatives, these open spaces and natural settings would continue to support quality of life for area communities and be a contributing factor to population growth. For communities where development is less desired in the project region, Hood River County for example, this alternative would convey private property to public ownership acting as a protection to those parcels from development and a buffer to potential development. This protection from development and buffering effect would provide greater welfare and non-use values compared to the no-action alternative.

In exchange for the protection from development through public ownership in Hood River County, Federal lands would be placed in private ownership in Clackamas County. It is assumed that these properties would be developed into residential units subject to state and county laws, building codes, and zoning regulations. The assumed level of development would increase the total housing units in Government Camp by close to 40 percent. As mentioned in the "Existing Condition" section, only 16 percent of existing units are used as primary residences. It is unknown whether and to what extent these new units would be used as primary versus secondary residences. That is to say, it is unknown the effect this development would have on the population count of the community. The community's considerable seasonal residences are due

to the desirable qualities such as open space, natural setting and recreational opportunities provided. Regardless, the proposed alternative would result in increased population, visitors and users to the area.

Human Uses and Values

Government Camp

Under Alternative 2 the existing Forest Service trails on the Government Camp parcels would be placed under easements, and should the Clarification Act be passed by Congress they would be non-exclusive, 24-foot-wide trail easements. Non-exclusive means the trails could be relocated to facilitate development by the land owner. The assumption was made that the location of trails outside of the proposed parcels to be conveyed would not change; however, it is assumed likely that the location of the trails within the parcels proposed for conveyance would change should the Clarification Act pass, which would allow this.

The relocation of these trails would affect the properties in Government Camp as access to these trails provide residents of and visitors to the housing units one means of convenient access to recreation opportunities. The direction and magnitude of this effect on the community as a whole is not possible to determine at this time as any trail relocation will have both winners and losers in terms of proximity and relative ease of access due to relocation of trails.

The width of the trail easement would be 24 feet total under the Clarification Act. This width would indirectly affect the future management of the trail system. The intent of the Government Camp Trails Project (2009) was to increase the amount of groomed trail on the Mt. Hood National Forest outside of developed ski areas for Nordic skiing (see Recreation Specialist Report for more details). The width of the proposed trail easement would likely be insufficient to accommodate the appropriate equipment for winter grooming operations. Therefore, this alternative could directly and negatively affect the welfare of this community of users.

The result of the development surrounding the Government Camp trail system could also negatively affect users' enjoyment and scenic beauty of these trails due to changes in location and nearby developments as well as potential trail discontinuity and changes in safety due to additional road crossings. If so, it could be that users may choose to use alternative sites and trails which might adversely impact local business, such as guiding businesses.

Cooper Spur

A connected action in Alternative 2 would re-allocate Forest Service lands as wilderness and the Crystal Springs Watershed Special Resources Management Unit would be created. This alternative would contribute toward enhancing the remote backcountry experience many users value. Therefore, this alternative would contribute to the range of cultural, social, and spiritual needs of wilderness recreationists. Hence, contributions to their well-being and sustainability would be greater than the no-action alternative. However, a wilderness designation would make lands less accessible to users who currently may access these lands through mechanized or motorized means, such as mountain biking and snowmobiling, thereby reducing this community of users' well-being.

There are economic effects of a wilderness designation related to recreation, cultural heritage, on-site hunting, and commercial guiding and outfitting. Wilderness attracts tourists and generates visitor spending in communities nearby as people value wilderness for recreation opportunities. Studies have been done to help document this employment and income generated by wilderness visitation (for example, Hjerpe et al. [2016]). However, several factors in the Mt. Hood National

Forest complicate the economic assessment of recreation benefits of wilderness designation. Namely the relative scarcity of wilderness as a number of acres are already designated. That is, the marginal value of each additional acre is expected to decrease and the marginal value is unknown. In addition, the self-limiting nature of parts of the Forest means that, in practice, many non-designated areas are already protected from motorized access. In these instances, the wilderness designation may add limited value in terms of direct recreational use. However, other non-market values of wilderness designation are discussed below.

The Recreation Specialist Report also discusses impacts to recreational users in greater detail.

Non-market Values

The proposed action would recommend an additional 1,709 acres of wilderness, which represents an approximately 2.5 percent increase within the Mt. Hood National Forest, as well as create the Crystal Springs Watershed Special Resources Management Unit. The social value of wilderness is not limited to recreation (as discussed above). Wilderness and this special management area may provide amenity values to nearby residents and landowners, support ecosystem service provision (for example, clean water and carbon sequestration), and offer opportunities for research and environmental education. Indeed, the purposes of the Crystal Springs Watershed Special Resources Management Unit are to ensure the protection of the quality and quantity of the Crystal Springs Watershed as a clean drinking water source for the residents of Hood River County, Oregon; and, to allow visitors to enjoy the special scenic, natural, cultural, and wildlife values of the Crystal Springs Watershed. Designated wilderness may also protect “non-use” values. Non-use values arise not from the consumption of goods or services provided by wilderness areas, but from the value of knowing it exists or preserving the option to visit in the future. The proposed action would do more to support social and non-market values related to wilderness and specially managed lands than the no-action alternative.

Economic Benefits

Local Government Taxes and Revenues

The proposed action would remove private property from the Hood River County tax rolls placing the land under Federal management. Clackamas County would see the opposite result having Federals lands placed into private ownership. As a result, this alternative would have opposite effects to the two counties revenues.

Under the proposed alternative Hood River County would see a decrease in county revenues because the increase in PILT and Forest Service payments would not fully offset the decrease in county property tax revenues. The direct effect is estimated to be an annual decrease of less than 0.5 percent of 2015 total county revenue.

Under the proposed alternative Clackamas County would see an increase in property tax revenue due to the conveyance of Forest Service parcels into private ownership as county property tax revenues are estimated to exceed the loss in Federal payments. The degree to which the county tax revenues increase in Clackamas County will be contingent on the development which occurs and the assessed value of the development. Therefore, the potential effects are unknown, but estimated. It is estimated the annual increase in tax revenue could range from 0.01 percent of 2015 total county property tax revenue on the undeveloped parcels to 0.1 percent of total county property tax revenue if the parcels are developed.

The above effects indicate changes in county revenues as a result of the proposed action. This, however, does not consider changes or avoided county expenditures which these taxes are levied

to cover. For example, Clackamas County and Government Camp could incur additional costs from the new residential development for public services such as roads and maintenance, law enforcement, or schools. The decrease in private lands could result in avoided costs in Hood River County for similar public services.

Forest Service Revenues and Expenses

Alternative 2, the proposed action, would have direct and indirect financial implications for the Forest.

Land Exchange and Connected Actions

A direct result of Mt. Hood National Forest acquiring new lands and the connected actions of the wilderness designation and management area designation would be both one-time costs as well as annual or intermittent costs that are incurred. One-time costs are expected to include, but are not limited to: boundary surveying and boundary marking, new signage, staff time to develop forest plan amendments and issuing special use permit prospectus. (Costs related to the special use permit for the Cooper Spur Ski Area and Resort and the related structures are discussed in the following section.) These costs are not expected to generate additional jobs or alter the absolute size of the Mt. Hood National Forest's budget, but would result in an opportunity cost of Forest activities that are foregone or postponed as a result of the need to carry out these activates.

Annual or intermittent costs incurred due to the proposed action (excluding the costs discussed related to the Cooper Spur Ski Area and Mountain Resort, discussed below) are expected to include, but are not limited to: changes in management due to the required use of primitive tools for maintenance on portions of trails within the designated wilderness area; Forest Service time related to administration of the special use permit.

Cooper Spur Ski Area and Mountain Resort

The acquisition of the Cooper Spur Ski Area and Mountain Resort would require development of a new special use permit. Special use permit(s) would be issued for the concession operation and maintenance of the Cooper Spur Ski Area and Cooper Spur Mountain Resort. The permit area for the Cooper Spur Mountain Resort and ski area under Alternative 2 includes 129 acres, a reduction of the existing special use permit for the ski area from 1,172 acres.

The proposed action is an administrative change that does not involve construction of new facilities or infrastructure. All of the sites currently exist, and management would continue with existing policies and regulations. Site improvements would be authorized with separate NEPA analysis. Land use and facility rental fees would be assessed annually based on revenues and/or the fair market value for the uses authorized. However, if there is no interest expressed for concessionaire operation and maintenance of the Cooper Spur Ski Area and Cooper Spur Mountain Resort, a prospectus would be developed to consider the need to keep the structures administratively. If the buildings are determined to be in excess to the government's need, a disposal process would be triggered.

Two potential scenarios are analyzed for the subsequent administration of the facilities and equipment acquired by the Mt. Hood National Forest include: (1) fully operational ski area and resort; and (2) ski area is decommissioned while base facilities are repurposed and inn and resort is fully operational.

Fully operational ski area and resort. Special use permit(s) would be issued for the concession operation and maintenance of the Cooper Spur Ski Area and Cooper Spur Mountain Resort.

Because the Forest Service would own the facilities in addition to the land which the concessionaire is operating the fees would be based on both revenues as well as a facility use fee. These fees would be collected under the authority of the Granger-Thye Act of 1950 (FSH 2709.11 Chapter 30). The annual fees paid by Cooper Spur Ski Area in the past, based on revenues alone and collected under a term permit authority, have ranged widely from a minimum of $110.00 to $6,500.00. The minimum was assessed in recent years when the ski area did not open due to inadequate snow fall. The fees paid by any future concessionaire would not necessarily be similar due to the change in the special use permit permitting area, the change in ownership of the facilities, the different fee collection authority and the potential addition of the facilities at the Cooper Spur Mountain Resort. The annual fee for the Mountain Resort operation is not estimable at this time. At the time the appraisal is complete a better assessment of fee may be possible. The fees from the ski area and resort are expected to remain variable due to the seasonal nature of the weather-dependent business operation.

The acquired facilities however, would require investment to meet operational standards. An assessment finds the facilities in need of “urgent corrective action” and “immediate upgrade”, as well as maintenance which can be deferred for 3 to 10 years or more (USDA Forest Service 2012). Table 80 shows these estimated costs of repairs to the ski area and resort by the indicated urgency level.

The Granger-Thye Act fee offset authority, allows the concessionaire to perform pre-agreed upon work, as well as emergency maintenance as a fee offset. The work is outlined in an annual or 5-year Granger-Thye Act plan. Therefore, this fee collection authority provides an offset to the facilities upgrades and maintenance outlined in the property condition assessment report. The fees are not estimable at this time however, given the estimated repair costs the fees required to cover these costs can be calculated. Table 83 shows the estimated costs and required fees to cover these costs over different time periods. If the “urgent corrective actions” and “immediate upgrades” are incurred in years 0 and 1, an assessed permit fee of over $59,000 annually for 5 years is required to cover these costs. However, if a longer time frame—10 years—is allowed for cost recovery additional maintenance costs will also be incurred, but the longer timeframe to recover costs reduces the total required fee to under $40,000 annually.

Table 83. Permit fees required to cover estimated repair costs over 5 years and 10 years

	Net Present Value		Annual Fees Required
Repair Totals, 0–1 years (urgent and immediate upgrades)	$265,601	5-Year Fee Plan:	$59,661
Repair Totals, 0–10 years (urgent, immediate, and deferred maintenance)	$307,987	10-Year Fee Plan:	$37,972

Source: Repair Costs are based on USDA Forest Service (2012) and updated to 2015 dollars using Bureau of Labor Statistics Consumer Price Index. Repair costs are assumed to be incurred in years 0, 1, and 3. A 4 percent real discount rate is used. Future inflation is assumed to be zero.

Ski area is decommissioned while base facilities are repurposed and inn and resort is fully operational. Special use permit(s) would be issued for the concession operation and maintenance of the Cooper Spur Mountain Resort with the base area facilities repurposed for additional resort activities. The ski lifts would be decommissioned. Because the Forest Service would own the facilities in addition to the land which the concessionaire is operating the fees would be based on both revenues as well as a facility use fee. These fees would be collected under the authority of the Granger-Thye Act of 1950 (FSH 2709.11 Chapter 30). The annual fee

for the Mountain Inn Resort operation are not estimable at this time. At the time the appraisal is complete a better assessment of fee may be possible. The fees from the resort are expected to remain variable due to the seasonal nature of the business operation. However, the Forest revenues from the resort are expected to be variable due seasonality of visitation. Also, without the ski area operation, which is highly seasonal and dependent on weather conditions, the variability could be less than the above scenario. Further, the total revenue may be lower as well without the business generated from the ski area operation.

The repair schedule and fee calculations to cover repairs are the same as the above scenario. This scenario assumes all facilities, excluding the ski lifts, are repaired and repurposed for resort use.

Under this scenario, the ski area would not be operated. There are several methods to dispose of these facilities. These alternatives are discussed in detail in the Facilities Specialist Report. This report considers only the decommissioning option which comes at an expense to the Forest Service. The estimated cost of decommissioning the ski lifts is $100,000 (personal communication with Rithy Bein, Civil Engineer, Mt. Hood National Forest). There are no fees or revenues to offset this cost. The opportunity cost of this action would be the activities the Forest cannot pay for due to the funds being spent on decommissioning.

Environmental Justice

The proposed action results in improvements in environmental quality and improved recreation opportunities for many users. The proposed land exchange is estimated to result in lower county revenues in Hood River County which could have potential effects on county services. However, the decrease in revenue is very small and not expected to affect environmental justice communities.

The Confederated Tribes of Grand Ronde and Warm Springs would lose access to 109 acres of ceded land for traditional uses through the conveyance of the Government Camp parcels. The assumption is that the land conveyance would result in an adverse effect to this cultural resource. In exchange for the Government Camp parcels, Mt. Hood National Forest would acquire approximately 769 acres on the east side of Mt. Hood (Cooper Spur parcels), of which all would be Confederation Tribes of Warm Springs ceded land. The acquired parcels are located further from the Confederation Tribes of Warm Springs reservation. While this alternative results in a net increase of ceded lands, the location and makeup of the parcels are not equivalent impacting access and use.

One of the connected actions associated with this land exchange is the re-assignment of 1,709 acres of Forest Service “matrix” lands to wilderness. As a result of this re-assignment, use of these lands by the Confederate Tribes of Warm Springs for traditional use would be restricted.

The Cultural Resources and Treaty Rights Specialist Report documents in further detail the consultation efforts with the tribes and the potential mitigation activities are currently under discussion.

Table 84. Resource indicators and measures for alternative 2 direct and indirect effects

Resource Element	Resource Indicator	Measure (quantify if possible)	Alternative 2 Direct and Indirect Effects
Social Conditions	Population size, growth and density	Change in housing units	Government Camp would see approximately 40% increase in total housing units
Human Uses and Values	Recreation	Qualitative evaluation	Enhances the remote backcountry experience increasing welfare of wilderness recreationists Decreases well-being of mechanized and motorized access user groups Government Camp Trail relocation and nearby development could affect users' enjoyment and scenic beauty of these trails as well as safety
Human Uses and Values	Property values	Change in property values (Qualitative)	Moving trail location in Government Camp would have indeterminate effects on property values with some units benefiting while others negatively impacted
Human Uses and Values	Non-market values	Qualitative evaluation	Increases social and non-market values related to amenity, option and preservation values and ecosystem services
Economic Benefit	Local government taxes and revenues	Percent of 2015 County Property Tax Revenue	Hood River County: annual decrease of less than 0.5%; Clackamas County: annual increase ranging 0.01–0.1%
Economic Benefit	Forest Service revenues and costs	Qualitative evaluation; net present value	One time and annual increases in costs for implementation and management Fees generated by special use permit needed to offset urgent and immediate maintenance: approximately $60,000/5 years or $40,000/10 years Additional costs contingent on need to decommission acquired ski lift facilities: $100,000
Environmental Justice	Disproportionate and adverse effects to low-income and/or minority populations	Qualitative evaluation	Improvements in environmental quality and recreation opportunities for most users Net increase of ceded lands-the location and makeup of the lands are not equivalent Reassignment of acres to Wilderness restricts traditional uses

Forest Plan Amendment Summary

A programmatic forest plan amendment is needed to assign LUAs to the newly acquired land, change the land use allocations for the Wilderness addition and Crystal Springs Watershed Special Resource Management Unit, and add standards and guidelines for the Crystal Springs Watershed Special Resource Management Unit. These changes would contribute toward enhancing the remote backcountry experience many users value. Therefore, these LUA changes would contribute to the range of cultural, social and spiritual needs of wilderness recreationists. However, a wilderness designation would make lands less accessible to users who currently may

access these lands through mechanized or motorized means, such as mountain biking and snowmobiling, thereby reducing this community of users' well-being.

Cumulative Effects

The spatial boundaries for analyzing the cumulative effects to social and economic conditions are the same as that for direct and indirect effects, which includes the counties of Clackamas and Hood River. Individuals who reside in these counties are most directly impacted by the proposed action as well as any past, present, and reasonably foreseeable activities relevant to the cumulative effects analysis. However, communities of users and visitors to Mt. Hood National Forest reside outside the study area and are addressed where appropriate.

The temporal scope extends from present through 20 years, which is the expected length of any initial special use permit issuance. The action is a one-time event, but social and economic consequences would continue to impact communities. Unmeasurable impacts would continue into the future.

Alternative 1

There is the potential for development on private lands in the study area. Scoping comments suggested development was undesirable in Hood River County and could adversely affect quality of life due to changing the character or quality of the area for recreation users and potential increases in traffic. Under Alternative 1 there is more private land available for development and could result in cumulative effects in the region when considered with other potential development on private lands. This would also impact both county revenues and costs.

Since there are no direct or indirect effects to environmental justice in Alternative 1, there would be no environmental justice cumulative effects.

Cumulative effects related to recreation and facility management are addressed in the relevant specialist reports.

Alternative 2

Development is always possible on other privately owned lands throughout the study area. Development would result in changes in local tax revenues and impacts to the costs of county services. The magnitude of the changes to revenues in the proposed action is small and unlikely to be contributing in any meaningful way to impacts on revenues from development in other parts of the study area.

None of the past, present, or reasonably foreseeable activities would affect economic efficiency because none of the activities would affect the costs or revenues associated with the proposed land exchange.

The Government Camp-Cooper Spur land exchange is directed by the Omnibus Public Land Management Act of 2009 (123 Stat. 991, P.L. 111-11), which also directed additional wilderness designations of lands in the Mt. Hood National Forest. The cumulative effects of other wilderness lands means the marginal value of additional wilderness acres is decreasing, however the total recreation and non-market values would be larger with the additional wilderness.

Additional wilderness designated lands also results in additional areas where traditional use by Indian tribes would be restricted.

The effects to social and economic resources are summarized in table 85.

Table 85. Summary comparison of environmental effects to social and economic resources

Resource Element	Measure (quantify if possible)	Alternative 1	Alternative 2
Social Conditions	Population and change in housing units	Current rate of population growth in region would likely continue.	Government Camp would see approximately 40% increase in total housing units. This is expected to largely impact seasonal use and not population levels, but would impact needed county services and Mt. Hood National Forest visitation.
Human Uses and Values: Recreation	Qualitative evaluation	Residents and visitors to Government Camp would continue to use and enjoy the existing trail system.	Development in Government Camp could negatively impact users enjoyment and safety on existing trail segments Enhances the remote backcountry experience increasing welfare of wilderness recreationists Decreases accessible area for mechanized and motorized access user groups
Human Uses and Values: Property Values	Change in property values (qualitative)	No new development and no changes to existing trail system results in no direct effects to property values in Government Camp.	Moving trail location in Government Camp would have indeterminate effects on property values with some units benefiting while others negatively impacted.
Human Uses and Values: Non-market values	Qualitative evaluation	Mt. Hood National Forest will continue to provide social and non-market values to users and non-users. However, without the targeted management efforts, the values will be lesser than under alternative 2.	Supports greater social and non-market values related to amenity, option, and preservation values and ecosystem services than alternative 1.
Local Government Taxes and Revenues	Percent of 2015 County Revenue	No changes to county revenues.	Hood River County: annual decrease of less than 0.5% Clackamas County: annual increase ranging 0.01-0.1%
Forest Service Revenues and Costs	Qualitative evaluation; net present value	No changes to costs and revenues.	Forest Service would see one time and annual increases in costs for implementation and management of new lands and plans. The fees generated by special use permit needed to offset urgent and immediate maintenance of newly acquired facilities are significant. Additional costs could be incurred, but are contingent on need to decommission acquired ski lift facilities should no concessionaire be found. The costs to the Forest Service are greater under alternative 2.
Environmental Justice	Qualitative evaluation	No effects to environmental justice communities.	Alternative 2 results in improvements in environmental quality and improved recreation opportunities for most users. There is a net increase of ceded lands; however, the location and makeup of the lands are not equivalent. Reassignment of acres to wilderness restricts traditional uses for Indian tribes.

Soils, Wetlands and Water Rights

Introduction

This section addresses terrain, soil, and wetland resources in the project areas that could be affected as well as water rights. Interpretations and descriptions contained in this report rely heavily on local information derived from the soil surveys of Clackamas and Hood River Counties (USDA NRCS 1985 and 1981), the Mount Hood National Forest Soil Resource Inventory (USDA Forest Service 1979), digital spatial data in the Forest Service's corporate Geographic Information System (GIS), and other local reports as cited. These information sources were used along with topographic and geologic maps, aerial photographs, watershed analyses, and field-based reconnaissance and sampling to characterize local conditions and support evaluation of the potential environmental consequences of the proposed land exchange.

Affected Environment

Government Camp Parcels

The parcels to convey adjacent to Government Camp are located on the lower southern slopes of Mt. Hood, a glaciated volcano. Terrain was formed by pyroclastic and debris-flows deposited during several former primary eruptive periods, the most recent occurring between about 1,400 to 1,800 years before present. Slopes are gentle to moderately steep (averaging 5 to 15 percent) and fairly uniform.

Soils underlying the parcels developed in loosely consolidated parent materials comprised chiefly of highly mixed andesite and dacite rocks and sands, and volcanic ash. The Mt. Hood National Forest Soil Resource Inventory (SRI, USDA Forest Service 1979) identifies several dominant soil types with a similar range of characteristics, capabilities, sensitivity, and resilience. They comprise about 87 percent of the total acreage of the conveyance parcels.

They are relatively young soils that have incurred nominal development, meaning they have weak structure and cohesion, a somewhat thin topsoil, and have low organic content. These are moderately acidic soil types, with a somewhat low nutrient status. Surface soils are mostly gravelly medium-textured loams, sandy loams, or silt loams over deep subsurface layers of coarser cobbley sandy loams. Litter and duff layers provide a nearly continuous layer of protective ground cover that is partially densified by the weight of a 3- to 4-foot deep snowpack that develops and persists through the winter in most years.

These soils are capable of producing and supporting fully stocked stands of high-elevation coniferous forest, principally because of the prodigious annual precipitation. But since the elevation is fairly high, the soil temperature regime is cold, and the growing season relatively short, so the degree of forest productivity (i.e., growth rate) is considered to be low to moderate.

These are permeable, well-drained soils with moderate to high infiltration rates, and moderately low runoff potential. Erosion hazard of surface soils is slight, but moderate in subsurface soils. The risk of mass movement is low. Their susceptibility to compaction is low to moderate. Overall, these soil types are not considered to be sensitive, but because of their thin topsoil, low organic content, weak structure, and the elevation they are moderately prone to disturbance and their inherent resilience to naturally recover can be low to moderate.

Sensitive Soils

Within these dominant soil types are contrasting inclusions. These are wetland soils and they comprise about 8 percent (9 acres) of the total acreage of the conveyance parcels. Categorized as hydric soil types, these are permanently saturated at the surface and are either headwater springs or locations of high water tables. They support emergent vegetation, hardwood shrubs, or in places coniferous forest and function to regulate hydrologic vacillation and sediment production, produce organic matter, buffer nutrients and pollutants, and provide unique aquatic habitats. Hydric soil types are considered to be sensitive to disturbance because they are saturated, flooded, or ponded throughout the growing season. Once impaired, or hydrologically altered as a result of ground disturbance, their functional capability is easily diminished and can be problematic to restore.

Soil Conditions

Soil resources in the conveyance parcels are considered to be mostly in an undisturbed condition and unimpaired. The extent and footprint of prior human-caused ground disturbance is not widespread. Commercial timber harvest has not been a principal management objective. Compaction is present in powerline and an old gondola corridors as access roads, there are also foot trails, and a couple of other old dirt road segments. Overall, however, it is estimated that detrimental soil impacts comprise less than 5 percent of the conveyance parcel acreage.

Soil quality across the majority of the parcels is in relatively good condition. Soils are functioning to support and maintain a growing native forest. They are mostly functioning to their capability, and despite some prior disturbance serving as a growing medium, storing and cycling nutrients and water, producing biomass, and supporting or regenerating a contiguous vegetative cover.

Cooper Spur Parcels

The parcels to acquire adjacent to the Cooper Spur Mountain Resort are located near the base of the northeastern slopes of Mt. Hood, a glaciated volcano. Terrain is variable and mountainous, consisting of broad gently sloped ridges and benches dissected by a couple of steep narrow ravines and several weakly defined drainages; and moderately steep mountain side slopes. On average, slopes range between about 5 and 15 percent, but in several places they slant to 40 percent or more. Their shape transitions from concave to convex, but in places on the broad ridges and benches, they tend to be uniform.

The most extensive (over 85 percent of the parcel’s acreage) soil types underlying the parcels developed in volcanic ash and mixed gravelly colluvium with high proportions of pyroclastic materials and andesite (USDA NRCS 2016). They have undergone a moderate degree of development, and have a lighter colored leached surface horizon that overlies a subsoil with good structure where organic carbon, aluminum, and iron has accumulated from above. Slightly acidic, these soils have a moderately good nutrient status. Surface and subsurface soils are mostly ashy, fine sandy loams that overlie a buried rocky, loamy glacial till. On the surface, a litter and duff layer provides a continuous effective ground cover.

These soils receive a prodigious amount of annual precipitation and are capable of producing and supporting fully stocked stands of mid-elevation coniferous forest, and can support over-stocked stands, too. The elevation is somewhat high and the soil temperature regime cold. These soils store a good amount of water late into the growing season, so the degree of forest productivity (i.e., growth rate) is considered to be moderate to moderately high.

These are very deep, well-drained soils that are moderately permeable, with a moderate infiltration rate and moderate runoff potential. They have good water-holding capacity. The erosion hazard is moderate to high and the mass movement potential is moderate, depending upon the degree of slope. Their susceptibility to compaction is moderate to high. Overall, these soil types are not considered to be sensitive. Because they are deep, with lots of volcanic ash, have a high water-holding capacity, a fair amount of organic carbon, and moderate to moderately high productivity, these soils not overly prone to ground disturbance, and exhibit a moderately high degree of resilience. They have an inherent capability to recover from disturbance.

Other soils of minor extent are located in several narrow, confined ravines. They are rocky soils that are somewhat shallow (less than 40 inches deep), less developed, and are ashy sandy loams that overlie andesite. Their side slopes are steep (50 to 70 percent). They comprise less than 15 percent of the parcel's acreage.

Sensitive Soils

Inclusions of wetland soils are also present in the bottom of one of the ravines and in a swale. These are hydric soils and they comprise less than 1 percent (4 acres) of the acreage (WPN 2010). They support emergent vegetation, hardwood shrubs, or, in places, coniferous forest and function to regulate hydrologic vacillation and sediment production, produce organic matter, buffer nutrients and pollutants, and provide unique aquatic habitats. Hydric soil types are considered to be sensitive to disturbance because they are saturated, flooded, or ponded throughout the growing season. Once impaired, or hydrologically altered as a result of ground disturbance, their functional capability is easily diminished and can be problematic to restore.

Soil Conditions

Soils in the acquisition parcels have been subject to ground-disturbing activities, primarily in the form of past timber harvest and some rural/resort development. The footprint of prior human-caused ground disturbance is present on all parcels, and timber harvest consisted of ground-based logging systems that included access spur roads, primary and secondary skid trails, and landings. Compaction is present on these surfaces, and in places, vegetative recovery in terms of tree stocking and growth suggests that detrimental soil conditions persist to a moderate extent. On portions of some parcels, it is estimated that the extent of detrimental soil conditions exceeds 10 to 15 percent of the acreage, while on others it is approximated to be between 5 to 10 percent. Currently, land use on these parcels consists mainly of rural recreational activities and private woodland management.

Soil quality across the majority of the parcels is fairly good. Soils are mostly functioning to their potential to support and maintain a growing native forest, although certain portions are less than fully stocked and exhibit growth rates that may not be to their full potential. Mostly, however, soils are functioning to their capability, and despite some prior disturbance, continue to serve as a growing medium, storing and cycling nutrients and water, producing biomass, and supporting or regenerating a contiguous vegetative cover.

Wetlands

A local wetland inventory was completed in 2010 for both the conveyance and acquisition parcels (WPN 2010). It identified the presence of wetlands, categorized their type, and delineated their location and extent. The inventory also assessed the function and values of each of the wetlands identified.

Government Camp Parcels

There are five areas on the conveyance parcels where wetlands have been identified. They amount to nearly 9 acres (8 percent of the total disposal acreage). They occur primarily in swales or drainageways. Most of these wetland areas are either forested or comprised of heavy brush, although one in the eastern parcel is dominated by emergent vegetation such as sedges. All can be characterized as either springs or having high water tables, and most are contributing headwaters to Camp Creek, although the most westerly ones drain to the pond known as Enid Lake in the Little Zigzag River drainage.

The wetlands in the Government Camp parcels are considered to have high functional value for organic production and transport, amphibian habitat, and richness of native aquatic plants. They are also sources of cold, high quality water. All but one are considered to be undisturbed, in good condition, and functioning unimpaired. One, however, has been disturbed in the past, and is located between two road and trail corridors where there was prior land use. Its hydrology has been altered and its function is partially impaired.

Cooper Spur Parcels

Two wetland areas have been identified on the acquisition parcels. They amount to about 4 acres (less than 1 percent), and are split nearly equally on each of the southern and northern parcels. One occurs along the long, narrow ravine of Tilly Jane Creek, and the other is in a long narrow swale that is tributary to Doe Creek. The former is a narrow floodplain adjacent to the creek and is forested with an emergent vegetation understory. The latter is mostly shrub and emergent vegetation. Both have high water tables and drain to the East Fork of Hood River.

These wetlands on the Cooper Spur parcels are considered to have high functional value for organic production and transport; good habitat for fish, aquatic vertebrates, mammals, and birds; and richness of native aquatic plants. They also convey cold water and filter sediment. The wetland in the Till Jane ravine is intact, in good condition, and functioning unimpaired. The other wetland, however, has been encroached upon by several rural home sites, a resort property, and several small adjacent dirt roads. It is also bisected by Cooper Spur road, but remains connected by a culvert. Although encroached upon, this wetland is in fairly good condition and continues to function with only slight impairment.

Water Rights

Water rights associated with the exchange parcels are recorded with the Oregon Water Resources Department (OWRD). The status, definition, and location of those water rights and any points of diversion have been queried using their online data base, the Water Rights Information System (OWRD 2016). Information acquired from that database has been compiled and is used here to characterize the associated water rights that are located within the boundaries of the exchange parcels. There are no federally reserved water rights within any of the exchange parcels.

Government Camp Parcels

There are two private party water rights on record located within the Forest Service parcels to convey. Both are designated for domestic use, one for a single dwelling and the other for five. Summarized in table 86, both are in a “non-cancelled” status. There are no records in the Water Rights Information System of wells or groundwater use in the parcels to convey.

There are two Points of Diversion for Certificate 22582, one originates from National Forest System (NFS) land and the other on private land. Certificate 54668 has a single Point of

Diversion that originates on NFS land. A pipeline conveys the water to the Point of Use on private land for both water rights. The priority of the right for Certificate 22582 was confirmed in October of 1938, and extensions to complete the construction and improvement of the system was granted into 1953. But with the development and subsequent expansion of the Government Camp water system, the use of this certified water right is uncertain, as it may have been succeeded. The priority of the water right for Certificate 54668 was confirmed in December of 1977, but there have been developments on the lot(s) since then that may have succeeded its use too.

Table 86. Summary of water rights in the Government Camp Parcels (OWRD 2016)

Permit or Certification No.	Tshp., Rng., Sec.	Type	Use	Point(s) of Diversion	Point of Use	Status
Cert. 22582	3S, 8.5E, 14	Surface Water, forks of Camp Ck. (2)	Domestic	Lot 3, NW ¼ SW ¼ (USFS) & Lot 4 SW ¼ SW ¼ (PVT)	Lot 4 SW ¼ SW ¼ (PVT)	Non-cancelled
Cert. 54668	3S, 8E, 13	Spring	Domestic	Lot 3, SE ¼ SE ¼ (USFS)	3S, 8E, 24, NW ¼, NE ¼ (PVT)	Non-cancelled

Cooper Spur Parcels

Table 87 summarizes the water rights recorded with OWRD that are within the acquisition parcels in the Cooper Spur area. Four of them are in a non-cancelled status, but the fifth one, which was for a Dillard Reservoir, has been cancelled. All are private party holders. Certificate 88981 is appurtenant to Tax Lot 103, which is the Cooper Spur Resort. It is the only water right designated for commercial use. Two other certificates also had Point of Use designations for the resort parcel, but both had points of diversion from another parcel and had priority dates in the late 1920s. So, while it's unconfirmed, it is likely that they have not been used for some time. The rights that were used primarily for irrigation to support livestock are also quite old, with priority dates from the early 1900s, and it's questionable when they were last in use.

Table 87. Summary of water rights in the Cooper Spur Parcels (OWRD 2016)

Permit or Certification No.	Tshp., Rng., Sec.	Type	Use	Point of Diversion	Point of Use	Status
Cert. 8190	2S, 10E, 6	Surface Water, Buck Ck.	Irrigation, Domestic	Tax Lot 102	Tax Lots 102, 103	Non-cancelled
Cert. 10729	2S, 10E, 6	Spring	Domestic	Tax Lot 401	Tax Lot 103	Non-cancelled
Cert. 15034	2S, 10E, 6	Surface Water, Unnamed	Irrigation	Tax Lot 102	Tax Lot 102	Non-cancelled
Cert. 88981	2S, 10E, 6	Well	Commercial	Tax Lot 401	Tax Lot 103	Non-cancelled
Permits R-12474 and R-12475	2S, 10E, 6	Reservoir, Dillard	Fire Protection, Fish & Wildlife	NE ¼ SE ¼	Same	Cancelled

Well logs recorded with OWRD indicate that several wells were drilled in the vicinity of 2S 10E 6, tax lots 102 and 401; however, most were abandoned because of inadequate or no water. According to the well logs, there are wells on tax lots 102 and 401. One of those, bore hole HOOD 517, was reconditioned, and is most likely the well associated with certificate 88981 for the Cooper Spur Resort.

Environmental Consequences

Effects of implementing any one of the alternatives have been analyzed based upon the regulatory framework that would be appurtenant to the type of land use. Public lands that would be administered by the Forest Service would be used based upon the standards and guidelines of attendant management plans and other applicable directives and Federal law. The use of private lands would be as per the individual land owner in accordance with State and county laws and zoning, and other Federal regulations, as applicable.

Direct and Indirect Effects

Alternative 1 – No Action

There would not be an exchange of lands under this alternative, and parcels would remain in their existing ownership. NFS lands would be administered as they currently are being used. Private lands would be used as is presently exercised by the current owner. Management of soil resources, wetlands, and water rights would remain as is.

Soil Resources

Government Camp Parcels

On the Federal parcels in Government Camp, soil resources would continue to be managed according to Standards and Guidelines of the Mt. Hood Land and Resource Management Plan (LRMP, USDA Forest Service 1990), as amended by the Northwest Forest Plan (NFP, USDA Forest Service and USDI BLM 1994). Regionally adapted agency directives including the programmatic Forest Service Manual and the activity-specific Forest Service Handbook would also guide any actions or management of soil resources on the Federal parcels.

Ground-disturbing activities in addition to current recreational use on existing trails or access on existing segments of road would not be expected to occur. Soils would remain in good condition and continue to function as a principal component supporting forest vegetation. They would be mostly unimpaired, providing ecosystem processes that transform, filter, store, and house water, nutrients, and biota. Existing soil conditions on the Government Camp parcels would not be expected to change. The current extent of detrimental soil conditions would not be expected to expand or diminish, and would remain in present form on compacted trails and segments of access roads. Sensitive hydric soil types would remain in an undisturbed condition.

Cooper Spur Parcels

Soils on private lands on the Cooper Spur tracts would continue to be used for rural home and recreational sites and woodland management. The footprint of prior human-caused ground disturbance would remain at its current extent on all parcels where there are cleared driving surfaces such as access spur roads/driveways, parking areas, old primary and secondary skid trails, and old landings. Detrimental soil conditions would persist on these surfaces to a moderate extent.

Soil quality across the majority of the parcels would remain in fairly good condition. Soils would function mostly to their potential to support and maintain a growing native forest or other home site vegetation such as grass, although certain portions would remain less than fully stocked and exhibit growth rates that may not be to their full potential. Mostly, soils would function to their capability, and despite some prior disturbance, continue to serve as a growing medium, storing and cycling nutrients and water, producing biomass, and supporting or regenerating a contiguous vegetative cover. Sensitive hydric soil types would remain mostly unimpaired in their current condition.

Ground-disturbing activities that could occur as a result of woodland management like timber harvest, would be regulated by the Oregon Department of Forestry according to the Oregon Forest Practices Act, which includes provisions to minimize adverse impacts to soils. Improvements, upgrades, or additional development of resort properties could potentially occur that would be ground-disturbing, and could convert productive soils to a surface type for another use such as a building site or parking area. These kinds of actions would be in response to the inclinations of the landowner and regulated by county zoning regulations and building codes.

Wetlands

Government Camp Parcels

Wetlands (9 acres) in the Government Camp parcels would continue to be managed by the Forest Service as directed by standards and guidelines in the LRMP and NFP. The standards and guidelines in the LRMP are intended to protect or restore these areas. The NFP recognizes them to be Riparian Reserves, prescribes specific buffer widths to protect them even further, and encourages restoration if needed.

The wetlands in the Government Camp parcels would remain in their current good condition and largely undisturbed and unimpaired. They would continue to have high functional value for organic production and transport, amphibian habitat, and richness of native aquatic plants. Being springs or having high water tables, they would remain sources of cold, high-quality water contributing to the headwaters of Camp Creek and the Little Zigzag River drainage.

Cooper Spur Parcels

In the Cooper Spur parcels the two wetlands (4 acres) would remain in private ownership. Any future development or construction within them would have to be authorized by the Oregon Division of State Lands and necessitate requisite review and permitting. Currently, few activities occur on them aside from minor, non-motorized recreational pursuits in the wetland adjacent to the resort and Cooper Spur Road.

There is no road or trail access to the wetland in the bottom of the Tilly Jane Creek ravine, so it would be expected to remain mostly undisturbed and intact. The wetland next to the resort property that has been encroached upon slightly would also be expected to remain fairly unimpaired. Both of these wetlands would continue to offer high functional values for organic production and transport; good habitat for fish, aquatic vertebrates, mammals, and birds; and richness of native aquatic plants. They also would continue to store water and filter sediment.

Water Rights

None of the water rights in the exchange parcels would change under the no-action alternative. There are no water rights on record in the name of the Forest Service in the exchange parcels. Water rights that are in a non-cancelled status would be expected to stay with their current right holders, and for the same beneficial uses unless transferred. No proof of use would be

anticipated. Any applications, permits, or certificates that are in a cancelled status could potentially become subject to re-application in the future through the OWRD application process.

Alternative 2 – Proposed Action

Lands exchanged under this alternative, would be managed differently than they were previously. National Forest System lands would be transferred to private ownership to be developed and used as residential and vacation properties. Laws or directives to conserve natural resources would no longer be administered by the Forest Service, rather they would be levied by other county, State, or Federal authorizations.

Private lands that would be transferred to Federal ownership to become public domain would be used as per the ascribed LRMP land allocation as amended by the NFP, and the 2009 Omnibus Bill. The management of soil, water, and wetland resources would be provisioned by the standards and guidelines specified by the designated land allocation, and according to Forest Service policy directives.

Soil Resources

Government Camp Parcels

Land use in the conveyance parcels would change from natural resource and recreation management to residential land use. Standards and guidelines of the Mt. Hood LRMP for soil productivity would no longer apply to the parcels. Soil management objectives to provide ecosystem services and sustain natural resources would shift to supporting residential buildings and infrastructure.

Soils would be converted from mostly an undisturbed condition to residential development, and would no longer function to support the maintenance and growth of a native forest. The extent and footprint of human-related ground disturbance resulting from conversion to residential use would increase substantially, with impervious surfaces comprising up to 40 percent of individual lots. Soil quality across the majority of the parcels would be transformed. Only the remaining portions of individual lots that are not an impervious surface would be available to serve as a growing medium, to store and cycle nutrients and water, and to support vegetation.

Cooper Spur Parcels

Land use in the acquired parcels would change from private ownership to management of natural resources and recreation on public lands. Standards and guidelines of the Mt. Hood LRMP for soil productivity (FW-022 to FW-038) would be put into effect. Soil management objectives would shift to providing ecosystem services that sustain natural resources and beneficial uses specified by the designated land allocation.

Soil quality across the parcels would remain in their current condition, which is fairly good. The existing footprint of prior human-caused ground disturbance such as building sites, parking and driveways, access spur roads, former primary and secondary skid trails, and landings would not be expected to expand. Detrimental soil disturbance on these surfaces would continue to persist in the near-term, but could be expected to improve somewhat from their current status. The degree of improvement would depend on the issuance of a special use permit for a concessionaire to run and manage the Cooper Spur Mountain Resort. If a permit were to be issued for the resort, then soil conditions could be expected to remain as they are with incremental improvements as soil restoration opportunities arise such as reconditioning of some segments of old access road. If a permit was not authorized, then the resort site would be

expected to be decommissioned. An element of decommissioning would be reconditioning of compacted surfaces such as building sites, parking areas, and segments of road, so that soils could become productive again. Site decommissioning would result in restoration of detrimental soil conditions, notably reducing their extent on the acquisition parcels.

In either circumstance, soils would continue to function mostly to their potential to support and maintain a growing native forest, although certain areas would remain less than fully stocked where growth rates would not be to their full potential. Mostly, soils would function to their capability, and despite some prior disturbance, continue to serve as a growing medium, storing and cycling nutrients and water, producing biomass, and supporting or regenerating a contiguous vegetative cover.

Wetlands

Nine acres of wetlands within the conveyance parcels would transfer from public to private ownership, while 4 acres would be transferred from private to public ownership. This would result in a net loss of 5 acres of wetlands from NFS lands. The local inventory of wetlands that was conducted for the exchange parcels included an assessment of function and values useful for making relative comparisons between individual wetlands based upon their ecological benefit. The methodology uses a series of rating scores that when summed generate a unit-less output value termed Functional Capacity Units (FCUs). Table 88 displays the FCUs that were determined for each site in the inventory's assessment.

Table 88. Comparison of functional capacity units (FCUs) for wetlands in the exchange parcels (WPN 2010)

Exchange Parcel	FCUs	Percent of Total FCUs	Acres
Government Camp	625	65	9
Cooper Spur Parcels	337	35	4
Total	962	100	13

Government Camp Parcels

Wetlands in the conveyance parcels would no longer be managed and conserved by the Forest Service as Riparian Reserves. Regulatory authority and oversight for the protection of these wetlands would switch to the Oregon Division of State Lands who share the responsibility implementing Section 404 of the Clean Water Act, the principal statute for governing activities in wetlands, with the Oregon Department of Environmental Quality, the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency. Activities associated with residential development that could encroach upon the wetlands would have to undergo a review and permitting process according to Oregon Revised Statute before they would be authorized (ORS 196.795-990).

A result of the proposed exchange would be that the wetlands acquired would have less function and value (i.e., ecological benefit) as represented by FCUs (table 88) than those that would be conveyed. The Forest Service would lose from its lands 9 acres of wetlands, and acquire 4 acres wetlands of a lesser ecological benefit. The inequity of the trade would not result in a loss of wetlands overall from the State because Section 404 of the Clean Water Act protects them from net loss regardless of ownership by the use of either on-site conservation easements or compensatory mitigation (i.e., funding the creation or restoration of wetlands at a different place and time and maintaining them in perpetuity). The proposed action would include conservation

easements, so the wetlands in the conveyed parcels would be protected according to regulation by the Oregon Division of State Lands.

Conservation easements would minimize direct impacts to the wetlands on the conveyed parcels. Existing wetland vegetation, hydrologic connectivity, and hydric soils would not be subject to ground-disturbing activities and remain in good condition and unimpaired. Indirectly, there would be a high potential for heightened runoff and sedimentation as a result of development activities and a persistence of hardened surfaces. Mitigation measures and design features would be requirements to the Oregon Division of State Lands permitting process, and have to meet requirements of the National Pollutant Discharge Elimination System as regulated by the Oregon Department of Environmental Quality and their requirements for Section 401 certification of the Clean Water Act.

All but one of the inventoried wetlands would continue to have high functional value for organic production and transport, amphibian habitat, and richness of native aquatic plants. They would remain on the landscape as springs or places of high water tables, and would be contributing sources of cold, high quality water to headwaters of Camp Creek or the pond known as Enid Lake in the Little Zigzag River drainage. There is one wetland, however, which has been disturbed in the past, and is located between two road and trail corridors in the western most parcel where there was prior land use. It would remain in its current altered and partially impaired condition.

Cooper Spur Parcels

Wetlands in the acquisition parcels would become managed and conserved by the Forest Service as Riparian Reserves. They would remain in their current condition, and would be evaluated to determine if any restoration or enhancement opportunities might be needed. Conditions would be expected to change little from their current status in the near-term.

Existing vegetation in the two identified wetland areas would not be disturbed as a result of the exchange. Surveys would be conducted to detect the presence and extent of any invasive plants that may have encroached, and eradication measures would be planned. Both wetlands would continue to have high water tables and drain to the East Fork of Hood River.

Both wetlands on the Cooper Spur parcels would continue to provide high functional values for organic production and transport; good habitat for fish, aquatic vertebrates, mammals, and birds; and richness of native aquatic plants. They also would continue to convey cold water and filter sediment. The wetland in the Tilly Jane ravine would remain intact and in good condition, and functioning unimpaired. The other wetland, which has been encroached upon by the resort property, and several small adjacent segments of road would continue to be in fairly good condition, but functioning with slight impairment.

Water Rights

None of the water rights on record within the exchange parcels are in the name of the Forest Service. Water rights would be conveyed with the exchange of the property unless specifically excluded from the property transaction deed or the buyer otherwise receives notice that interest in the water right was conveyed to another party, prior to the sale of the property. Any transfers would be in accordance with OWRD and their pertinent administrative rules.

Transfer applications are a tool for changing water rights. Transfer applicants are generally the owner of the land to which the water right(s) proposed for change are appurtenant. However, the transfer applicant may not always be the landowner. To complete a transfer application, the

applicant must be able to demonstrate that they are authorized to pursue the requested change. Pursuant to Oregon Administrative Rule (OAR) 690-380-4010 (5), the applicant must show, as of the time the application is to be proposed for approval that:

1. The applicant is the current owner of the lands to which the water right is appurtenant,
2. The current landowner has consented to the transfer application, or
3. The applicant holds sufficient interest in the water right to pursue the transfer application in the absence of the consent of the current landowner.

Water Right Conveyance Agreements provide a method for a water right transfer applicant to demonstrate that the applicant holds a sufficient interest in a water right to pursue the transfer. The critical elements of these agreements are: (1) a specific conveyance of the interest in the land and the water rights separately, and (2) recordation of the document in the deed records of the relevant county. A variety of legal documents that are typically used in real estate transactions may qualify as Water Right Conveyance Agreements under OAR 690-380-0100(13), including, but not limited to, Purchase and Sale Agreements, deeds, and Quit Claims.

> OAR 690-380-0100(13) "Water right conveyance agreement" means a purchase and sale agreement, deed or other document that has been recorded in the deed records by the relevant county describing land to which a water right is appurtenant and demonstrating that the interest in that land and interest in the appurtenant water right have been separately conveyed. <emphasis added>

If the interest in a water right is not being conveyed as part of a real estate transaction, but is intended to be conveyed by the seller to another party or retained by the seller, OWRD recommends that an agreement that qualifies as a Water Right Conveyance Agreement be executed by the parties prior to the sale of the property (the land) being completed. If a subsequent transfer application is submitted to OWRD, a copy of the Water Right Conveyance Agreement will be required as part of the transfer application process.

Even if a Water Right Conveyance Agreement has been executed, the water rights remain appurtenant to those lands until OWRD approves a water right transfer. The Water Right Conveyance Agreement or other agreement in which interest in water rights are retained or conveyed should describe the lands to which the water rights are appurtenant sufficient to satisfy the purpose of the seller and purchaser, and in a manner consistent with typical procedures for real property transactions (OWRD 2016a).

Government Camp Parcels

The two appurtenant water rights on record that are within the conveyance parcels are in the name of private owners, in a non-cancelled status, designated for domestic use, and certificated. As standard practice of the real property transaction, they would be reviewed to determine if they are still in use, or have been used in the last 5 to 15 years. If they have not, then they may be considered to be abandoned, and could be transferred, cancelled, forfeited, or remain outstanding to a third party.

Water rights that could supply the proposed residential development at full build-out do not currently exist on the conveyance parcels. Sources would have to be developed under either a new water right application through OWRD, or by tapping into an existing off-site source. Using an off-site source would necessitate third-party feasibility and examination by OWRD.

Water rights are obtained in a three-step process. The applicant first must apply to the Department for a permit to use water. Once a permit is granted, the applicant must construct a water system and begin using water. When water is applied, the permit holder must hire a certified water right examiner to complete a survey of water use and submit to the Department a map and report detailing how and where water is being applied. If water has been used according to the provisions of the permit, a water right certificate is issued based upon the report findings (OWRD 2016).

Cooper Spur Parcels

The appurtenant water rights on the acquisition parcels would be transferred to the Forest Service according to the OWRD review process. Surface rights that have been cancelled or abandoned could be subject by the State to statutory forfeiture, or recognized as an instream water right to be held by the State (OWRD 2002). Rights transferred to the Forest Service would either remain apportioned to their original beneficial use or possibly re-apportioned to another as part of the transfer.

Exercised rights for domestic use, such as the well that supplies the resort, would become the responsibility of the Forest Service, or a permittee/concessionaire and necessitate annual water-use reporting, system maintenance, water quality testing, and be in compliance with the Safe Drinking Water Act as amended in 1996, and enforced by the Oregon Department of Environmental Quality and the Oregon Health Authority.

Connected Actions

Conservation easements to protect wetlands: The Clarification Act includes a provision to the Government Camp parcels that “the Secretary and Mt. Hood Meadows may mutually agree for the Secretary to reserve a conservation easement to protect the identified wetland in accordance with applicable law, subject to the requirements that the conservation easement shall be consistent with the terms of the September 30, 2015, mediation between the Secretary and Mt. Hood Meadows, and in order to take effect, the conservation easement shall be finalized not later than 120 days after the date of the enactment of the Mount Hood Cooper Spur Land Exchange Clarification Act.” Since the Clarification Act has not yet been enacted, the following assumption was developed to enable the environmental analysis process to progress. This assumption was developed using the best scientific information available, and knowledge of county, State, and Federal laws and regulations related to wetland protection.

Wetland easements include locally inventoried wetland delineations plus geomorphic functional contributing areas. The latter was determined using bare earth LiDAR and ArcGIS hydro tools to define stream initiation zones and provincial topographic contributing areas which were then refined based upon field validation.

Cumulative Effects

Alternative 1

Since no direct or indirect effects would occur, there can be no cumulative effects.

Alternative 2

Residential land use being proposed in the conveyance parcels would necessitate development of a water system of sufficient supply, and would have to undergo the application and permit process through OWRD. Use of an existing appurtenant water right that may have been transferred to the new landowner, or a new water right such as a well, or supplemental to an

existing off-site right like a municipal system would be subject to review and the OWRD permitting process.

A part of that process would be to discern if the transfer or application could be injurious to other water right holders. If a water source is used that is contributing to either Camp Creek or the Little Zigzag, then a determination would have to be made as to whether existing water users downstream would be negatively affected by water usage of the proposed residential development. Considering the variety of existing municipal, commercial, domestic, and fire-fighting uses in the Camp Creek and Little Zigzag subwatersheds, the cumulative effect to available water to downstream water right holders would be a vital component for OWRD to review before issuing a permit.

Visuals

Introduction

The Mt. Hood National Forest Forest Plan uses the Visual Management System to manage its scenery. This system prescribes visual quality objectives (VQOs) that are the minimum level of visual quality. The Forest Plan has three viewing platforms (viewpoints) that have prescribed VQOs:

- Management Areas
- Designated Viewsheds
- Views from Trails

This project was analyzed by assessing changes in VQOs between the two alternatives. VQOs, distance zones, and viewing platforms were mapped. A schematic visibility study identified potentially seen areas.

The connected action of the reservation of trail easements on the Government Camp parcels was analyzed. Scenic quality from affected trails was evaluated by comparing existing conditions to visual quality anticipated after land development (full build-out) of the Government Camp parcels. While there would be an expected change in visual quality, NFS lands conveyed to private ownership would cease to have objectives. Therefore, there would be no expected violations of the Forest Plan. An assumption for this analysis is that the parcels to be conveyed will be developed for residential housing.

The addition of wilderness and creation of A14 Crystal Springs Watershed Special Resources Management Unit was analyzed by expected changes in VQOs.

The connected action of the Special Use Permit Prospectus for Operation of the Cooper Spur Mountain Resort and Ski Area is not expected to affect scenic quality, and therefore, is not analyzed in this report.

The Forest Plan Goals, Desired Future Condition, and Standards and Guidelines related to scenery are described in the Scenery Specialist Report.

Affected Environment

Existing Condition

Biophysical Context for both Government Camp and Cooper Spur Areas

The biophysical description for both the Government Camp and Cooper Spur areas is summarized as the Level IV ecoregion, Cascade Crest Montane Forest, 4c (Woods et al. 2002).

The ecoregion's landform is characterized as a glaciated, undulating plateau punctuated by buttes, volcanic cones, lava flows, and mountains. Locally, the massive Mt. Hood peak, Cascades Subalpine/Alpine ecoregion (4d), towers over the sprawling plateau. Scoured canyons formed by earth flows radiate downward from its twisted summit. These canyons define viewsheds from mid-slope vantages (Government Camp and Cooper Spur areas). When not obscured by weather, vegetation, or terrain, the perpetually snow clad summit of the Mt. Hood massif is a constant focal point.

Meandering, medium gradient streams drain the glaciated terrain. Numerous lakes dot glacial rock-basins. Elevations range between 4,000 and 6,500 feet. Geology is classified as colluvium, volcanic ash, glacial deposits, and volcanic rocks on the surface with basaltic and andesitic lava flows, breccia, and pyroclastic deposits as bedrock.

Average annual precipitation is between 55 and 100 inches. The mean annual frost free days is between 30 and 90 days. The average temperatures in January are a minimum of 21 degrees F and high of 35 degrees F. The average temperatures in July are a minimum of 43 degrees F and high of 72 degrees F.

Potential vegetation is mostly fir-hemlock forest/ Mostly Pacific silver fir, mountain hemlock, and subalpine fir; some noble fir, Douglas-fir, western white pine and lodgepole pine. Understory is vine maple, huckleberries, rhododendron, beargrass, twinflower, and wintergreen. Mountain meadows support sedges, dwarf willows, and tufted hairgrass.

Land uses are predominantly forest recreation and some logging. The ecoregion is an important water source for lower elevation urban, suburban, and agricultural areas.

Government Camp Parcels

The parcels are located on the gentle southwest-facing slope of Mt. Hood at the north end of the village of Government Camp. Elevations range from about 3,760 to 4,120 feet. Parcels are mostly undeveloped and fully vegetated by a mature, conifer overstory, and lush understory. See the vegetation specialist report for more details. The two parcels are physically separated by a 40-acre aliquot part that is privately owned.

West Parcel

The westerly parcel in Section 13 lies mostly north of Government Camp Loop Road and is accessed from a street on the east end. A creek traverses from northeast to southwest at the southeast comer of the property. The area around the creek is predominately wetlands. There are two parallel cuts through the timber for the Skyway Trail, a former gondola tram that ran from Thunderhead Condominiums to Timberline Lodge. A transmission line also cuts through the timber from the southwest to the northeast. Wally's Trail leads from the southern terminus of the Skyway Trail to the northwest comer of the parcel. The Forest has issued numerous special-use permits for a water storage tank and water lines, transmission lines, trails, and a telephone line. There is a terrain break that runs through the center of parcel. Western reaches of the parcel are lower in elevation than eastern reaches.

Figure 40. Aerial oblique view of Government Camp West Parcel (looking north)

East Parcel

The easterly parcel in Section 14 lies at the north end of Government Camp with subdivision development to the south and west and with a Summit Ski Area run to the east. Access is provided by East Lige Lane that lies on the southern border of the parcel. The Crosstown Trail enters the property at the southeast comer and exits at the midpoint of the northern border. The Forest has issued special-use permits for a water tank and water lines, electric and power lines.

Figure 41. Aerial oblique view of Government Camp East Parcel (looking north)

Government Camp Parcels Visual Quality Objectives

The following platforms have existing VQOs for the Government Camp parcels.

- A11 Management Area
- Designated Viewsheds relevant to the Government Camp Parcels are listed in table 89:
  - Highway 26, West of Jct./ Hwy 35
  - Timberline Road
  - Timberline Lodge
  - Trillium Lake
- Segments of the trails listed in table 91

Table 89. Existing conditions: VQOs of Government Camp area

Viewing Platform	Parcels Potentially Visible	Distance Zone	VQO
A11	yes	Foreground Middleground	Retention/ Partial Retention
Type II Trails	yes	Near Foreground/ Far Foreground/ Middleground	Partial Retention/ Modification/ Modification
Highway 26, West of Jct./ Hwy 35	yes	Foreground/ Middleground	Retention/ Retention
Timberline Road	yes	Middleground	Partial Retention
Timberline Lodge	yes	Middleground	Partial Retention
Trillium Lake	yes	Middleground	Partial Retention

Table 89 summarizes Management Area and Designated Viewshed VQOs relevant to the Government Camp Parcels. The most restrictive VQO is Retention from the Highway 26 viewing platform and the foreground of A11 Management Area; therefore, it is used to compare alternatives.

Both Government Camp parcels, 109 acres, have VQOs of Retention for this analysis.

Table 90. VQOs in acres for the Government Camp parcels existing condition

Parcel/ Designation	VQO	Acres	Total
Government Camp West Parcel	Retention	68	**109 acres Retention**
Government Camp East Parcel	Retention	41	

As stated earlier, a connected action is the retention of trail easements by the Mt. Hood National Forest. These trails would continue to have prescribed VQOs by the Forest Plan. Table 91 summarizes trails with proposed easements, trail class, and VQOs.

Table 91. Trails within Government Camp parcels

Government Camp Parcel	Trails with Segments Located within Parcels	Trail Number	Trail Class	VQO Near foreground/ Far foreground/ Middleground
West Parcel	Skiway	755B	II	Partial Retention/ Modification/ Modification
	Maggie's Tie	753	II	Partial Retention/ Modification/ Modification
	Wally's Tie	755A	II	Partial Retention/ Modification/ Modification
East Parcel	Crosstown	755	II	Partial Retention/ Modification/ Modification
	Alpine	660	II	Partial Retention/ Modification/ Modification

Cooper Spur Area

A variety of recreational activities occur within the Cooper Spur area. State Highway 35, a scenic byway, runs to the east. Portions of the proposed lands are within the designated viewshed. Cooper Spur Road, or Forest Road 3512, bisects the proposed lands. Both roads offer scenic views and many people drive them for pleasure throughout the year. Forest Road 3512 also provides access to Cloud Cap Road, which is one of the most popular roads on the Mt. Hood National Forest due to its terminus at Cloud Cap Inn, its access to several trails including the Timberline Trail, and the view of Mt. Hood from the top of the road. There are numerous trailheads for popular non-motorized trails within the planning area. Recreation use is popular during both the summer and the winter. Due to the variety of activities available, and its proximity to Hood River, a popular tourist destination, the amount of visitor use increases annually.

Cooper Spur Parcels

The land exchange proposes that the Mt. Hood National Forest would acquire 769 acres of private land. This land is described as mostly vacant forest land in various stages of seral development, the Cooper Spur Mountain Resort, and structures at Cooper Spur Ski area. The terrain is gently sloping, dissected by deep canyons, gradually breaking off toward the East Fork of the Hood River.

The resort is located about 2 miles east of the Cooper Spur Ski Area at the intersection of Cooper Spur and Cloud Cap roads. The resort site consists of 11 different structures. The resort also includes spas, storage, a tennis court, equipment storage and shop, and a single-family residence.

Figure 42. Aerial oblique view of Cooper Spur parcels (looking north)

Cooper Spur Parcels Visual Quality Objectives

The private land does not have VQOs, but for the purposes of comparing the land exchange, direction for scenery management is derived from the following viewing platforms.

- Newly Created Crystal Springs WSRMU, A14 Management Area
- Designated Viewsheds
- There are no NFS system trails that currently cross the private property

Table 92. Designated viewshed in the Cooper Spur area

Designated Viewsheds	Viewer Position	Distance Zone from Viewer Position		
		Foreground	Middleground	Background
Highway 35	OR Hwy 35, Rec Sites	Retention	Partial Retention	Partial Retention

Crystal Springs Watershed Special Resources Management Unit, A14 Management Area

A goal of the CSWSRMU is to allow visitors to view the scenery of the watershed. A desired future condition is predominantly natural appearing scenery. The following Standards and Guidelines would apply.

B. Visual Resource Management

1. Management activities within the cultural landscape of the Cloud Cap – Tilly Jane National Historic District (see map below) shall meet a visual quality objective (VQO) of retention in the foreground and partial retention in the middleground and background distance zones, as seen from open roads, high recreational use areas, and waterbodies.
    a. Foreground retention for the Cloud Cap Road within the National Historic District is applied to lands visible for distances up to 0.5 miles from the road and public areas, and means the following:
        i. Vegetation is composed primarily of multi-age, multi-species stands with diverse understory of natural plant associations (where biologically feasible).
        ii. Numerous large diameter, old trees are a major component of the stands (where biologically feasible).
        iii. Small, natural appearing openings provide diversity and a sense of depth.
        iv. The ground is generally free of unnatural forms and patterns of debris or litter.
        v. Seasonal changes in vegetation color and texture are emphasized.
    b. Middleground and background partial retention is applied to lands visible for distances from 0.5 to 5 miles from the Cloud Cap Road and public areas within the National Historic District, and means the following:
        i. Natural appearing forest landscape, with little evidence of human alteration.
        ii. Dominant visual impression is mostly continuous tree canopies, with diversity in occasional natural appearing openings.

iii. Mosaic of species and age classes add texture and color contrast in natural patterns.

iv. Management activities repeat form, line, color, and texture common to the characteristic landscape.

2. Management activities outside of the cultural landscape of the Cloud Cap – Tilly Jane National Historic District (see map below) shall achieve a VQO of partial retention from open roads.
3. VQOs accepting less visual quality disturbance shall be applied when A14 Management Areas are located within "designated viewsheds."
4. See Forestwide Visual Resource Management Standards and Guidelines for VQOs prescribed for trails.

Table 93. VQOs for proposed Cooper Spur parcels

Viewing Platform	Parcels Potentially Visible	Distance Zone	VQO
A 14	yes	Foreground, Middleground	Partial Retention all distance zones
A 14: Cloud Cap-Tilly Jane Historic District	yes	Foreground Middleground	Retention/ Partial Retention
Highway 35	yes	Foreground Middleground	Partial Retention / Partial Retention

The Visual Resource Management Standards and Guidelines for A 14 prescribe the VQO of Retention for the foreground distance from the Cloud Cap road. Approximately 160 acres of the proposed land exchange private land fall within this distance zone. The remaining, 609 acres are outside the Cloud Cap road foreground and have a VQO of Partial Retention.

Table 94. Existing condition: VQOs in the Cooper Spur area

Parcel/ Designation	VQO	Acres	Total
Cooper Spur Parcels	Retention	160	**160 acres Retention**
	Partial Retention	609	**609 acres of Partial Retention**
CSWSRMU	Retention	660	**660 acres of Retention**
	Partial Retention	1,396	**1,396 acres of Partial Retention**
	Modification	34	**34 acres of Modification**
Mt. Hood Wilderness Addition	Retention	492	**492 acres of Retention**
	Partial Retention	1,217	**1,217 acres of Partial Retention**

Table 94 lists the existing condition VQOs for the management area direction on NFS lands proposed to be designated as the CSWSRMU and added to the Mt. Hood Wilderness.

Environmental Consequences

Direct and Indirect Effects

The spatial boundaries for analyzing the direct and indirect effects on visuals are the Government Camp parcels and Government Camp trail system, and the combined Crystal Springs Watershed Special Resources Management Unit and the wilderness addition because these areas are predicted be most affected by the proposed action.

The temporal boundaries for analyzing the direct and indirect effects are 1 to 5 years (short-term) and 5 to 30 years (long-term). The short-term reflects time to finalize the LEX. The long-term reflects time for full build-out of the Government Camp parcels and the subsequent change of management of the Cooper Spur parcels.

Alternative 1

Government Camp

NFS lands would remain managed by A11 land use allocation (LUA) management area direction, which prescribes a Visual Quality Objective (VQO) of Retention in the foreground and Partial Retention in the middleground.

NFS lands visible from the Highway 26, designated viewshed, would continue to be managed to meet the VQO of Retention in the foreground and middleground distance zones.

NFS lands visible from the other designated viewsheds would be managed to meet the prescribed VQOs from these viewing platforms.

Trails within the Government Camp parcels (segments of Crosstown, Alpine, Maggie's Tie, Wally's Tie and Skiway) would remain in their current location, solely on NFS lands. The NFS lands adjacent to the Level II trails would be managed to meet the following VQOs.

- Near-foreground- Partial Retention
- Far-foreground- Modification
- Middleground- Modification

Retention: "The visual quality objective provides for management activities which are not visually evident. Activities may only repeat form, line, color, and texture, which are frequently found in the characteristic landscape."

Partial Retention: "Activities may repeat form, line, color, or texture which are found infrequently or not at all in the characteristic landscape, but remain visually subordinate to the visual strength of the characteristic landscape."

Modification: "Activities of vegetative and landform alteration must borrow from naturally established line, form, color, and texture so that their visual characteristics are those of natural occurrences within the surrounding area when viewed as middle ground or background. Activities may visually dominate the original characteristic landscape."

Table 95. Existing conditions: VQOs of Government Camp area

Viewing Platform	Parcels Potentially Visible	Distance Zone	VQO
A11	yes	Foreground Middleground	Retention Partial Retention
Type II Trails	yes	Near Foreground/ Far Foreground/ Middleground	Partial Retention/ Modification/ Modification
Highway 26, West of Jct./ Hwy 35	yes	Foreground/ Middleground	Retention/ Retention
Timberline Road	yes	Middleground	Partial Retention
Timberline Lodge	yes	Middleground	Partial Retention
Trillium Lake	yes	Middleground	Partial Retention

Cooper Spur Area

The private land (proposed Cooper Spur parcels) would continue to be managed without any objectives for managing effects to the scenery.

NFS lands in the proposed CSWSRMU would continue to be managed in compliance with VQOs prescribed for the A4, A11, B2, and C1 LUAs.

The VQOs for NFS lands proposed for inclusion in the Mt. Hood Wilderness would remain a mix of Retention and Partial Retention.

Table 96. Existing condition: VQOs in the Cooper Spur area

Parcel/ Designation	VQO	Acres	Total
Cooper Spur Parcels	None	None	**None**
CSWSRMU	Retention	660	**660 acres of Retention**
	Partial Retention	1,396	**1,396 acres of Partial Retention**
	Modification	34	**34 acres of Modification**
Mt. Hood Wilderness Addition	Retention	492	**492 acres of Retention**
	Partial Retention	1,217	**1,217 acres of Partial Retention**

Alternative 2- Proposed Action

Government Camp

The proposed action would have direct and indirect effects to the scenery in the Government Camp area. The primary proposed action, the land exchange, was analyzed by the loss and gain of acres of VQOs. Both of the Government Camp parcels are prescribed a VQO of Retention.

A direct effect of the proposed action is the loss of 109 acres of NFS lands with the VQO of Retention to the Mt. Hood National Forest, therefore, 109 acres of land would cease to have VQOs.

An indirect effect would be a change in the visual quality of the future use and management of the Government Camp parcels proposed for the land exchange.

It was assumed that future development would comply with Clackamas County zoning ordinances. This states that both Government Camp parcels would be developed for residential housing. Houses would occupy ¼ acre lots. The total amount of impervious surface would not exceed 40 percent of each lot. The height of the buildings would not exceed 50 feet. Lots would likely be cleared of most mature forest vegetation, but some select specimens/ islands of forest vegetation would be retained for aesthetic values.

It was further assumed that future build out would result in very similar land use/ land cover that currently exists on the 40-acre aliquot part, which physically separates the two proposed LEX parcels. The following figures are photos of this development. An aerial Google Earth image displays overall residential fabric that would likely be viewed from above (the proposed LEX parcels are outlined in magenta). Future housing stock would be similar in height and proportions to existing stock. The streetscapes would likely be large enough to handle emergency vehicles, but be residential in nature.

Additional Assumptions:

- Private development would not have a required buffer between NFS lands.
- Buffers of native forest would be retained around aquatic resources such as wetlands and streams.
- Architecture and lot vegetation would be consistent with ecoregion attributes.

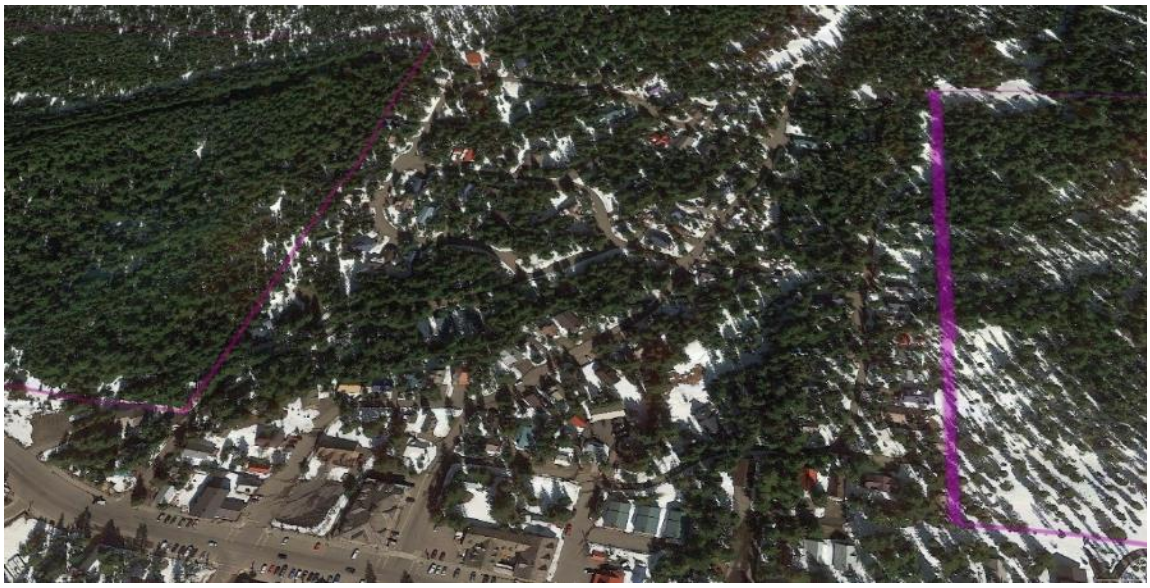

Figure 43. Existing residential development in the Government Camp area (looking northwest)

Figure 44. Existing housing stock in the Government Camp area

Figure 45. Existing building height in the Government Camp area

Figure 46. Existing lot with forest vegetation in the Government Camp area

Figure 47. Existing streetscape in the Government Camp area

Visibility

To determine Designated Viewsheds and facilitate analysis, a schematic reverse viewshed map was created. It is coarse in detail but characterizes areas potentially visible from the Government Camp parcels and vice versa. The following figure displays the viewshed.

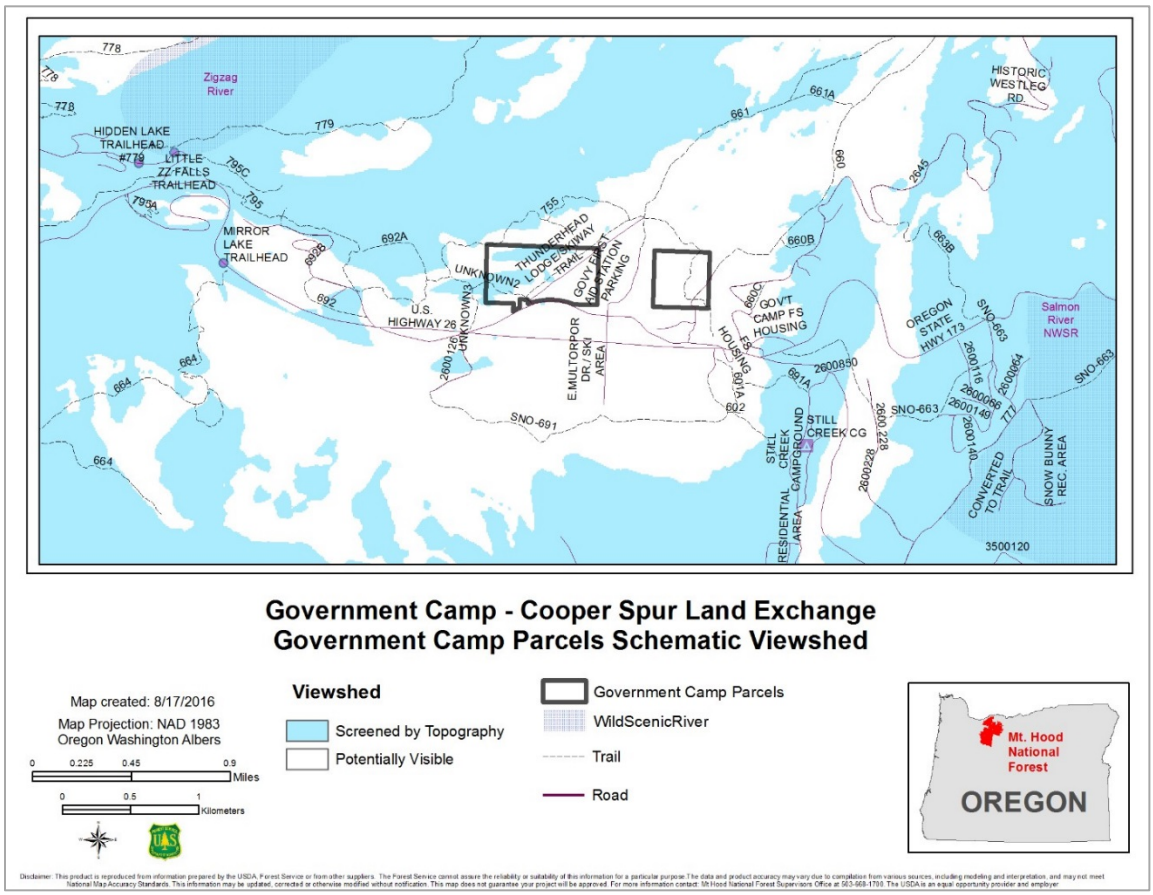

Figure 48. Government Camp parcels schematic viewsheds

Government Camp Trail System

A direct effect from the connected action of the reservation of trail easements would be segments of affected trails would cease to have VQOs. The following table lists affected trails. The trails would cease to have a VQO of Partial Retention in the near-foreground or any objectives to meet regarding visual quality. The total of all trail segments subjected to easements is approximately 1 mile. It would be expected that visual quality would change from the trail viewing platform, from natural-appearing to modified by residential development.

Table 97. Trails within Government Camp parcels that would cease to have VQOs

Government Camp Parcel	Trails with Segments Located within Parcels	Trail Number	Trail Class	VQO Near foreground/ Far foreground/ Middleground
West Parcel	Skiway	755B	II	Partial Retention/ Modification/ Modification
	Maggie's Tie	753	II	Partial Retention/ Modification/ Modification
	Wally's Tie	755A	II	Partial Retention/ Modification/ Modification
East Parcel	Crosstown	755	II	Partial Retention/ Modification/ Modification
	Alpine	660	II	Partial Retention/ Modification/ Modification

Cooper Spur Area

The proposed action would have direct and indirect effects to scenery in the Cooper Spur Area. The primary proposed action, the land exchange, was analyzed by the loss and gain of acres of VQOs. The Cooper Spur parcels proposed to be conveyed to the Mt. Hood National Forest are private and therefore lack existing VQOs. However for purposes of comparison, VQOs derived from the connected actions were used. VQOs would be Retention and Partial Retention.

A direct effect of the proposed action would be the gain of 160 acres of NFS lands with VQOs of Retention and 609 acres of Partial Retention to the Mt. Hood National Forest.

A direct effect would be a total of 769 acres of land would begin to be managed for VQOs.

The LUA of Crystal Springs Watershed Special Resource Management Unit (CSWSRMU)

A direct effect to the creation of CSWSRMU would be scenery management direction that would comply with the newly created LUA of A14. A full list of Standards and Guidelines for this new LUA are listed in chapter 2 of this DEIS. Those regarding VQOs are listed below.

B. Visual Resource Management

1. Management activities within the cultural landscape of the Cloud Cap – Tilly Jane National Historic District (see map below) shall meet a visual quality objective (VQO) of retention in the foreground and partial retention in the middleground and background distance zones, as seen from open roads, high recreational use areas, and waterbodies.
    a. Foreground retention for the Cloud Cap Road within the National Historic District is applied to lands visible for distances up to 0.5 mile from the road and public areas, and means the following:
        i. Vegetation is composed primarily of multi-age, multi-species stands with diverse understory of natural plant associations (where biologically feasible).
        ii. Numerous large diameter, old trees are a major component of the stands (where biologically feasible).
        iii. Small, natural appearing openings provide diversity and a sense of depth.
        iv. The ground is generally free of unnatural forms and patterns of debris or litter.
        v. Seasonal changes in vegetation color and texture are emphasized.

b. Middleground and background partial retention is applied to lands visible for distances from 0.5 to 5 miles from the Cloud Cap Road and public areas within the National Historic District, and means the following:

   i. Natural appearing forest landscape, with little evidence of human alteration.

   ii. Dominant visual impression is mostly continuous tree canopies, with diversity in occasional natural appearing openings.

   iii. Mosaic of species and age classes add texture and color contrast in natural patterns.

   iv. Management activities repeat form, line, color, and texture common to the characteristic landscape.

2. Management activities outside of the cultural landscape of the Cloud Cap – Tilly Jane National Historic District (see map below) shall achieve a VQO of partial retention from open roads.
3. VQOs accepting less visual quality disturbance shall be applied when A14 Management Areas are located within "designated viewsheds."
4. See Forestwide Visual Resource Management Standards and Guidelines for VQOs prescribed for trails.

The following table compares changes in VQOs between alternatives.

Table 98. Changes in CSWSRMU VQOs between alternatives

CSWSRMU VQO	Alternative 1 acres	Alternative 2 acres	Net Change
Retention	660	820	**Gain of 160 acres**
Partial Retention	1,396	2,039	**Gain of 643**
Modification	34	0	Loss of 34 acres

Addition of 1,708 acres to the Mt. Hood Wilderness

A direct effect is the change of VQO from a combination of Retention and Partial Retention to Preservation. The following table summarizes changes.

Table 99. Changes in proposed wilderness addition VQOs between alternatives

Proposed Wilderness VQO	Alternative 1 acres	Alternative 2 acres	Net Change
Preservation	0	1,709	**Gain of 1,709 acres**
Retention	492	0	**Loss of 492**
Partial Retention	1,217	0	Loss of 1,217 acres

Preservation "This objective applies to Wilderness areas, primitive areas, other special classified areas, areas awaiting classification and some unique management units which do not justify special classification.

A direct effect would be the changes to trail class and VQOs to the trails in the following table.

Existing conditions, the trails are class II with VQOs of Partial Retention in the near-foreground and Modification in the Middle and Background. The proposed wilderness addition would classify trails as class I with VQOs of Retention in the Near-foreground, Partial Retention in the Far-foreground, and Modification in the Middleground.

Table 100. Trails with VQOs affected by the proposed wilderness addition

Trail Name	Trail Number	Season of Use	Within Mt. Hood Wilderness Addition
Tilly Jane	643	Winter and Summer	Yes, segments
Tilly Jane ski trail	643A	Winter and Summer	Yes, segments
Wagon Road	642	Mostly Cross Country Ski in Winter but also Summer Use	Yes, segments

Visibility

To determine Designated Viewsheds and facilitate analysis, a schematic reverse viewshed map was created. It is coarse in detail but characterizes areas potentially visible from the Cooper Spur parcels and vice versa. The following figure displays the viewshed.

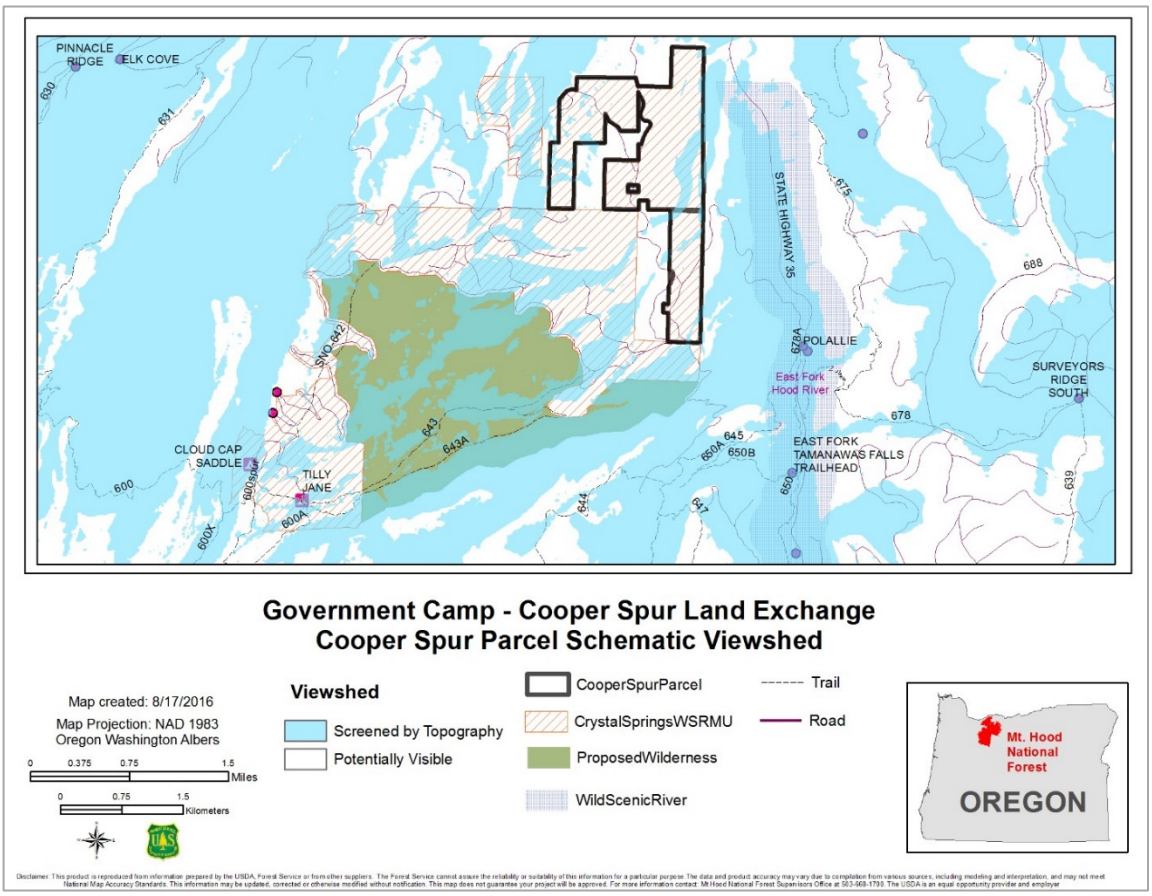

Figure 49. Cooper Spur parcels schematic viewshed map

Changes in VQOs from Primary Action

Table 101. Comparison of acres of VQOs gained and lost

Parcels	Gain/ Loss	VQO	Acres
Government Camp Parcels	**Loss**	Retention	109
Cooper Spur Parcel	**Gain**	Retention	160
		Partial Retention	609

Changes in VQOs from Connected Actions

The proposed Wilderness Addition would change VQOs from a mix of Retention and Partial Retention to Preservation.

The proposed Wilderness Addition would change VQOs for trails listed in table 100 to more restrictive in the Foreground distance zones.

The creation of CSWSRMU would change VQOs by gaining 160 acres of Retention and 609 acres of Partial Retention, and, the loss of 34 acres of Modification.

Forest Plan Amendment Summary

The expansion of the Mt. Hood Wilderness would not have any changes that would alter the long-term relationship between levels of multiple-use goods and services. The management area would continue to provide high quality scenery to recreation and social uses.

The Land Use Allocation of A14 would have no changes that would alter the long-term relationship between levels of multiple-use goods and services. The management area would continue to provide high quality scenery for recreation and social uses.

The expansion of the Mt. Hood Wilderness would not have any important effects on the entire planning area or land management plan. The management area would continue to provide high quality scenery for recreation and social uses.

The Land Use Allocation of A14 would have no important effect on the entire land management plan or affect land and resources throughout a large portion of the planning area during the planning period. The management area would continue to provide high quality scenery for recreation and social uses.

Cumulative Effects

The spatial boundaries for analyzing the cumulative effects to VQOs are the Government Camp parcels and Government Camp trail system, and the combined Crystal Springs Watershed Special Resources Management Unit and the wilderness addition because these areas are predicted be most affected by the proposed action.

The temporal boundaries for analyzing the cumulative effects are 1 to 5 years (short-term) and 5 to 30 years (long-term). The short-term reflects time to finalize the land exchange. The long-term reflects time for full build-out of the Government Camp parcels and subsequent change of management of Cooper Spur parcels.

The list of past, present, and reasonably foreseeable projects that may overlap with this project in time and space were provided at the beginning of this chapter. Many of the listed projects have

shaped and continue to shape the Visual Quality in the Government Camp and Cooper Spur areas. Patterns of recreation, such as ski areas, lodges, camps, residences, trails, and semi-primitive untrailed areas, continue to blend and contrast with the predominantly natural appearing backdrop of the land exchange areas.

The wilderness additions change VQOs to Preservation. Otherwise, the proposed action(s) when considered with the listed projects would continue to shape the Visual Quality, but cumulatively there would be no change in Visual Quality Objectives.

Wildlife

(Threatened, Endangered, and Sensitive Species; Management Indicator Species; Migratory Birds; and Survey and Manage Species)

Introduction

This section of the DEIS provides a summary of the analyses that were conducted for Threatened, Endangered, and Sensitive terrestrial wildlife species via a Biological Evaluation, Mt. Hood National Forest Management Indicator Species, Migratory Birds, and Survey and Manage Species. Refer to the Wildlife Specialist's Report in the project record for additional background and supporting information.

Biological Evaluation

As part of the National Environmental Policy Act (NEPA) decision-making process, biological evaluations are required to determine how proposed Forest Service management activities may affect threatened, endangered, or proposed species, or Forest Service sensitive species or their habitats (U.S. Forest Service Manual [FSM] 2670). The Biological Evaluation presents existing information on threatened, endangered, proposed, or sensitive species and their habitat in the project area, and describes the anticipated direct, indirect, and cumulative effects resulting from the proposed project. The review is conducted to ensure that Forest Service actions do not contribute to the loss of species viability or cause a species to move toward Federal listing (43 U.S.C. 1707 et. seq.). Threatened and endangered species are managed under authority of the Endangered Species Act (36 U.S.C. 1531-1544) and the National Forest Management Act (16 U.S.C. 1600-1614). The Endangered Species Act requires Federal agencies make certain all actions they authorize, fund, or carry out will not likely jeopardize the continued existence of any threatened or endangered species. Sensitive species are those recognized by the Pacific Northwest Region's Regional Forester as needing special management to meet National Forest Management Act obligations. Forest Service policy requires a biological evaluation to determine possible effects to sensitive species from proposed management activities.

Excerpts from the Biological Evaluation for the species that could be affected by the Proposed Action are provided in this section. Refer the Wildlife Specialist's Report in the project record for the complete Biological Evaluation that contains additional background and supporting information. A full list of wildlife species was considered for possible effects from the proposed action and alternatives. Table 2, in the Biological Evaluation, lists U.S. Fish and Wildlife Service threatened, endangered or proposed terrestrial wildlife species and their critical habitats (where applicable), as well as Pacific Northwest Region sensitive terrestrial wildlife that may be present or are known within the planning area. The possibility of effects to each species were evaluated based on identified threats, important habitat components, and the expected interaction with disturbances associated with project alternatives.

The biological evaluation/biological assessment reviews the proposed action and alternatives in sufficient detail to determine the level of effect that would occur to federally listed wildlife and Pacific Northwest Region sensitive wildlife species. One of four possible determinations is chosen based on the available literature, a thorough analysis of the potential effects of the project, and the professional judgment of the wildlife biologist who completed the evaluation. The four possible determinations (from FSM 2672.42) are:

- No impact
- Beneficial impact
- May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area
- May affect individuals, and is likely to result in a trend toward Federal listing or loss of viability in the planning area

Similar categories for federally listed threatened and endangered species are:

- No effect
- Beneficial effect
- May affect, not likely to adversely affect
- May affect, likely to adversely affect

Species Considered for Analysis

Threatened, Endangered, and Proposed Species

An official list of terrestrial threatened, endangered, and proposed species that may occur within the boundary of the project or may be affected by the project, was obtained from the U.S. Fish and Wildlife Service's Information for Planning and Conservation (IPaC) website on August 15, 2016 (USDI Fish and Wildlife Service 2016a). One listed species, northern spotted owl, is described as potentially occurring within, or potentially affected by, the project. The species list identifies northern spotted owl designated critical habitat as occurring within the project area; however, GIS review of land parcels proposed for transfer shows no overlap with spotted owl critical habitat. North American wolverine is currently considered proposed for Federal listing. The species occurrence map displayed in the U.S. Fish and Wildlife Service Environmental Conservation Online System (ECOS) shows potential occurrence overlaps the project area. In addition, the most recent Regional Forester Special Status Species List (USDA Forest Service 2015) describes suspected occurrence of the species on the Mt. Hood National Forest. Therefore, North American wolverine is also addressed in this analysis.

Table 102. Threatened, endangered, and proposed wildlife species applicable to the project

Threatened, Endangered, and Proposed Species	Known Species Presence Within Project Area?	Habitat Present Within Project Area?	Analysis Included in this document?	Habitat and Rationale for not carrying species forward into this document
Northern spotted owl *(Strix occidentalis caurina)*	No	Yes	Yes	Late successional and old-growth conifer habitats for nesting, roosting, and foraging; younger stands utilized for dispersal. Refer to Effects Analysis.
Northern spotted owl Designated Critical Habitat	No	No	No	Designated Critical Habitat is not located within the project area.
North American wolverine (*Gulo gulo luscus*)	No	Yes	Yes	Strongly associated with high elevation alpine habitats as well as subalpine conifer habitats. Refer to Effects Analysis.

Sensitive Species

The most recent Region 6 sensitive species wildlife list (effective 21 July 2015; USDA Forest Service 2015) was reviewed and 22 species that may occur in or near the Mt. Hood National Forest were identified (Biological Evaluation, Table 4). Although each of these species are known to or could potentially occur in or near the Mt. Hood National Forest, not all of them have potential to occur in the Government Camp-Cooper Spur Land Exchange project area. A pre-field wildlife review of the project area for all Pacific Northwest Region sensitive species was completed using Heritage database records, district data, and literature reviews to identify which sensitive species are applicable to the analysis. Many of the species listed have neither habitat nor documented occurrences within the project area. Therefore, the proposed project would have no impact upon them. No further analysis is provided for these species.

The remaining species have potential habitat at least in portions of Government Camp-Cooper Spur Land Exchange project area and require further analysis. These species are analyzed in the following section, and include: Sierra Nevada red fox, Townsend's big-eared bat, fringed myotis, Larch Mountain salamander, Cope's giant salamander, Johnson's hairstreak, Mardon skipper, western bumble bee, Dalles sideband, Crater Lake tightcoil, and shiny tightcoil.

Threatened, Endangered and Proposed Species Carried Forward for Analysis

Northern Spotted Owl

Affected Environment

This species, which is listed as threatened, is typically associated with old-growth forested habitats throughout the Pacific Northwest. Northern spotted owls have been documented in a variety of forest types; however, this species does show a preference to Douglas-fir forests (USDI Fish and Wildlife Service 2011). Nest sites and roost sites are typically found in forests that exhibit complex structure and heterogeneity. These habitats are multi-storied with large-diameter trees and high canopy cover. Most spotted owls are territorial and dispersal of young

depends on availability of suitable habitat and prey species (USDI Fish and Wildlife Service 2011).

Past management activities, such as timber harvest, have reduced or fragmented northern spotted owl habitat throughout its range. In addition, the barred owl has presented cumulative impacts to this species (Courtney et al. 2004, USDI Fish and Wildlife Service 2011). The barred owl is an invasive species from the eastern United States and has expanded its range extensively throughout the Pacific Northwest. It is a generalist that can use a wide range of habitat types and forest age classes. It also has a wide diet range and can survive on many different prey types (Forsman et al. 2004, USDI Fish and Wildlife Service 2011). As a result, overall northern spotted owl population densities have decreased, specifically in areas where habitat reduction is concentrated and where barred owls are present (USDI Fish and Wildlife Service 2011).

There are no known owl sites either inside or within 1.2 miles of Government Camp parcels. The nearest known owl site is located about 2.3 miles to the east (figure 50). No known owl sites occur within Cooper Spur parcels, but a total of 5 known sites occur within 1.2 miles of those parcels (figure 51).

Spotted Owl Suitable Habitat

Suitable habitat consists of forested stands used by spotted owls for nesting, roosting, and foraging. Features that support nesting and roosting typically include a moderate to high canopy closure (60-90 percent); a multi-layered, multi-species canopy with large overstory trees (with diameters of greater than 30 inches); a high incidence of large trees with various deformities (large cavities, broken tops, mistletoe infections, and other evidence of decadence); large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for spotted owls to fly (USDI Fish and Wildlife Service 2012).

Foraging habitat generally has attributes similar to those of nesting and roosting habitat, but such habitat may not always support successfully nesting pairs (USDI Fish and Wildlife Service 2011). Trees within foraging habitat may vary in size, and could be of smaller diameter than tress in nesting and roosting habitat depending on site-specific conditions. Together, nesting, roosting or foraging habitat comprise suitable habitat in this document.

Suitable Habitat within and Adjacent to the Project Area

Suitable and dispersal habitats within the Government Camp and Cooper Spur parcels were delineated based on field reconnaissance and satellite imagery. For areas outside the parcels, both the spotted owl habitat GIS layer delineated by the Mt. Hood National Forest (Northern spotted owl habitat 2012 layer) and the Mt. Hood corporate vegetation layer generated from gradient nearest neighbor (GNN) data were reviewed for applicability to the analysis. The GNN layer was queried for spotted owl suitable habitat structure characteristics (i.e., canopy cover greater than or equal to 60 percent and overstory [majority] tree size greater than 30 inches). This resulted in very little suitable habitat represented on the landscape, even in areas where inspection of satellite imagery as well as past vegetation information suggested suitable habitat was present. Variations in structure query involving lower canopy cover and stand diameter values appeared to improve representation of suitable habitat, but comparison of these variations to suitable habitat depicted in the Northern spotted owl habitat 2012 layer using satellite imagery and ground-based knowledge of the area indicated the northern spotted owl habitat 2012 layer better represented spotted owl habitat within the project area.

Spotted owl habitat spatial data developed for the 20-year monitoring report for the Northwest Forest Plan was reviewed for this analysis as a source to identify suitable spotted owl habitat in and around the parcels proposed for transfer. Based on satellite image analysis as well as field reconnaissance within the Government Camp parcels, it is apparent that the monitoring report data are not very accurate in this area, and appears to overestimate the amount of suitable habitat. The northern spotted owl habitat 2012 layer appears to be more accurate in identifying suitable spotted owl habitat in this area, so that data was used for this analysis.

Government Camp Parcels

The two parcels proposed for transfer in the Government Camp area contain a range of habitat conditions from open early seral stands to closed mature conifer. Although no mapped suitable habitat occurs within the parcels, field review revealed that relatively small inclusions (less than 8 acres each) of mature forest with high levels of canopy closure exist within the parcels. These total about 3 acres in the east parcel and almost 19 acres in the west parcel, totaling approximately 22 acres (table 103). Due to the small patch size, these inclusions can be considered marginally suitable habitat, with structure providing mainly foraging habitat, but also nesting/roosting structure at the microsite (less than 1 to 2 acres) level. Suitable habitat contiguous to the parcels is generally lacking, but larger blocks are present to the west and east (figure 50). Mapped suitable habitat within 1.2 miles of the parcels totals 677 acres, which equates to approximately 14 percent of all acreage within that area.

Table 103. Habitat structure within Government Camp parcels

Habitat Structure*	East Parcels	West Parcels
Dry meadow	0.5	0
Early seral open	0	1.8
Mature closed	3.0	18.7
Mid seral closed	8.1	43.8
Mid seral moderate	6.8	1.2
Mid seral open	20.9	0
Wet meadow	0.6	0
Non-forested emergent vegetation wetland	0.9	0
Nonhabitat/Urban	0.2	2.5
Grand Total	41.0	68.0

*Early = 0-25 years old, Mid = 25-80 years old, Mature = >80 years old; Open= 0-40% canopy closure, Moderate = 40-60% canopy closure, Closed = >60% canopy closure

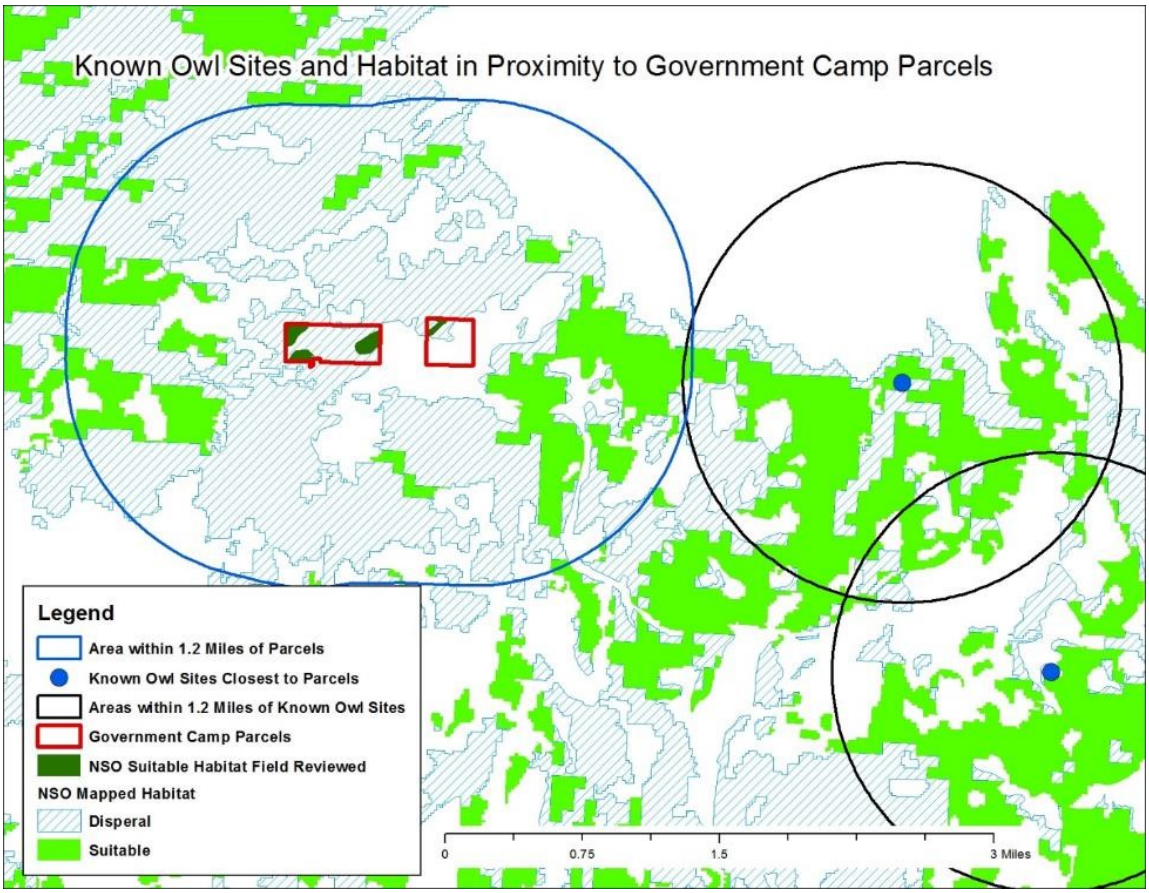

Figure 50. Known owl sites and habitat within and near Government Camp parcels

Cooper Spur Parcels

Parcels proposed for transfer in the Cooper Spur area contain a range of habitat conditions from open early seral stands to closed mature conifer. Although no mapped suitable habitat occurs within the parcels, field review (Dyck 2010, personal communication) showed that approximately 30 acres located along Tilly Jane Creek contains mature forest with high levels of canopy closure (table 104). Due to the narrow configuration of the stand (generally less than 400 feet in width) in addition to being surrounded by dispersal habitat and non-habitat, the stand can be characterized as marginally suitable habitat.

Suitable Habitat within Home Range Areas Encompassing Cooper Spur Parcels

There are a total five known owl sites within 1.2 miles of Cooper Spur parcels proposed for transfer. Recent surveys (2014) indicated owl breeding activity associated with site 6113P13. Analysis results show that suitable habitat amount within 1.2 miles of known owl sites range from about 451 to 740 acres, and averaged approximately 620 acres (table 105). Percentage of suitable habitat within potential home ranges averaged 19.3 percent and ranged from 15.3 to 25.2 percent. None of the potential home ranges contained suitable habitat amounts close to or above thresholds which the literature indicates is the minimum needed for optimal northern spotted owl reproduction (suitable habitat of approximately 40 percent or more in the home range; USDI Fish and Wildlife Service 2011). The Gnarl Ridge Fire (2008; Figure 6) removed habitat within a considerable portion of the home range surrounding site 6097P91. The home range associated with site 6111P96 contains about half of its acreage in other ownerships.

Vegetation structure within other ownerships was not assessed, but review of satellite imagery indicates that some suitable habitat may be present on these lands.

Table 104. Habitat structure within Cooper Spur parcels

Habitat Structure*	Acres
Dry meadow urban	4.3
Dry meadow/trees	28.4
Early seral closed	180.0
Early seral mod	50.1
Early seral moderate	39.6
Early seral open	54.0
Hardwood mix	12.7
Mature closed	30.0
Mid seral closed	279.0
Mid seral moderate	27.2
Mid seral open	49.9
Rock/scree	8.6
Developed	6.0
Grand Total	769.7

*Early = 0-25 years old, Mid=25-80 years old, Late= >80 years old; Open= 0-40% Canopy closure, Moderate= 40-60% Canopy closure, Closed= >60% Canopy closure

Table 105. Northern spotted owl suitable habitat within 1.2 mile radius of known owl sites within 1.2 miles of Cooper Spur parcels

Known Owl Site	Acres of Suitable Habitat within 1.2 Miles of Known Site, Existing NFS lands	Acres of Suitable Habitat within 1.2 Miles of Known Site, Cooper Spur Parcels	Total Acres of Suitable Habitat within 1.2 Miles of Known Site	Percent of Area in Suitable Habitat within 1.2 Miles of Potential Site
6084P91	597.3	0	597.3	20.2%
6097P91	605.4	0	605.4	20.9%
6102P90	693.5	0	693.5	23.5%
6111P96	450.9	0	450.9	15.3%
6113P13	713.5	26.9	740.4	25.1%
		Average	620.1	21.0%

Suitable Habitat within Core Areas

Areas within 0.5 mile of the 5 known sites were delineated for analysis (figure 51). None of the core areas overlap with Cooper Spur parcels.

Results of the analysis show that suitable habitat amount within 0.5 mile of potential sites range from about 21 to 205 acres, and averaged approximately 123 acres (table 106). Percentage of suitable habitat averaged 24.4 percent and ranged from 4.2 to 40.9 percent. None of the areas contained suitable habitat amounts close to or above thresholds which the literature indicates is the minimum needed for optimal northern spotted owl reproduction (suitable habitat of approximately 50 percent or more within the core area; USDA USDI 2016).

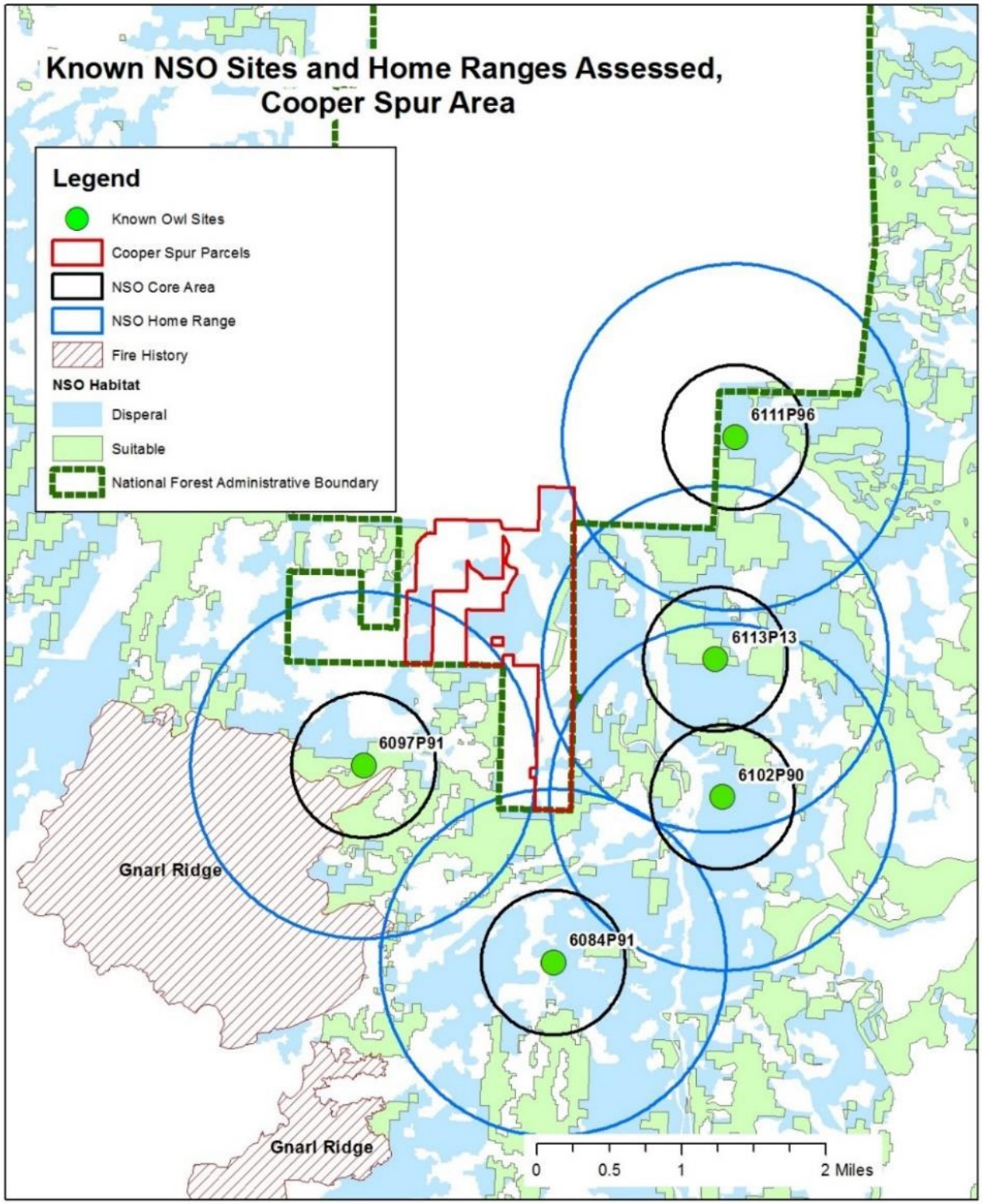

Figure 51. Known owl site home ranges and core areas within 0.5 mile of Cooper Spur parcels

Table 106. Northern spotted owl suitable habitat within 0.5 mile radius of known owl sites within 1.2 miles of Cooper Spur parcels

Known Owl Site	Acres of Suitable Habitat within 1.2 Miles of Known Site, Existing NFS lands	Percent of Area in Suitable Habitat within 1.2 Miles of Potential Site
6084P91	41.0	8.1
6097P91	176.9	35.2
6102P90	102.2	20.3
6111P96	75.3	15.0
6113P13	160.7	31.9
	Average	22.1%

NFS = National Forest System

Dispersal Habitat

Dispersal habitat allows spotted owl movement across the landscape between stands of suitable habitat and for juveniles to disperse from natal territories. This habitat generally lacks the optimal characteristics to support nesting and typically lacks multi-storied canopies, large trees or large snags and down wood. Dispersal habitat generally consists of mid-seral stands between 40 and 80 years of age with canopy cover of 40 percent or greater and trees with a mean diameter of 11 inches or more (USDI 2011). Most managed or natural forest stands 35 to 40 years old begin to develop dispersal habitat conditions.

Government Camp

Currently, dispersal habitat is not limiting across the landscape. Within 1.2 miles of known owl sites the amount of dispersal habitat ranges from 794 to 1,760 acres. Mid-seral moderate and mid-seral closed stands (table 104) comprise dispersal habitat totaling about 60 acres.

Cooper Spur

Availability of dispersal habitat in known Northern spotted owl site home ranges that encompass the Cooper Spur parcels is somewhat less than in the Government Camp area, ranging from 556 acres to 1,400 acres. Mid-seral moderate and mid-seral closed stands (table 104) comprise dispersal habitat within the parcels totaling about 306 acres.

Areas of Concern

The North Willamette Late Successional Reserve Assessment (USDA Forest Service 1998) identified areas outside the late successional reserves where there are concerns about spotted owl dispersal due to the lack of primary constituent elements. The areas of concern were mapped and projects were analyzed to ensure that dispersal habitat is maintained in these locations to facilitate owl dispersal. There were four areas of concern identified on the Mt. Hood National Forest.

In 2012, an analysis of the areas of concern was completed by Ray Davis, Wildlife Biologist for the Interagency Regional Monitoring Team. Davis found that each of the four areas had over 78 percent coverage of dispersal and suitable habitat, sufficient for Northern spotted owl dispersal across the landscape. Based on this analysis the Mt. Hood National Forest has removed areas of concern as a habitat designation for consultation with the U.S. Fish and Wildlife Service and this habitat is now treated the same as any general habitat on the national forest. As a point of reference, the Government Camp-Cooper Spur Land Exchange project area is not located within any of the previously designated areas of concern.

Recovery Action 32 Designations

Among the recovery actions of the 2011 Revised Recovery Plan for the Northern Spotted Owl, Recovery Action 32 is one of the most important actions in retaining high quality suitable habitat. This Action states:

> Because spotted owl recovery requires well distributed, older and more structurally complex multi-layered conifer forests on Federal and non-Federal lands across its range, land managers should work with the Service as described below to maintain and restore such habitat while allowing for other threats, such as fire and insects, to be addressed by restoration management actions. These high-quality spotted owl habitat stands are characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees.
>
> Maintaining or restoring forests with high-quality habitat will provide additional support for reducing key threats faced by spotted owls. Protecting these forests should provide spotted owls high-quality refugia habitat from the negative competitive interactions with barred owls that are likely occurring where the two species' home ranges overlap. Maintaining or restoring these forests should allow time to determine both the competitive effects of barred owls on spotted owls and the effectiveness of barred owl removal measures. Forest stands or patches meeting the described conditions are a subset of NRF habitat and actual stand conditions vary across the range. These stands or patches may be relatively small but important in a local area, may not be easily discernable using remote sensing techniques, and likely require project-level analysis and field verification to identify.

Barred Owls

The Revised Recovery Plan also identifies competition from the barred owl as an important threat to the spotted owl (USDI Fish and Wildlife Service 2011). Current science shows that the barred owl is an invasive species from the eastern United States and has expanded its range extensively throughout the Pacific Northwest. Unlike the northern spotted owl, it is a generalist that can utilize a wide range of habitat types and forest age classes. The species has a wide diet range and can survive on many different prey types (Forsman et al. 2004, USDI Fish and Wildlife Service 2011). As a result, overall northern spotted owl population densities have decreased and barred owls are believed to be out competing spotted owls for habitat and food (USDI Fish and Wildlife Service 2011). The barred owl resilience to habitat fragmentation and modification increases the likelihood of persistence on the landscape. Hybridization levels may increase if northern spotted owl population levels decrease substantially (Courtney et al. 2004). Vegetation management activities can also benefit barred owls indirectly by providing habitat and prey species that are not necessarily preferred by the northern spotted owl.

Because routine surveys have not been conducted for spotted owls on the Mt. Hood National Forest since approximately 1994, it is unknown as to what extent their presence has affected the population of spotted owls. However, within the Oregon demographic study areas, there has been a steady increase in the number of barred owls as measured by the proportion of spotted owl sites with barred owls detected, with as many as 60 percent of the spotted owl sites having barred owls detected (Forsman et al. 2011). Dugger et al. (2011) modeled extinction and colonization rates for spotted owl pairs in the South Cascade Demographic Study area where barred owls were detected on some home ranges. They found that extinction rates for spotted owls increased with decreasing amounts of old forest in the core area, and that the effect was 2 to 3 times greater when barred owls were detected. They found that colonization rates for spotted owls decreased as the distance between patches of old forest increased (i.e., increased habitat

loss and fragmentation) and that barred owl presence similarly decreased the rate of colonization of spotted owl pairs. They concluded that conserving large blocks of contiguous old-forest habitat was important for reducing interference competition between the two owl species.

Disturbance

The U.S. Fish and Wildlife Service has concluded that noise can result in a disruption of breeding, feeding, or sheltering behavior of the spotted owl such that it creates the potential for injury to individuals (i.e., incidental take in the form of harassment; USDI Fish and Wildlife Service 2011). For a substantial disruption of spotted owl behavior to occur, the disturbance and spotted owl(s) must be in close proximity. The northern spotted owl breeding season generally extends from March 1 to September 30 with March 1 to July 15 considered to be critical from a disturbance perspective.

Activities that generate noise above ambient levels have the potential to disturb or disrupt nesting spotted owls. Disturbance activities that can affect northern spotted owl are listed in table 107 and show the minimum distances required.

A spotted owl that may be disturbed at a roost site is presumably capable of moving away from a disturbance without a substantial disruption of its behavior. Since spotted owls forage primarily at night, projects that occur during the day are not likely to disrupt its foraging behavior. The concern about noise is with breeding behavior at active nest sites.

In the late breeding period, potential effects from disturbance decline because juvenile spotted owls are increasingly more capable of moving as the nesting season progresses. The critical breeding period is March 1 through July 15. After July 15, most fledgling spotted owls are capable of sustained flight and can move away from most disturbances (USDI Fish and Wildlife Service 2011).

Table 107. Minimum disturbance and disruption distances for activities affecting northern spotted owls during the breeding season (USDI Fish and Wildlife Service 2016)

Source of Disturbance/ Disruption	Disturbance Distance Entire Breeding Period (March 1 – September 30)	Critical Breeding Period (March 1 – July 15)	Disruption Distance Late Breeding Period (July 16 – September 30)
Aircraft –small fixed-wing	440 yards (0.25 mile)	110 yards	NA
Blasting	1,760 yards (1 mile)	100 yards	100 yards
Burning	440 yards (0.25 mile)	440 yards (0.25 mile)	NA
Chainsaw use	440 yards (0.25 mile)	65 yards	NA
Hauling on open roads	440 yards (0.25 mile)	NA	NA
Heavy equipment	440 yards (0.25 mile)	65 yards	NA
Helicopter: Chinook 47d	880 yards (0.5 mile)	265 yards	100 yards (hovering only)
Helicopter: Boeing Vertol 107, Sikorsky S-64 (SkyCrane)	440 yards (0.25 mile)	150 yards	50 yards (hovering only)
Helicopters: K-MAX, Bell 206 L4, Hughes 500	440 yards (0.25 mile)	110 yards	50 yards (hovering only)
Pile driving	440 yards (0.25 mile)	120 yards	NA
Road brushing/maintenance	440 yards (0.25 mile)	NA	NA
Log hauling on open roads	440 yards (0.25 mile)	NA	NA
Rock crushing	440 yards (0.25 mile)	120 yards	NA
Tree climbing	25 yards	25 yards	NA

NA = not applicable

Portions of the Government Camp east parcel are located within 0.25 mile of mapped suitable spotted owl habitat.

Environmental Consequences

Analysis Area

The analysis area for spotted owl consists of the land parcels proposed for transfer as well as areas included within 1.2 miles surrounding Government Camp parcels (figure 50) and areas within 1.2 miles of known owl sites for home ranges encompassing Cooper Spur parcels (figure 51).

No Action – Direct and Indirect Effects

Under the no action alternative there would be no transfer of parcels. Existing habitat within 109 acres in the Government Camp would remain under Forest Service management in the short-term (less than 2 years) marginally suitable habitat inclusions and dispersal habitat will remain in existing condition. In the longer term, stands will continue to develop with additional amounts of suitable habitat available in future decades barring future disturbances such as wildfire, insect outbreak, or vegetation management activities that preclude stand development. Forest stands within Cooper Spur private parcels will likely develop further in maturity to an extent, but because these are private lands and timber harvest has occurred in the recent past, additional harvest in these stands is expected once they reach commercial value.

Alternative 2–Direct and Indirect Effects

Habitat Impacts

The proposed action, which consists of transferring Government Camp parcels to private ownership would have no direct effect on northern spotted owls. However, full build-out of residential development within the parcels is expected after the ownership transfer is completed (see *Proposed Action Assumptions*). Therefore, the proposed action would indirectly result in loss of northern spotted owl habitat loss totaling approximately 22 acres of suitable habitat and 60 acres of dispersal habitat. Because no recent surveys have been conducted, spotted owl use of habitats within the Government Camp parcels is unknown. Based on the small size of suitable habitat inclusions within the parcels, the relative isolation from larger blocks of suitable habitat, and the low amount of suitable habitat (14 percent) within 1.2 miles of parcels, the potential for spotted owl occupancy within the parcels is expected to be low.

Conversely, Federal acquisition of Cooper Spur parcels would place approximately 30 acres of marginally suitable habitat and an estimated 306 acres of dispersal habitat under Forest Service management. Portions of suitable habitat (27 acres) occur within the home range of a known owl site, while a total of 96 acres of dispersal habitat occurs within the home ranges of 5 known owl sites. These lands would receive consideration as spotted owl habitat for future management per forest plan and Endangered Species Act requirements.

Barred Owls

Direct and indirect effects of the proposed action, including loss of suitable and dispersal habitat, no effect on potential barred owl impacts to spotted owls in the project area, mainly due the general lack of suitable habitat in proximity to the parcels.

Sound Disturbance

The proposed action would have no direct effects on sound disturbance to owls. Indirectly, forest clearing and residential construction activities that include use of chainsaws, heavy equipment, hauling on open roads, would increase potential disturbance out to 0.25 mile (table 107) for an undetermined length of time. Potential for impact to spotted owls due to disturbance is low because the only mapped suitable habitat within 0.25 mile of the parcels is located to the southeast of the east parcel where existing noise and human activities occur activities occur in the town of Government Camp and Highway 26.

Consistency with Recovery Action 32 Designations

Recovery Action 32 of the recovery plan (USFWS 2011) prescribes retention of high-quality habitat stands to promote spotted owl recovery. Under Recovery Action 32, high-quality habitat is defined as:

> "Older, multi-layered structurally complex forests that are characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees. This is a subset of spotted owl habitat and specific characteristics may vary due to climatic gradients and abiotic factors across the range."

Portions of stands within the Government Camp parcels contain these characteristics. While these areas are small (less than 8 acres each), the recovery action recognizes that such areas may be small and should be retained. Therefore, habitat loss resulting indirectly from the proposed action is inconsistent with Recovery Action 32.

Effects of Other Proposed Action Elements

Elements of the proposed action identified in the DEIS other than land transfer include potential wetland easements (if mutually agreed upon), trail easements, and infrastructure special use permits and water permit conveyance. These would have no additional measurable effect on northern spotted owls. Creation of the Crystal Springs Watershed Special Resource Management Unit, identified as an action connected to the proposed action, would have no measurable effect on northern spotted owls. Change in land use allocation of 1,709 acres outside the Cooper Spur parcels from current land use allocations to additions of wilderness may preclude potential future management impacts to habitats within these lands, but would also preclude future habitat restoration opportunities if they exist. Wilderness additions would have no measurable effect on northern spotted owls.

Cumulative Effects

The cumulative effects analysis area consists of the parcels proposed for transfer and areas out to 1.2 miles from these parcels. Past activities such as timber harvest, road construction, development, wildfire, and other disturbances are reflected in the existing condition. Ongoing and foreseeable activities within the analysis area are listed in appendix A. Those consisting of recreation, residential use, infrastructure operations and maintenance, and highway expansion would continue to create noise disturbance out to 0.25 mile. The Mazama Lodge Parking Area Expansion has the potential to remove a small amount of spotted owl habitat (less than one acre). The Mirror Lake Trail Relocation Project may impact small amounts of habitat via parking lot construction and new trail construction. The additional effect of these activities is minor and does not measurably change overall impacts to spotted owls described above. Any future Forest Service projects that include Cooper Spur parcels would be subject to environmental analysis and section 7 Endangered Species Act consultation requirements where applicable.

Determinations

Alternative 1 (No Action)

Alternative 1 would have **no effect** on northern spotted owls.

Alternative 2 (Proposed Action)

Alternative 2 **may affect, and is likely to adversely affect** spotted owls based on the following rationale:

- The proposed action would remove approximately 22 acres of spotted owl suitable habitat.
- Potential for spotted owl occurrence with the parcels is expected to be low; however, recent spotted owl presence/absence surveys have not been conducted within the Government Camp parcels proposed for transfer or within 1.2 miles of these parcels.

North American Wolverine

Affected Environment

In February 2013, the U.S. Fish and Wildlife Service published a proposed rule to list the North American wolverine (*Gulo gulo luscus*) as a threatened distinct population segment in the contiguous United States (Federal Register, Vol. 78, No. 23, February 4, 2013, Proposed Rules). On August 13, 2014 the U.S. Fish and Wildlife Service withdrew its previous proposal (Federal Register, Vol. 79, No. 156, August 13, 2014, Proposed Rules). On April 14, 2016, the Court

remanded the matter to the U.S. Fish and Wildlife Service for further consideration consistent with order CV 14-246-M-DLC (Consolidated with Case Nos.14-247-M-DLC and 14-250-M-DLC). The species is currently considered proposed for Federal listing.

Deep, persistent, and reliable spring snow cover (April 15 to May 14) is the best overall predictor of wolverine occurrence in the contiguous United States (Aubry et al. 2007; Copeland et al. 2010), although evidence of a requirement for deep snow beyond a den site is lacking (USDI Fish and Wildlife Service 2014). Wolverines are opportunistic, consuming a variety of foods but primarily scavenged carrion (Hornocker and Hash 1981). Wolverines in Glacier National Park had average adult male home ranges of 193 square miles and adult female home ranges of 55 square miles (Copeland and Yates 2006). In Montana, natal dens occur above 7,874 feet and are located on north aspects in avalanche debris, typically in alpine habitats near timberline (Inman et al. 2007). Female wolverines forage close to their den in early summer, progressively ranging further from dens as kits become more independent (May et al. 2010). Wolverines have a high dispersal capability and seem to be able to move successfully through highly altered landscapes.

Populations in the Cascade Mountains are small and scattered. Current records (1995–2005) are limited to north-central Washington, northern and central Idaho, western Montana, and northwestern Wyoming (Aubrey 2007). Historic sightings of wolverines both verified and unverified are within a few miles of the project area. Snow Bunny Snow Park had one verified track sighting in 1990. However, current thinking on wolverine distribution is that individual wolverines may invade the Oregon Cascades on occasion but that there is no breeding population this far south (Aubry 2007). Camera and hair sample surveys conducted recently in the Cascades south of the Mt. Hood National Forest found no evidence of wolverine occurrence (McFadden-Hiller and Hiller 2014).

Recent field surveys in the project area have not been accomplished. The last time broad-based surveys were conducted over the watershed was during the winter of 1993–1994 and 1994–1995. Some survey efforts have been ongoing, centered around Mt. Hood, but at this point in time there have been no verifiable sightings of wolverine or sign of presence. A group of volunteers led by Cascadia Wild have performed tracking surveys and some remote camera work for the Mt. Hood National Forest since 2001. No wolverine tracks or photos have been located anywhere on the national forest during that time. There are also no verified sightings in the Oregon Cascades for the last decade. The last verified sighting of a wolverine in the Oregon Cascades was a wolverine killed on Interstate 84 near Hood River in 1994.

Habitat within the Analysis Area

Government Camp Parcels

Habitats within these parcels consist of moderate-aged (80 to 120 years old) forested stands with relatively large expanses of unroaded and undisturbed lands to the north and developed recreation, roaded areas, and urban lands immediately to the east and south. Several well-used trails as well as a powerline corridor currently exist within the western parcel. Due to existing levels of human activity, wolverine are unlikely to make this a portion of a home range core area, but may occasionally pass through the Government Camp parcels. No structure is available for denning.

Cooper Spur Parcels

Forested stands within the Cooper Spur parcels consist of young and moderate-aged conifer at elevations below 3,800 feet. The area is well roaded with buildings located in the eastern portion. Although some rock scree slopes exist in the northeastern corner of the parcel, these slopes do not constitute suitable denning habitat due to the low elevations and lack of persistent spring snows. Due to the low elevation, existing levels of human activity, and lack of unroaded and undisturbed lands, presence of wolverines and suitable wolverine habitat within the Cooper Spur parcels is unlikely.

Environmental Consequences

No-action Alternative

Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No transfer in ownership of existing amounts of California wolverine habitat would occur. No direct, indirect, or cumulative effects would occur as a result of the no-action alternative.

Proposed Action

Direct and Indirect Effects

Implementation of the proposed action would have no direct effects on wolverine or habitat. Existing levels of disturbance generated by hiking trails that may get used year-round, powerline right-of-way, and adjacent residential areas make the parcels an unlikely place for wolverine to utilize other than for transient movements. Within the Government Camp parcels, it is assumed that under private ownership these lands would be developed for residential, commercial, or recreational uses, thereby indirectly removing habitat or further increasing disturbance in areas that are currently suitable for travel only. Loss of this habitat would total 109 acres. Loss of habitat would not create barriers to wolverine movements at the landscape level.

Upper elevation areas (above 4,000 to 4,500 feet) of the Mt. Hood National Forest consisting of mountain hemlock, Pacific silver fir, and alpine vegetation zones are most likely to be used for travel by wolverines if present. These areas total approximately 583,669 acres. The loss of travel habitat within the Government Camp parcels would equate to approximately 0.02 percent of habitat estimated within the Forest.

Cumulative Effects

The cumulative effects analysis area consists of the parcels proposed for transfer and areas out to 1.0 mile from these parcels. This encompasses the potential disturbances and habitat impacts for wolverine traveling through the area (Scrafford and Boyce 2015). Past activities such as timber harvest, road construction, development, wildfire, and other disturbances are reflected in the existing condition. Ongoing and foreseeable activities within the analysis area are listed in the Past, Present, and Reasonably Foreseeable Actions section. Those consisting of recreation, residential use, infrastructure operations and maintenance, and highway expansion would continue to create noise disturbance to wolverines out to 1 mile. The Mazama Lodge Parking Area Expansion has the potential to remove a small amount of habitat (less than one acre). The Mirror Lake Trail Relocation Project may impact small amounts of habitat via parking lot construction and new trail construction. The additional effect of these activities is minor and does not measurably change overall impacts to wolverines described above.

Determinations

Alternative 1 (No Action)

Alternative 1 would have **no effect** on North American wolverines.

Alternative 2 (Proposed Action)

Alternative 2 will not jeopardize the continued existence of North American wolverines based on the following rationale:

- The proposed action would indirectly cause 109 acres of habitat suitable for wolverine travel.
- The amount of habitat loss equates to approximately 0.02 percent of travel habitat estimated to be available on the Mt. Hood National Forest.
- The loss of habitat would not create barriers to wolverine movements across the landscape.
- There is currently no known population of wolverines in the Oregon Cascades.

Sensitive Species Carried Forward for Analysis

Sierra Nevada Red Fox

Affected Environment

Sierra Nevada red fox use multiple habitat types in the alpine and subalpine zones (near and above treeline). In addition to meadows and rocky areas the species use high-elevation conifer habitat in typically open or patchy structure. In winter, they are known to descend into high-elevation conifer areas above the subalpine zone (USDI Fish and Wildlife Service 2015). Winter sightings in the Oregon Cascades have been in elevations as low as 4,200 feet where the species shows a preference for mature closed-canopy conifer forests. Sierra Nevada red fox use natural openings in rock piles at the base of cliffs and slopes as denning sites. They may also dig earthen dens, but this has not been directly documented.

Home range for the species in Oregon has not been documented. In the Lassen area (California) summer home range size averages about 6,400 acres, with winter home ranges larger, averaging about 8,000 acres. Recent species occurrence has been confirmed in the Oregon Cascades as far north as Mount Hood. The Mount Hood sightings consist of 15 reports, with three individuals distinguished. No estimation of population size or trend in the Oregon Cascades has been identified (USDI Fish and Wildlife Service 2015).

Sierra Nevada red fox could be impacted by noise disturbance from recreation areas, but the magnitude of impacts from noise is unknown. Red foxes in the Lassen area of California clearly use roads as movement corridors to facilitate both daily and seasonal movements, with some individuals foraging along the roads, and several foxes in the Lassen area became acclimated to humans, posing problems at some campgrounds and parking areas (Perrine 2005). Sightings in areas with existing recreational disturbance suggests the species adjusts to such disturbances (USDI Fish and Wildlife Service 2015).

No sightings have been reported within the analysis area. The nearest known sighting (2013) is located approximately 2 miles north of the Government Camp parcels. Carnivore sampling stations placed at elevations ranging from 1,250 to 6,400 feet recorded red fox in the Mount

Hood area recorded red fox occurrences at elevations between 4,700 and 6,300 feet. Nine of eleven red fox observations occurred within 1 mile of treeline. The observation most distant from alpine habitat was located approximately 1.4 miles from treeline (Mt. Hood National Forest, NRIS Database).

Habitat within the Analysis Area

Government Camp Parcels

Habitats within these parcels consist of moderate-aged (80 to 120 years old) relatively dense conifer stands with relatively large expanses of unroaded and undisturbed lands to the north, including alpine habitats, and developed recreation, roaded areas, and urban lands immediately to the east and south. Several well-used trails as well as a powerline corridor currently exist within the western parcel. Government Camp parcels are located approximately 2 miles from alpine habitats on Mount Hood and about 2 miles from documented species occurrence. Parcel elevations range from about 3,760 to 4,120 feet, which is just below the lowest elevation reported for Oregon sightings (4,200 feet) and lower than those reported for the Mount Hood area (4,700 feet).

Cooper Spur Parcels

Forested stands within the Cooper Spur parcels consist of young and moderate-aged conifer at elevations below 3,800 feet. The area is well roaded with buildings located in the eastern portion. Due to the low elevation and general lack of dense mature conifer stands within these parcels, it is unlikely that the Cooper Spur parcels function as either suitable habitat or part of an overall seasonal home range.

Environmental Consequences

No-action Alternative

Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No transfer in ownership of existing amounts of Sierra Nevada red fox habitat would occur. No direct, indirect, or cumulative effects would occur as a result of the no-action alternative.

Proposed Action

Direct and Indirect Effects

Implementation of the proposed action would have no direct effects on red fox or habitat. Existing elevations (below 4,200 feet) in addition to distance from alpine and treeline (just over 2 miles) decrease the potential for red fox occurrence, but do not eliminate the possibility. Given that little documented information is available to suggest that the species avoids human presence and disturbances, it is possible that Government Camp parcels are used by the species as lower elevation portions of a winter home range. Within the Government Camp parcels, it is assumed that under private ownership these lands would be developed, thereby indirectly removing habitat that may be used by the species. Loss of this habitat would total 109 acres. Loss of habitat would not create barriers to Sierra Nevada red fox movements at the landscape level.

Alpine habitats on the Mt. Hood National Forest total approximately 14,500 acres and upper elevation conifer areas within 2 miles of alpine habitat total about 36,100 acres. Combined, these areas amount to over 50,000 acres of potential suitable red fox habitat. Removal of 109 acres of

habitat located on the lower fringe of suitability would equate to approximately 0.2 percent of available habitat.

Cumulative Effects

The cumulative effects analysis area consists of the parcels proposed for transfer and areas out to 0.25 mile from these parcels. This encompasses the potential habitat impacts for Sierra Nevada red fox through the area (Scrafford and Boyce 2015). Past activities such as timber harvest, road construction, development, wildfire, and other disturbances are reflected in the existing condition. Ongoing and foreseeable activities in proximity to the project area are listed in the Past, Present, and Reasonably Foreseeable Actions section. Those consisting of recreation, residential use, infrastructure operations and maintenance, and highway expansion would continue to create noise disturbance, but the effects to red foxes is expected to be minor given the species' apparent ability to adjust to some level of human presence. The Mazama Lodge Parking Area Expansion has the potential to remove a small amount of habitat (less than one acre). The Mirror Lake Trail Relocation Project may impact small amounts of habitat via parking lot construction and new trail construction. The additional effect of these activities is minor and does not measurably change overall impacts to Sierra Nevada red fox described above.

Determinations

Alternative 1 (No Action)

Alternative 1 would have **no impact** on Sierra Nevada red fox.

Alternative 2 (Proposed Action)

Alternative 2 may impact individuals, but is not likely to cause a trend to Federal listing or loss of viability to the species based on the following rationale:

- The proposed action would indirectly cause 109 acres of habitat suitable for red fox travel.
- The amount of habitat loss equates to approximately 0.2 percent of habitat estimated to be available on the Mt. Hood National Forest.
- The loss of habitat would not create barriers to red fox movements across the landscape.
- Habitat loss would occur in an area with lower probability of species occurrence.

Cope's Giant Salamander

Affected Environment

Habitat

The Cope's giant salamander ranges across two distinct ecoregions in western Washington and Oregon, occurring predominantly in the Coast Ranges and Cascade Range. In the Cascade Range it occurs from the Nisqually River at Mount Rainier National Park, Washington, southward to the upper White River watershed in Wasco County, Oregon. The species is absent in the Puget Sound lowlands and the northeastern portion of the Olympic Peninsula in Washington, and the Willamette Valley lowlands and foothills in Oregon (Foster and Olsen 2014)

This species is found in small, steep-gradient, permanent streams with clear, cold water. Streambeds are composed of large gravel to small boulders, with some large logs and no silt (Corkran and Thoms 1996). Normally, this species is restricted to moist coniferous forests with

water temperatures ranging from 8 to 14 degrees Celsius (46 to 57 degrees Fahrenheit), and can be found under stones, bark slabs, or other cover in streams, and out of streams on wet rocks and streamside vegetation in nights with heavy rainfall (Nussbaum et al. 1983). Steele et al. (2002) reported capturing this species in streams within commercial forest stands ranging from 0 to nearly 100 years old. Adams and Bury (2002) found this species in natural stands within Olympic National Park to be a generalist in terms of stream substrate, gradient, and aspect, but it was associated with low canopy cover. This species has been reported on the Mt. Hood National Forest at elevations below 5,500 feet. Based on satellite imagery, forest conditions at known sites on the Mt. Hood National Forest appear to vary widely in stand age and structure.

No occurrences are reported for either Government Camp or Cooper Spur parcels. The nearest observation to Government Camp parcels, reported in 2006, is located about 2.5 miles to the southeast. The closest occurrence to Cooper Spur parcels (2001) is approximately 3.5 miles to the northwest.

Habitat within the Analysis Area

Given the rather general nature of habitat associations and with elevational range (from sea level to below 5,500 feet), the species may occur in association with perennial streams within Government Camp and/or Cooper Spur parcels.

Government Camp Parcels

Suitable habitat consisting of perennial streams occurs within both Government Camp parcels. Approximately 770 feet of Camp Creek runs through the southeastern corner of the western parcel. About 1,140 feet of an unnamed perennial creek bisects the northwestern quarter of the eastern parcel.

Coopers Spur Parcels

Perennial stream habitat occurs within the Coopers Spur parcels, with portions of Ash Creek (1.5 miles), Doe Creek (1.1 mile), and Tilly Jane Creek (0.8 mile) flowing through the eastern portion of these lands.

Environmental Consequences

No-action Alternative

Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No transfer in ownership of existing amounts of Cope's giant salamander habitat would occur. No direct, indirect, or cumulative effects would occur as a result of the no-action alternative.

Proposed Action

Direct and Indirect Effects

Implementation of the proposed action would have no direct effects on Cope's giant salamander or habitat. Indirectly, increased peak flows and level of sediment delivery into steams is expected due to surrounding development (see Hydrology Specialist Report).

Water Quantity

Peak streamflow increases above 10 percent have the potential to cause stream channel damage in the form of increased bank erosion, channel scour, channel widening, and sedimentation. At

the site scale, both Camp Creek and the unnamed tributary to the Little Zigzag River have predicted peak stream flows increases above 10 percent and based on stream surveys on Camp Creek and the Little Zigzag River the dominant substrate is these areas is gravel and based on stream gradient from NetMap stream datasets there are sections of stream with gradients in the 2 to 4 percent range. Based on predicted increases in peak stream flows, streambed composition and stream gradient there may be impacts in the form of increased bank erosion, channel scour, channel widening, and sedimentation in these areas (see Hydrology Specialist Report). These changes in stream structure may impact habitat suitability for Cope's giant salamander within the project area.

Water Quality

Removal of surrounding trees due to residential development is predicted to cause slight increases in stream temperatures compared to the existing condition. Additional sediment yield of about 3 percent is also predicted due to changes in the road network and land use associated with implementation of the proposed action (see Hydrology Specialist Report). Changes in stream temperature and sediment yield may alter habitat suitability for this species within the project area.

Impacts Summary

The proposed action may impact Cope's giant salamander habitat suitability within portions or all perennial streams via predicted increases in stream flows, water temperatures, and sediment delivery. Impacts would be localized to two stream reaches (upper portions of Camp Creek and tributary to Zigzag Creek). At the larger scale, the Zigzag River subwatershed contains approximately 80.1 miles of perennial streams below treeline. Stream length within the parcels totals about 0.4 mile, which equates to approximately 0.5 percent of perennial stream length within the subwatershed.

Cumulative Effects

The cumulative effects analysis area consists of perennial stream habitats within and downstream from the Government Camp parcels. This encompasses the potential disturbances and habitat impacts for Cope's giant salamander. Past activities such as timber harvest, road construction, development, wildfire, and other disturbances are reflected in the existing condition. Ongoing and foreseeable activities in proximity to the parcels are listed in the Past, Present, and Reasonably Foreseeable Actions section. No projects or activities listed in appendix A are expected to contribute detrimental cumulative effects to peak stream flows, stream temperatures, or sediment delivery (see Hydrology Specialist Report).

Determinations

Alternative 1 (No Action)

Alternative 1 would have **no impact** on Cope's giant salamanders.

Alternative 2 (Proposed Action)

Alternative 2 may impact individuals, but is not likely to cause a trend to Federal listing or loss of viability to the species based on the following rationale:

- An increase in sediment delivery, temperature, and streamflow to existing streams is expected.

- The affected habitat represents a very small portion of potential habitat within the Zigzag subwatershed.

Larch Mountain Salamander

Affected Environment

Habitat

Larch Mountain salamanders occur in a wide array of habitat types including: (1) old-growth forests; (2) younger naturally regenerated forests in gravelly/cobble soils with residual late successional features (snags and large down logs); (3) scree and talus (forested and un-forested); and (4) lava tube entrances where debris (e.g., pieces of lava, wood, fine organic and inorganic particles) has accumulated. In a large portion of the species range, late-seral forest conditions appear to be crucial to the species existence. In other areas, combinations of rocky substrates, soils, and vegetation provide suitable cool, moist microhabitat conditions necessary for Larch Mountain salamanders to exist. Recorded species observations range in elevation from 1,698 to 3,608 feet, with most individuals found between 2,600 and 3,280 feet (Crisafulli et al. 2008), although the species has also been described to occur up to 3,950 feet (Crisafulli 1999). Species locations showed no preference for aspect, however, 90 percent of individuals were found on slopes greater than 40 percent (Crisafulli et al. 2008).

The relative importance of vegetation composition and structure appears to be related to the substrate/soil conditions present at a site. When rocky substrates (scree, talus or gravelly soils) are prevalent, the role of vegetation composition and structure appears to be less important; and animals are found where several vegetation types occur. In contrast, when loamy soils are present, Larch Mountain salamanders appear to be restricted to sites only with old-growth forest conditions, or confined to small isolated pockets of refugia possessing rocky substrates within the matrix of old-growth forest with loamy soils (Crisafulli et al. 2008).

Habitat within the Analysis Area

Government Camp Parcels

Surface soils within the eastern three-quarters of Government Camp parcels are composed primarily of gravelly loams derived from fine to medium textured glacial till, locally influenced by volcanic ash deposit (Soil Resources Inventory [SRI] mapping unit 380). Outcrops of tuffaceous brecchia, while described as common in this soil type, were not observed within the Government Camp parcels. In the western quarter of the parcels, soil surface layers consist of brown sandy loams and silt loams derived from unconsolidated medium textured glacial till (SRI mapping unit 333).

Query of the NRIS database showed no reported observations of Larch Mountain salamander within 12 miles of these parcels.

Cooper Spur Parcels

Soils information from Mt. Hood National Forest GIS layers is available only for extreme western, eastern portions of these parcels, as well as the entire southern “leg.” Extrapolation of soil map polygons indicate that soils composition within these parcels are more varied that those within the Government Camp parcels. The western portion contains SRI type 333 (discussed above) and SRI type 334 (sandy loams and silt loams somewhat similar to 333). In the eastern portion, SRI mapping units include 6-7, 168, and 169-6. SRI 168 and 169 consist of cobbly fine

sandy loams and silt loams of volcanic ash overlaying bedrock of basalt and andesite. Types 6 and 7 are unvegetated talus and rubbleland consisting of fallen rock materials at the foot of rock slopes and headwalls (type 6) and large exposed outcrops of basalt and andesite with some areas of shallow soils (type 7). The southern leg is composed almost entirely of SRI 168 with a small amount of 6 and 7.

Similar to the Government Camp parcels, query of the NRIS database showed no reported observations of Larch Mountain salamander within 12 miles of Cooper Spur parcels.

Environmental Consequences

No-action Alternative

Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No transfer in ownership of existing amounts of Larch Mountain salamander would occur. No direct, indirect, or cumulative effects would occur as a result of the no-action alternative.

Proposed Action

Direct and Indirect Effects

Implementation of the proposed action would have no direct effects on Larch Mountain salamander or habitat. Analysis of forest condition and soils information available for Government Camp parcels indicates a lack of old-growth forest, and lack of rock features including talus/scree and lava tubes. These parcels do contain mature forests in gravelly or cobble soils with residual late successional features (snags and large down logs). The area estimated to contain these conditions totals about 12.3 acres. However, the likelihood of Larch Mountain salamander occurrence is reduced because the elevation range of these parcels (3,760 to 4,100 feet) are at the upper limit or higher than those described for distribution of the species (up to 3,950 feet). In addition, the lack of slopes greater than 40 percent, (where Crisafulli et al. reported 90 percent of individuals occurring) further decreases the likelihood of species presence. After ownership transfer, subsequent forest removal and infrastructure development would lead to loss of potential habitat on 12.3 acres with a low potential for species occurrence.

Soil and rock conditions in Cooper Spur parcels appear more suitable for this species, specifically in areas containing talus, scree, and rocky outcrops. Available soil mapping shows that about 60 acres of soil type 6, 7, or a combination of both, occur within Cooper Spur parcels, mainly in the vicinity of Tilly Jane Creek. In addition, a large portion of Cooper Spur parcels occur at elevations between 2,600 and 3,280 feet where Crisafulli et al. (2008) reported individuals to be more common. Within those elevations, small inclusions of talus and scree slopes are present on slopes exceeding 40 percent. Mature conifer stands are present along Tilly Jane Creek, but the Cooper Spur parcels general lack any old-growth forest structure.

Cumulative Effects

The cumulative effects analysis area consists of suitable habitats within the portions of parcels proposed for transfer. This encompasses the potential disturbances and habitat impacts for Larch Mountain salamander. Past activities such as timber harvest, road construction, development, wildfire, and other disturbances are reflected in the existing condition. Ongoing and foreseeable activities in proximity to the project area are listed in appendix A. None of the activities listed in

appendix A are expected to cause substantial impacts in excess of those described in the direct or indirect effects.

Determinations

Alternative 1 (No Action)

Alternative 1 would have **no impact** on Larch Mountain salamander.

Alternative 2 (Proposed Action)

Alternative 2 **may impact individuals,** but is not likely to cause a trend to Federal listing or loss of viability to the species based on the following rationale:

- The proposed action would remove about 12 acres of potentially suitable habitat.
- There is a lower probability for species occurrence due to lack of steep slopes, rocky outcrops, and habitat location at the upper elevational limit described for the species.

Johnson's Hairstreak

Affected Environment

These butterflies have been found in Southwestern British Columbia, south through eastern and western Washington, Oregon, and western Idaho to central California. Scattered sightings have been reported in Oregon in the Cascades, Coast Range, Siskiyou Mountains, Blue Mountains and Wallowa Mountains. Johnson's hairstreak has been found in Washington in Olympic and Mt. Rainer National Parks as well as at a few other locations in western Washington. In Oregon, most records indicate that this butterfly survives from 2,000 feet or higher, with the majority living at approximately 3,500 feet, and a few as high as 5,000 and 6,000 feet (Huff 2011).

This species is believed to be closely associated with old-growth forests that are infected with dwarf mistletoe (*Arceuthobium spp*.). However, eggs and larvae have been found from infected second growth stands as well. The primary host trees for dwarf mistletoes that are associated with *C. johnsoni* presence are western hemlock (*Tsuga heterophylla*), mountain hemlock (*Tsuga mertensiana*) white fir (*Abies concolor*) and ponderosa pine (*Pinus ponderosa*). Dwarf mistletoe can occur on all age classes of forest, but is most abundant in mature stands and old-growth. Johnson's hairstreak is seldom seen, perhaps because it spends most of its adult life high in the forest canopy (Davis and Weaver 2011).

Habitat within the Analysis Area

Government Camp Parcels

Mountain hemlock trees of various sizes are present in these parcels, more specifically throughout much of the western parcel, and within the western portion of the eastern parcel. No surveys for Johnson's hairstreak have been conducted within these areas. Field visits noted presence of brooms and platforms within conifers, but did not specify or quantify mistletoe presence by conifer type (Dyck 2010, pers. comm.). Potential suitable habitat within mature conifer containing hemlock totals approximately 22 acres.

Cooper Spur Parcels

Western and mountain hemlock are absent from Cooper Spur parcels. Ponderosa pine occurs as inclusions of mixed conifer stands. Current level of mistletoe occurrence in these stands is

unknown, but levels are likely to be low if at all present. No known Johnson's hairstreak occurrences are reported for this area.

Environmental Consequences

No-action Alternative

Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No transfer in ownership of existing amounts of Johnson's hairstreak habitat would occur. No direct, indirect, or cumulative effects would occur as a result of the no-action alternative.

Proposed Action

Direct and Indirect Effects

Implementation of the proposed action would have no direct effects on Johnson's hairstreak or habitat. Stands where a suitable host species (mountain hemlock) is considered a major species component within the Government Camp parcels total about 22 acres, whereas stands with a major presence of a suitable host species and potential mistletoe presence are largely lacking. Due to advanced stand development and noted indications of dwarf mistletoe presence, Government Camp parcels are more likely to contain suitable Johnson's hairstreak habitat. Therefore, implementation of the proposed action would reduce Federal ownership of potential habitat for Johnson's hairstreak by an estimated 22 acres. Subsequent development of Government Camp parcels would likely cause habitat loss on 22 acres. Mid to late-seral stands (trees larger than 15 inches diameter) containing tree species known to host suitable mistletoe species total approximately 119,000 acres within the Mt. Hood National Forest. Loss of 22 acres equates to approximately 0.02 percent of existing within the national forest.

Cumulative Effects

The cumulative effects analysis area consists of the parcels proposed for transfer and areas out to 0.25 mile from these parcels. This encompasses the potential area of use by individuals that may use habitats within the parcels. Past activities such as timber harvest, road construction, development, wildfire, and other disturbances are reflected in the existing condition. Ongoing and foreseeable activities within the analysis area are listed in appendix A. Those consisting of recreation, residential use, infrastructure operations and maintenance are not expected increase habitat impacts. The Mazama Lodge Parking Area Expansion has the potential to remove a small amount of habitat (less than one acre). The Mirror Lake Trail Relocation Project may impact small amounts of habitat via parking lot construction and new trail construction. Suitability of these habitats would depend on presence of mistletoe preferred by Johnson's hairstreak. The additional effect of these activities is minor and does not measurably increases impacts described for direct and indirect effects.

Determinations

Alternative 1 (No Action)

Alternative 1 would have **no impact** on Johnson's hairstreak.

Alternative 2 (Proposed Action)

Alternative 2 may impact individuals, but is not likely to cause a trend to Federal listing or loss of viability to the species based on the following rationale:

- The proposed action would remove about 22 acres of potentially suitable habitat.
- Affected acres represent a very small portion (0.02 percent) estimated existing potential suitable habitat.

Fringed Myotis

Affected Environment

Myotis thysanodes ranges through much of western North America from southern British Columbia, Canada, south to Chiapas, Mexico and from Santa Cruz Island in California, east to the Black Hills of South Dakota.

Habitats for fringed myotis in Oregon are not well described. Day roosts in northwestern California consisted primarily of larger snags (Weller and Zabel 2001). In the eastern Cascades of Oregon and Washington, roost sites were in rock substrates consist primarily of rocky outcrops, talus slopes, large rocks in wooded side slopes, and boulder fields. Several roost sites were also in ponderosa pine snags (Lacki and Baker 2007). Reported night roost structures used by this species include bridges, buildings, caves, mines, rock crevices, and under bark or in tree cavities (Lacki et al. 2007). Frequent roost switching is reported to be common. Foraging habitats reported for the Pacific Northwest include areas along streams and rivers, and old-growth Douglas-fir/hemlock forest (Verts and Carraway 1998, Nagorsen and Bridgham 1993).

There are no reported fringed myotis sightings within the project area. The closest reported occurrence of this species to Government Camp parcels is located about 20 miles to the southwest. Nearest reported occurrence to Cooper Spur parcels is located approximately 31 miles to the southwest (Mt. Hood National Forest NRIS database).

Habitats within the Analysis Area

Government Camp Parcels

These parcels lack buildings, caves, bridges, and rock features as potential roosting habitat. Some moderate and larger-diameter snags noted during field reconnaissance may serve as suitable roosting sites within 22 acres of forest stands. Buildings and bridges are present on private lands adjacent to these parcels. Foraging habitat is present along existing streams and in portions of forested stands with older forest characteristics.

Cooper Spur Parcels

No known caves or bridges occur within the Cooper Spur parcels. About 10 buildings are located in the southern portion. Potential or existing bat roosting activities within these buildings are unknown. Rocky scree slopes appear to occur in the northeastern portion of these parcels. Potential foraging habitat exists along portions of Ash Creek, Doe Creek, and Tilly Jane Creek. No known species observations are reported for these lands. Nearest reported occurrence is located approximately 31 miles to the southwest (Mt. Hood National Forest NRIS database).

Table 108. Fringed myotis habitat features within parcels

Habitat Feature	Government Camp Parcels	Cooper Spur Parcels
Rock/scree (roosting)	0 acres	8.5 acres
Advanced Forest (roosting and foraging)	22 acres	30 acres*
Riparian (foraging)	0.4 mile	3.4 miles
Building (roosting)	0	10

*size, condition, and abundance of snags are unknown.

Environmental Consequences

No-action Alternative

Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No transfer in ownership of existing amounts of fringed myotis habitat would occur. No direct, indirect, or cumulative effects would occur as a result of the no-action alternative.

Proposed Action

Direct and Indirect Effects

Implementation of the proposed action would have no direct effects on fringed myotis or habitat.

Potential tree roosting could occur in stands with more advanced structure. Such structure is estimated to total about 22 acres in Government Camp and about 30 acres in Cooper Spur parcels. However, snags that may support roosting were observed in Government Camp parcels; status of snag size, condition, and abundance in Cooper Spur parcels is unknown. Buildings as roosting structure occur only in Cooper Spur parcels. Riparian foraging habitat occurs along about 0.4 mile of perennial stream in Government Camp parcels in comparison to 3.4 miles within Cooper Spur. In addition, buildings and talus/scree sites that may provide roosting are present only in Cooper Spur parcels.

Implementation of the proposed action and subsequent development would reduce Federal ownership of potential habitat for fringed myotis by an estimated 22 acres. Advanced stands with structural characteristics (conifer stands greater than 20 inches diameter) that may support roosting total approximately 276,000 acres within the Mt. Hood National Forest. Loss of 22 acres equates to less than 0.01 percent of existing within the national forest.

Cumulative Effects

Fringed myotis may move fairly long distances between foraging and roosting habitats. However, overlap distances of potential disturbances to roosting and foraging with those impacts described for the project area are likely to occur within one mile of parcels. Past activities such as timber harvest, road construction, development, wildfire, and other disturbances are reflected in the existing condition. Ongoing and foreseeable activities listed in the Past, Present, and Reasonably Foreseeable Actions section consisting of recreation, residential use, infrastructure operations and maintenance are not expected increase habitat impacts. The Mazama Lodge Parking Area Expansion has the potential to remove a small amount of potential tree roosting habitat (less than one acre). The Mirror Lake Trail Relocation Project may impact small amounts of habitat via parking lot construction and new trail construction. Suitability of these habitats would depend on presence of larger snags with loose bark or cavities. The additional effect of

these activities is expected to be minor and does not measurably increases impacts described for direct and indirect effects.

Determinations

Alternative 1 (No Action)

Alternative 1 would have **no impact** on fringed myotis.

Alternative 2 (Proposed Action)

Alternative 2 **may impact individuals**, but is not likely to cause a trend to Federal listing or loss of viability to the species based on the following rationale:

- The proposed action would remove about 22 acres of potentially suitable habitat.
- Affected acres represent a very small portion (less than 0.01 percent) estimated existing potential suitable roosting habitat.

Townsend's Big-eared Bat

Affected Environment

Corynorhinus townsendii occurs throughout the west and is distributed from the southern portion of British Columbia south along the Pacific coast to central Mexico and east into the Great Plains, with isolated populations occurring in the central and eastern United States.

Townsend's big-eared bat commonly is considered a cave-dwelling species, and caves and abandoned mine tunnels are considered primary hibernacula and maternity sites for this species (Verts and Carraway 1998). Buildings and bridges are frequently used as night roosts (Csuti et al. 1997). Foraging habitat for Townsend's big-eared bat includes forest edges, roads, riparian forest, or forest openings (Dobkin et al. 1995, Lacki et al. 2007).

The reported observation closest to Government Camp parcels is located about 18 miles to the southwest. The species observation nearest to Cooper Spur parcels is located about 30 miles to the southwest (Mt. Hood National Forest NRIS database).

Habitat within the Analysis Area

Government Camp Parcels

Primary reproductive, hibernation, and roosting habitats are absent from these parcels. However, these areas may function as foraging habitat for this species. No known observations are reported for these parcels.

Cooper Spur Parcels

Primary reproductive and hibernation habitat in the form of caves or abandoned mines are likely absent from Cooper Spur parcels. These lands also lack potential bridge roost sites. About 10 buildings currently exist in the southern portion, but the status of suitability or potential bat occurrence at these sites is unknown. Both forested and nonforested portions of these parcels consist of suitable foraging habitat for this species. No known observations are reported for these parcels. The closest reported observation is located about 30 miles to the southwest (Mt. Hood National Forest NRIS database).

Environmental Consequences

No-action Alternative

Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No transfer in ownership of existing amounts of Townsend's big-eared bat habitat would occur. No direct, indirect, or cumulative effects would occur as a result of the no action alternative.

Proposed Action

Direct and Indirect Effects

Implementation of the proposed action would have no direct effects on Townsend's big-eared bat or habitat. Lands within the Government Camp parcels contain some foraging habitat in the form of forest openings, riparian forest, and forest edges. The western block contains a small amount of riparian forest with closed canopy that may be marginal for this species. Narrow openings created by the powerline and old road corridors constitute a strip of edge habitat about 6,100 feet in length. The existing parking area and trail head also constitute a small opening of about 2 acres. Larger amounts of potential foraging habitat occur within the eastern block. This block contains approximately 2 acres of open wetland and meadow habitat, and about 9 acres of open forest habitat. Forest edge habitat is estimated at about 4,800 feet. Length of mapped perennial streams in all Government Camp parcels totals 1,900 feet (0.4 mile). Total open foraging habitat amounts to 13 acres and edge habitat about 10,900 feet (2.1 miles) within all Government Camp parcels (table 109). Development would likely result in loss of edge habitat, but suitable foraging habitat may be retained along perennial streams.

Lands within the Cooper Spur parcels appear to contain a higher amount of Townsend's big-eared bat foraging habitat. About 141 acres of dry meadow, open canopy forest, and areas of rock/scree occur within these parcels. There are also approximately 9.8 miles of forest edge habitat where dry meadows, rock/scree areas, and early seral and open canopy forest contrast with denser and more developed forest stands. Length of mapped perennial streams in all Cooper Spur parcels totals over 3 miles.

Table 109. Townsend's big-eared bat habitat features within parcels

Habitat Feature	Government Camp Parcels	Cooper Spur Parcels
Meadow/Wetland	1 acre	28 acres
Open Canopy Forest	23 acres	103.9 acres
Rock/scree Opening	0 acres	8.5 acres
Forest Edge	2.1 miles	9.8 miles
Riparian	0.4 mile	3.4 miles

Cumulative Effects

Similar to fringed myotis, Townsend's big-eared bats may move fairly long distances between foraging and roosting habitats. However, overlap distances of potential disturbances to roosting and foraging with those impacts described for the project area are likely to occur within one mile of parcels. Past activities such as timber harvest, road construction, development, wildfire, and other disturbances are reflected in the existing condition. Ongoing and foreseeable activities listed in appendix A consisting of recreation, residential use, infrastructure operations and maintenance are not expected increase habitat impacts. The Mazama Lodge Parking Area

Expansion has the potential to remove a small amount of potential tree roosting habitat (less than one acre). The Mirror Lake Trail Relocation Project may impact small amounts of habitat via parking lot construction and new trail construction. Suitability of these habitats would depend on presence of larger snags with loose bark or cavities. The additional effect of these activities is expected to be minor and does not measurably increases impacts described for direct and indirect effects.

Determinations

Alternative 1 (No Action)

Alternative 1 would have **no impact** on Townsend's big-eared bat.

Alternative 2 (Proposed Action)

Alternative 2 **may impact individuals,** but is not likely to cause a trend to Federal listing or loss of viability to the species based on the following rationale:

- The proposed action would remove approximately 13 acres of forest edge foraging habitat.
- **No impacts** to primary maternity or hibernaculum habitats including caves, mines, or buildings are expected.

Mardon Skipper

Affected Environment

Surveys for this species in Oregon and Washington have focused on each of the four disjunct population areas as well as in between and along the edges of these populations. In the south Puget Sound, grasslands have been surveyed, including large areas of Joint Base Lewis-McChord. Within forested-grassland openings in areas of the southern Cascades of Washington, areas have been surveyed on the Gifford Pinchot National Forest and Naches Ranger District of the Okanogan-Wenatchee National Forest. In the southern Oregon Cascades, surveys have been conducted on Medford District of the BLM, the Klamath Falls Resource Areas of the Lakeview BLM District, the eastern portion of the Rogue River-Siskiyou National Forest, and western portion of the Fremont-Winema National Forest. Surveys in between the southern Washington Cascade and southern Oregon Cascade populations have been conducted on the Columbia River Gorge National Scenic area, and the Mt. Hood and Willamette National Forests with no Mardon skippers found (Kerwin and Huff 2011).

Habitat

Mardon skippers occupy grassland habitats, the characteristics of which appear to vary by region. Habitats in the south Puget Sound consist of grasslands situated on glacial outwash soils, often referred to as prairies. In this habitat type, they use open grasslands with abundant *Festuca roemeri* interspersed with *Viola adunca*. In the southern Cascades of Washington, distribution ranges from 1,800 to 5,500 feet elevation where the species is found in warm, dry grand fir (*Abies grandis*) savannah/woodland with grassland intrusions or in small (less than ½ acre) to larger grassland complexes. Forty percent of the Gifford Pinchot National Forest sites are in older clearcuts which are now dominated by fescue bunchgrasses. Site conditions range from dry, open ridge tops to areas associated with wetlands or riparian habitats. Populations in southern Oregon occupy smaller grasslands (0.5 to 10 acres), higher-elevation (4,500 to 5,100 feet) grasslands within mixed conifer forests at higher elevation (4,500 to 5,100 feet). They are usually associated with a water source (Kerwin and Huff 2007).

No known sightings are reported for the Mt. Hood National Forest. Surveys were conducted in 2009 at six sites with the highest probability of species occurrence, with no Mardon skipper occurrences reported (Walcott 2010). One survey site was located about 0.8 mile from the Cooper Spur parcels.

Habitat within the Analysis Area

All Parcels

Approximately 28 acres of meadow habitat, located in the western portion of the Cooper Spur parcels, may function as suitable Mardon skipper habitat; however, much of this contains encroaching conifers. Approximately 0.5 acre of potentially suitable habitat exists within Government Camp parcels (table 103).

Environmental Consequences

No-action Alternative

Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No transfer in ownership of existing amounts of Mardon skipper habitat would occur. No direct, indirect, or cumulative effects would occur as a result of the no-action alternative.

Proposed Action

Direct and Indirect Effects

Alternative 1 (no action) - Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No direct, indirect, or cumulative effects would occur as a result of the no-action alternative.

Alternative 2 (proposed action) – Implementation of the proposed action would have no direct effects on Mardon skipper or its habitat. Subsequent development of Government Camp parcels would potentially cause loss of habitat totaling about 0.5 acre. Meadow habitat is more abundant on Cooper Spur parcels (28 acres); however, much of the meadow habitat at Cooper Spur is currently encroached by conifers at the edges and interiors. Actual suitability of all sites due to local conditions such as wind and exposure are unknown. Overall, there would be a gain in Federal ownership of about 27 acres of dry meadow habitats, which could potentially be managed to maintain habitat suitability. Portions of meadows will require future removal of encroaching conifers to maintain meadow condition in the long term.

Non-forested habitats on the Mt. Hood National Forest below 5,200 feet elevation total approximately 10,500 acres. Removal of 0.5 acre of habitat within the Government Camp parcels would equate to less than 0.01 percent of estimated available foraging habitat.

Cumulative Effects

The cumulative effects analysis area for Mardon skipper consists of the parcels proposed for transfer and areas out to 0.25 mile from these parcels. This encompasses the potential area of use by individuals that may use habitats within the parcels. Past activities such as timber harvest, road construction, development, wildfire, and other disturbances are reflected in the existing condition. None of the ongoing and foreseeable activities listed in the Past, Present, and Reasonably Foreseeable Actions section are expected to contribute impacts to this species in excess of those described for direct and indirect effects.

Determinations

Alternative 1 (No Action)

Alternative 1 would have **no impact** on Mardon skipper.

Alternative 2 (Proposed Action)

Alternative 2 **may impact individuals,** but is not likely to cause a trend to Federal listing or loss of viability to the species based on the following rationale:

- The proposed action would indirectly cause loss of 0.5 acre of potentially suitable Mardon skipper habitat.
- Approximately 28 acres of dry meadow and meadow with tree habitat would be transferred to Federal ownership with potential for management to maintain suitable foraging conditions.
- Removal of 0.5 acre of habitat within the Government Camp parcels would equate to less than 0.01 percent of estimated available foraging habitat.

Western Bumble Bee

Affected Environment

Prior to 1998, the western bumble bee was both common and widespread throughout the western United States (including Colorado) and western Canada. Since 1998, this bumble bee has undergone a drastic decline throughout some areas of its former range. While viable populations still exist in Alaska and east of the Cascades in the Canadian and U.S. Rocky Mountains, the once common populations of central California, Oregon, Washington and southern British Columbia have largely disappeared (Xerces 2015). In Oregon, this species has been documented on Deschutes, Fremont-Winema, Malheur, Mt. Hood, Ochoco, Rogue River-Siskiyou, Siuslaw, Umatilla, Umpqua, Willamette, and Wallow-Whitman National Forests, and BLM land in the Burns, Lakeview and Medford Districts.

Given the relatively recent range decrease for this species, it is unknown what the current “documented” status is for many of these field units, as many of the documented sites are considered historic. Species occurrence adjacent to the Government Camp parcels was reported in 1932, 1941, 1956, and 1968 and near the Cooper Spur parcels in 1925 (Mt. Hood National Forest NRIS database). Surveys conducted on Mount Hood in 2013 reported western bumble bee occurrence approximately 2 miles northeast of the parcels (Hatfield et al. 2013). No status or trend has been identified for populations within the project area.

The western bumble bee has three basic habitat requirements: suitable nesting sites for the colonies, nectar and pollen from floral resources available throughout the duration of the colony period (spring, summer and fall), and suitable overwintering sites for the queens (Jepson et al. 2014). Nests occur primarily in underground cavities such as old squirrel or other animal nests and in open west-southwest slopes bordered by trees, although a few nests have been reported from above-ground locations such as in logs among railroad ties (Jepson et al. 2014).

Bumble bees require plants that bloom and provide adequate nectar and pollen throughout the colony’s life cycle, which is from early February to late November for *B. occidentalis* (although the actual dates likely vary by elevation). Very little is known about the hibernacula, or overwintering sites (Jepson et al. 2014).

Habitat within the Project Area

Lands within the Government Camp parcels contain some foraging habitat in the form of meadows totaling less than 1 acre, and open canopy forested stands totaling 23 acres (table 103). Lands within the Cooper Spur parcels appear to contain a higher amount of foraging habitat. About 28 acres of dry meadows with scattered trees is available to support nectar-producing plants in addition to open canopy forest totaling 104 acres.

Environmental Consequences

No-action Alternative

Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No transfer in ownership of existing amounts of western bumble bee habitat would occur. No direct, indirect, or cumulative effects would occur as a result of the no-action alternative.

Proposed Action

Direct and Indirect Effects

Implementation of the proposed action would have no direct effects on western bumble bee or habitat. Subsequent development of Government Camp parcels would potentially cause destruction of underground colonies as well as loss of foraging habitat totaling about 24 acres. Meadow habitat is more abundant on Cooper Spur parcels (28 acres); however, much of the meadow habitat at Cooper Spur is currently encroached by conifers at the edges and interiors. Actual suitability of all sites due to local conditions such as wind and exposure are unknown. Overall, there would be a gain in Federal ownership of about 28 acres of dry meadow habitats, which could potentially be managed to maintain habitat suitability. The 81 acres of open canopy forest is expected to lose foraging suitability as stands mature and canopies become denser. Portions of meadows will require future removal of encroaching conifers to maintain meadow condition in the long term.

Non-forested habitats on the Mt. Hood National Forest total approximately 23,000 acres. Removal of less than 1 acre of meadow habitat within the Government Camp parcels would equate to less than 0.01 percent of estimated available foraging habitat.

Cumulative Effects

The cumulative effects analysis area consists of the parcels proposed for transfer and areas out to 0.25 mile from these parcels. This encompasses the potential area of use by individuals that may utilize habitats within the parcels. Past activities such as timber harvest, road construction, development, wildfire, and other disturbances are reflected in the existing condition. Activities listed in appendix A consisting of recreation, residential use, infrastructure operations and maintenance are not expected to increase habitat impacts. Current and ongoing development of private lands in the vicinity of Cooper Spur parcels may impact habitat availability locally, but would not add to direct or indirect impacts because no negative impacts to this species were identified for these parcels. No other activities are expected to cause impacts additional to those describe for direct and indirect effects.

Determinations

Alternative 1 (No Action)

Alternative 1 would have **impact** on western bumble bees.

Alternative 2 (Proposed Action)

Alternative 2 **may impact individuals,** but is not likely to cause a trend to Federal listing or loss of viability to the species based on the following rationale:

- The proposed action would indirectly cause loss destruction of colonies and loss of 1.1 acres of suitable bumble bee foraging habitat.
- Approximately 28 acres of dry meadow and meadow with tree habitat would be transferred to Federal ownership with potential for management to maintain suitable foraging conditions.
- Removal of less than 1 acre of meadow habitat within the Government Camp parcels would equate to less than 0.01 percent of estimated available foraging habitat.

Dalles Sideband

Affected Environment

Dalles sideband is a local endemic known from watersheds tributary to the Columbia Gorge on both the Oregon and Washington sides of the river in Wasco, Hood River, Klickitat, Skamania and Sherman Counties, from Hood River east to the vicinity of The Dalles, and in upland sites in watersheds tributary to the lower Deschutes River in Wasco County. In Oregon, it is documented on the Mt. Hood National Forest. Local extirpations and declines have been documented in the Columbia River Gorge area. Frest and Johannes (1995) note that extinct colonies have been found along the I-84/U.S. 30 corridor, and list the population trend (number of sites, number of individuals) as downward. The vast majority (79/100) of known records are from the Barlow Ranger District on the national forest where most detections have been relatively recent, and changes in population number and size through time are not known (Jordan and Black 2014).

The parent species, *Monadenia fidelis*, is found in mesic forest habitats or near springs or other water sources in forest situations, generally with rock substrates or large woody debris and logs for refugia (Frest and Johannes 1995, 2000). The subspecies Monadenia fidelis minor is known only from relatively few sites within a limited range. It is associated with talus habitat and seasonally moist rocky areas, especially around seeps and springs, though it is not found in the springs or seeps, nor is it considered to be a talus obligate. In The Dalles, this species lives among rocks and in and under bluffs around springs and in riparian areas (Burke 2013). Frest and Johannes (1995) emphasize the association of this subspecies with basalt and basalt-derived soils, noting that taluses are often comparatively dry and open, but partial cover by *Celtus*, grasses, *Rhus horribilis*, *Artemisia*, *Urtica*, and *Balsamorrhiza* is typical (Jordan and Black 2014).

Habitat within the Project Area

Suitable habitat for this species is lacking within the Government Camp parcels. A small amount of talus/scree habitat (9 acres) occurs within the northeast portion of the Cooper Spur parcels.

Environmental Consequences

No-action Alternative

Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No direct, indirect, or cumulative effects would occur as a result of the no-action alternative.

Proposed Action

Because no suitable habitat exists within the Government Camp parcels, no direct or indirect effects to existing species distribution or habitat would result from implementation of the proposed action. In addition, no direct or indirect effects to habitats or individuals potentially occurring within Cooper Spur parcels as a result of the proposed action and connected actions.

Determinations

Alternatives 1 and 2

Both the no action and proposed action would have **no impact** on Dalles sideband.

Crater Lake Tightcoil

Affected Environment

In Oregon, Crater Lake tightcoil occurs throughout the Oregon Cascades from Mt. Hood National Forest in the north to the Umpqua and Winema National Forests in the south at elevations exceeding 2,000 feet in scattered wetland areas (Gowan and Burke 1999).

The species is usually found in non-acid fens or sedge habitats at elevations from 2,750 to 6,400 feet (Gowan and Burke 1999). This species has been found in mature conifer forests and among rushes, mosses and other surface vegetation or under rocks and woody debris within 10 meters of open water in wetlands, springs, seeps and riparian areas which experience perennially moist conditions and long winters. The sites where Frest and Johannes (1995) found Crater Lake tighcoil were small openings such as “spring meadows” in generally undisturbed forests. Plant litter and natural porous soils provide some necessary cover for protection against excessive fluctuations in temperature and humidity, and also for hiding or escaping from predators (Andrews 2010).

No occurrences are reported within the project area. The nearest known occurrences are located approximately 5 miles from Government Camp parcels and over 6 miles from Cooper Spur parcels.

Habitat within the Project Area

Suitable habitat is located within a portion of one wetland (Wetland No. 11, Mt. Hood National Forest Land Exchange Wetland Survey, Watershed Professionals Network LCC 2010). The site consists of an emergent vegetation wetland totaling 1 acre in size adjacent to moderate-sized conifers (figure 52), located in the eastern block of the Government Camp parcel. No suitable habitat is expected to occur within Cooper Spur parcels.

Figure 52. Potential Crater Lake tightcoil habitat, Government Camp east parcel (photo source: Watershed Professionals Network LCC 2010)

Environmental Consequences

No-action Alternative

Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No transfer in ownership of existing amounts of Crater Lake tightcoil habitat would occur. No direct, indirect, or cumulative effects would occur as a result of the no-action alternative.

Proposed Action

Direct and Indirect Effects

Implementation of the proposed action would have no direct effects on Crater Lake tightcoil or habitat. About 1 acre of suitable habitat is located within Government Camp parcels. The 2009 Omnibus Act prescribed as a mandatory condition to the land exchange that the Forest Service reserve wetland and trail easements on the Federal parcels to be exchanged. More specifically, the Omnibus Act required the Forest Service to reserve a conservation easement on the Federal land to protect existing wetlands, as identified by the Oregon Department of State Lands that allows equivalent wetland mitigation measures to compensate for minor wetland encroachments necessary for the orderly development of that land following the exchange. The Clarification Act (which is now the proposed action) changed this provision from “shall reserve” to “may mutually agree to reserve.” Under both scenarios with or without a Federal conservation easement, some increased level of sediment delivery into wetlands is expected due to surrounding development (see Hydrology Report).

Under the proposed action, wetlands in the conveyance parcels would no longer be managed and conserved by the Forest Service as Riparian Reserves. Regulatory authority and oversight for the protection of these wetlands would switch to the Oregon Department of State Lands who share the responsibility implementing section 404 of the Clean Water Act, the principal statute for governing activities in wetlands, with the Oregon Department of Environmental Quality, the U.S.

Army Corps of Engineers and the U.S. Environmental Protection Agency. Activities associated with residential development that could encroach upon the wetlands would have to undergo a review and permitting process according to Oregon Revised Statute before they would be authorized (see Wetland Supplement to the Watershed Resources Report).

Section 404 of the Clean Water Act protects wetlands from net loss regardless of ownership by the use of either on-site conservation easements or compensatory mitigation (funding the creation or restoration of wetlands at a different place and time and maintaining them in perpetuity). The proposed action would include conservation easements, so that the wetlands in the conveyed parcels would be protected according to regulation by the Department of State Lands. If on-site conservation easement is applied, retention of suitable Crater Lake tightcoil habitat is expected. In the event that compensatory (off-site) mitigation is applied, residential encroachment of the site may occur, thereby reducing or removing habitat suitability on approximately 1 acre. Based on data accessed from the National Wetlands Inventory (USDI Fish and Wildlife Service 2016b), freshwater emergent wetland and freshwater forested/shrub wetland habitats total 1,883 acres and 3,840 acres, respectively, on the Mt. Hood National Forest. The 1-acre patch of habitat within the Government Camp parcel represents approximately 0.05 percent of freshwater emergent wetland habitat and 0.02 percent of all potential habitat on the national forest.

Cumulative Effects

The cumulative effects analysis area consists of the areas within 10 meters of emergent vegetation wetland (approximately 1 acre) within the Government Camp parcel as well as perennial streams above the wetland. This encompasses the potential disturbances and habitat impacts for Crater Lake tightcoil. Past activities such as timber harvest, road construction, development, wildfire, and other disturbances are reflected in the existing condition. Ongoing and foreseeable activities in proximity to the parcels are listed in the Past, Present, and Reasonably Foreseeable Actions section. No projects or activities listed in appendix A are expected to contribute detrimental cumulative effects to peak stream flows, stream temperatures, or sediment delivery (see Hydrology Report).

Determinations

Alternative 1 (No Action)

Alternative 1 would have **no impact** on Crater Lake tightcoil.

Alternative 2 (Proposed Action)

Alternative 2 may impact individuals, but is not likely to cause a trend to Federal listing or loss of viability to the species based on the following rationale:

- An increase in sediment delivery to wetlands is expected.
- Without application of a Federal wetlands conservation easement, habitat may maintain function if on-site mitigations are applied. If compensatory mitigation is applied, habitat on 1 acre may be degraded or removed.
- The 1-acre habitat patch that may be impacted constitutes a very small portion of potential habitat available forestwide.

Shiny Tightcoil

Affected Environment

This species is reported from many widely separate (but often imprecise) historic locations. It is known from the Washington and Oregon Cascades. It is also reported from the Blue Mountains in Oregon (Wallowa Valley above Wallowa Lake in Wallowa County) and from several counties in Idaho (Washington, Adams, Boise, and Shoshone) (Huff 2011).

The species seems to occur rarely in Oregon and surveys in recent years in appropriate areas have failed to relocate it; a number of sites in Wasco County, Oregon, were unsuccessfully surveyed for this taxon (Frest and Johannes 1995), as well as areas in western Oregon. In Oregon, this species is documented in Deschutes and Mt. Hood National Forests and suspected in Malheur, Umatilla and Wallowa-Whitman National Forests, BLM land in the Prineville and Salem Districts, and the Columbia Gorge National Scenic Area in Oregon (Huff 2011).

Most sites for this species are in ponderosa pine and Douglas-fir forests at moderate to high elevations. The eastern Washington record is from a relatively moist, shaded basalt cliff and with talus and *Populus* cover (Frest and Johannes 1995). Burke and Leonard (2009, draft) describe the habitat as primarily under deciduous trees, particularly quaking aspen and red alders. Other *Pristiloma* species in the ecoregion are known to prefer moist microsites such as basalt talus accumulations, usually with riparian influence (Duncan 2008).

Habitat within the Project Area

No reported sightings or suitable habitat exist within the Government Camp parcels. No sightings are reported for the Cooper Spur parcels, for which the nearest sighting is located about 6 miles to the northeast. Suitable habitat may occur within Cooper Spur parcels along draws containing deciduous trees and basalt talus, particularly along Tilly Jane Creek.

Environmental Consequences

No-action Alternative

Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No transfer in ownership of existing amounts of Shiny tightcoil habitat would occur. No direct, indirect, or cumulative effects would occur as a result of the no-action alternative.

Proposed Action

Direct and Indirect Effects

Implementation of the proposed action would have no direct effects on Shiny tightcoil or habitat. No suitable habitat exists within Government Camp parcels, therefore, no direct or indirect impacts would result from transfer of this property from Federal ownership. In addition, no direct, indirect, or cumulative impacts would result from the addition of Cooper Spur parcels to Federal ownership, including connected actions because no ground-disturbing activities would occur without further environmental analysis.

Determinations

Alternatives 1 and 2

Both the no-action and proposed action would have **no impact** on shiny tightcoil.

Mt. Hood National Forest Management Indicator Species

The Mt. Hood forest plan (USDA Forest Service 1990a) identifies seven wildlife species as management indicator species (table 110). These species serve as indicators of the effects of management activities by representing a broad range of other wildlife species. The habitat requirements of management indicator species are presumed to represent those of a larger suite of species using the same type of habitat. Table 110 lists all Mt. Hood National Forest management indicator species, primary habitats as identified in the forest plan, as well as habitat presence and species occurrence in the Cooper Spur-Government Camp analysis area. Five management indicator species and associated habitats are documented or suspected to occur within the analysis area. These consist of northern spotted owl, pileated woodpecker, American marten, deer, and elk.

Table 110. Management indicator species and their primary habitats

Species	Habitat Type	Habitat Present in Analysis Area	Species Present in Analysis Area
Northern spotted owl	Mature and old growth forest	Yes	Suspected
Pileated woodpecker	Mature, old growth snags	Yes	Documented
American (pine) marten	Mature and old growth forest	Yes	Suspected
Silver gray squirrel	Pine/oak (East side)	No	No
Merriam's turkey	Pine/oak (East side)	No	No
Deer	Grass/forb, seedling/sapling	Yes	Documented
Elk	Grass/forb, seedling/sapling, old growth forest	Yes	Documented

A forestwide analysis for management indicator species has been conducted (USDA Forest Service 2011). It summarizes the Mt. Hood National Forest's consistency with the National Forest Management Act goal of managing wildlife habitat to "maintain viable populations of existing native and desired non-native vertebrate species." The forestwide analysis for management indicator species describes population and habitat trends and is incorporated by reference. It was conducted at a coarse scale using available GIS data. Further refinement is provided in this analysis based on available local data.

Monitoring at the national forest scale has been documented in annual monitoring reports available on the Mt. Hood National Forest website (http://www.fs.fed.us/r6/mthood). There is no requirement in the forest plan, as amended, to survey for or gather site-specific, project-scale population data regarding the project implementation's effects to the viability of the population of management indicator species. Rather, the forest plan directs that habitat be used as a proxy for population monitoring. Land allocations near or adjacent to the project area that provide habitat for management indicator species include late-successional reserves and riparian reserves for pine marten, pileated woodpecker, and northern spotted owl; and winter range and summer range for deer and elk. Of these allocations, only summer range overlaps the project area. There are also numerous forestwide standards and guidelines that pertain to these species.

Northern Spotted Owl

The northern spotted owl was selected as a management indicator species because it represents old growth habitats. The biological evaluation above describes, in detail, the species and its habitat requirements.

The overall trend for spotted owl populations is declining in the Pacific Northwest. The recovery for the species is covered under the U.S. Fish and Wildlife Service Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*) (USDI 2011). Because the northern spotted owl is listed as a threatened species, the Forest Service consults on the effects to the species and its habitat with the U.S. Fish and Wildlife Service prior to making decisions on actions by the agency. The US Fish and Wildlife Service has not found any proposed actions on the Mt. Hood National Forest to place the northern spotted owl in jeopardy.

Determination

The degree of effect to northern spotted owl habitat for the Government Camp-Cooper Spur Land Exchange project, when combined with other projects that affect owl habitat, would **not contribute to a negative trend in viability** on the Mt. Hood National Forest for the northern spotted owl.

American Marten

Affected Environment

This species (*Martes americana*) was formerly known as the pine marten. It was selected as a management indicator species because of its association with mature and over-mature habitat and need for large snags and large amounts of down wood. Shrinking habitat and trapping pressure led to the concern for marten populations (USDA Forest Service 1990b). Conservation status is listed below.

Table 111. American marten conservation status

Scientific Name **Common Name**	**Heritage Rank**	**Federal Status**	**Oregon Dept. of Fish and Wildlife Status**	**Oregon Biodiversity Information Center List**
Martes americana American marten (SV in BM and CR ecoregions only)	G5 [1] S3S4 [2]	Not applicable	SV[3]	4 (Not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences.)

1. G5: NatureServe Global Rank - Secure
2. S3: Oregon Natural Heritage Program Conservation Status Rank - Vulnerable. At moderate risk of extinction due to a restricted range, relatively few populations, recent and widespread declines, or other factors; S4: Apparently Secure. Uncommon but not rare; some cause for long-term concern due to declines or other factors
3. SV – Sensitive Species, Vulnerable Category

Distribution

Globally, the species is distributed throughout Canada and Alaska, south through the Rockies, Sierra Nevada, northern Great Lakes Region, and northern New England. In Oregon and Washington, it occurs in montane forests of the southern Oregon Coast Range, Siskiyou Mountains, Cascade Mountains, Blue Mountains, Olympic Peninsula, and northeast Washington (Marcot et al. 2003). Marten are absent from the northern Oregon and southern Washington coastal mountains, and are rare in the Olympic Peninsula (Zielinski et al. 2001).

Habitat Characteristics and Ecology

American marten are typically associated with late-seral coniferous forests with closed canopies, large trees, and abundant snags and down woody (Zielinski et al. 2001). Wisdom et al. (2000; Appendix 1, Table 1) list subalpine and montane forests in old multi- and single-story, and unmanaged young multi-story structural stages as providing source habitat for American marten in the Columbia Basin. Lower montane forests are not listed as source habitat. Snags and down logs are identified as special habitat features of source habitat for the marten. Down logs provide habitat for prey and subnivean access points as well as rest and den sites for marten. Thomas et al. (1993) list marten as closely associated with late-successional and old-growth forests and the old-growth elements of large snags and down logs. The reports also indicate a strong relationship of marten with riparian areas. On the eastern side of the North Cascades of Washington, marten were detected in wet-forest habitats, but were not detected in dry-forest habitats (Munzing and Gaines 2008). Wet forests include western hemlock, Pacific silver fir, and mountain hemlock plant associations.

Habitat and Trend

American martens prefer older habitat at higher elevations and select habitat with high amounts of snags and down wood. Their preference is highly associated with cavities for denning and a higher abundance of rodents, especially squirrels and chipmunks.

American martens occur at high elevations with greatest populations in subalpine areas (Buskirk and Ruggiero 1994). Riparian areas are used for foraging and resting; they select resting sites in large trees or in piles of woody debris in riparian areas. Large coarse woody debris and canopy cover are important for martens during winter because they have limited energy reserves in winter. Winter habitat requirements include more than 30 percent canopy cover. Under snow, coarse woody debris concentrations provide resting areas and habitat for marten prey. Other resting sites or den sites include cavities in large snags, hollow stumps, and under logs (USDA USDI 1993).

Since the marten was identified as a management indicator species in the forest plan, several factors listed below have contributed cumulatively to a trend of improving habitat:

- The establishment of late-successional reserves and riparian reserves has resulted in the retention of late-successional stands and the enhancement of younger stands to accelerate the development of late-successional conditions.
- The Northwest Forest Plan required the national forests to reassess the need for land allocations for pileated woodpeckers during watershed analysis. On the Mt. Hood National Forest, most of the B5 land allocations were removed during watershed analyses because the network of late-successional reserves, riparian reserves, and other land allocations would provide for the species. Currently, no pileated woodpecker land allocations occur within proximity of the project area.
- Several wilderness areas have been designated.
- Timber harvest on the Mt. Hood National Forest, even on Matrix lands, has transitioned from reliance on regeneration harvest of mature stands to a program of thinning younger stands.
- The Mt. Hood National Forest has decommissioned several hundred miles of roads, reducing disturbance.
- Hazardous fuels have been treated to reduce the potential impact of wildfire on the species.

Using the data from the habitat modeling analysis (Davis 2008), there are 10,876 to 21,553 acres of habitat with a 30 to 40 percent or higher probability of supporting American marten on the Mt. Hood National Forest.

American marten home range size in Montana ranged from 0.4 to 1.0 square kilometers (99 to 247 acres). For this analysis of home ranges, 173 acres was used in determining the number of home ranges on the national forest. For Mt. Hood National Forest, the analysis indicates there are approximately 63 to 125 home ranges for martens. The original analysis for marten was much higher (the forest plan indicates a minimum number of home ranges at 231. However, the 1990 forest plan analysis would have to assume that habitat that current analysis would indicate had only a 15 to 20 percent probability would support martens to have that many home ranges. As stated above, the forest plan overestimated the number of home ranges. The current analysis is probably closer in actual number of a population and is better supported by tracking information provided by Cascadia Wild from their winter tracking data and camera stations. During the spring, a home range might be occupied by a male, a female, and three young. Therefore, an estimate of population on the Mt. Hood National Forest would be 310 to 625 martens, depending on prey availability.

Habitat within the Project Area

Portions of the Government Camp parcels contain structure suitable for American marten. About 22 acres contain forested stands mature enough and containing sufficient snags and down log to be considered marten habitat. The remaining portions consist of younger stands lacking sufficient snags and down logs that may be used for movement.

Environmental Consequences

No-action Alternative

There would be no impacts to marten or marten habitat on Mt. Hood National Forest lands as a result of no action.

Proposed Action

Direct and Indirect Effects

Ownership transfer of Government Camp parcels would result in a reduced amount of suitable habitat on Mt. Hood National Forest lands totaling 22 acres. Once transferred, it is likely these stands would be developed resulting in a loss of suitable marten habitat. Stands with overstory and size suitable to support marten within the Cooper Spur parcels is estimated at 30 acres; however, the amount of larger snags and down logs has not been identified in these parcels. Therefore, the habitat may appear suitable, but quality for marten was not verified. In addition, existing habitat distribution and potential road-related disturbance factors indicate that habitat at Government Camp is currently less impacted by open roads and forested stands not currently suitable habitat will begin to become suitable in the short term (less than 20 years) as stands continue to mature. Conditions at Cooper Spur consist of higher road densities and younger stands that would take longer to develop into suitable habitat.

Cumulative Effects

The area used to analyze cumulative impacts is the area within one mile of all parcels proposed for ownership transfer. In the Government Camp area, past development of National Forest System and lands of other ownership has decreased available marten habitat locally, but areas to

the north and west remain primarily forested, with trees continuing advancing in age toward maturity. This is reflected in the existing condition. Ongoing and foreseeable activities listed in the Past, Present, and Reasonably Foreseeable Actions section consisting of recreation, residential use, infrastructure operations and maintenance are not expected to increase habitat impacts, but may cause localized noise disturbance leading to marten avoidance of some areas. The Mazama Lodge Parking Area Expansion has the potential to remove a small amount of potential tree roosting habitat (less than one acre). The Mirror Lake Trail Relocation Project may impact small amounts of habitat via parking lot construction and new trail construction. These activities may also increase noise disturbance locally, but because of the small scope of these activities, the additional effect is minor.

Determinations

The current trend for American marten is stable. The proposed action would transfer about 22 acres of suitable habitat from Federal ownership and about 30 acres of potentially suitable habitat with unverified quality, to the Mt. Hood National Forest. Loss of 22 acres constitutes approximately 6 percent of one home range, and 0.11 percent of the upper limit of habitat estimated to occur on the Mt. Hood National Forest. Therefore, the project would not contribute to a negative trend in viability on the Forest for American marten.

Pileated Woodpecker

Affected Environment

The pileated woodpecker was chosen as a management indicator species because of its need for large snags, large amounts of down woody material for foraging, and large defective trees for nesting, roosting and foraging. They are listed as an indicator of mature and over-mature habitat.

The breeding bird atlas project (Sauer et al. 2008) analyzed the breeding bird survey routes in Oregon and the result was a trend of a 0.9 (in percent per year) increase for the species with a 0.53 probability with a sample of 61 survey routes. This probability is too high to determine that the species was above 0 for the trend. However, a survey-wide analysis for the species showed a 1.7 percent increase with a 0.0 probability, indicating that it was statistically significant with 1,890 survey routes as the sample size.

Table 112. Pileated woodpecker conservation status

Scientific Name **Common Name**	**Heritage Rank**	**Federal Status**	**Oregon Dept. of Fish and Wildlife Status**	**Oregon Biodiversity Information Center List**
Dryocopus pileatus Pileated woodpecker	G5[1] S4[2]	Not applicable	SV[3]	4 (Not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences.)

1. G5: G5: NatureServe Global Rank - Secure
2. S4: Oregon Natural Heritage Program Conservation Status Rank - Apparently Secure-Uncommon but not rare; some cause for long-term concern due to declines or other factors
3. SV – Sensitive Species, Vulnerable Category

Habitat Characteristics and Ecology

The pileated woodpecker is associated with forest habitats that have large trees, especially large snags (greater than 20 inches diameter) for nesting and foraging. It uses both coniferous and

deciduous trees, but tends to be most common in old-growth Douglas-fir forests in western Oregon. They choose foraging habitats that contain high densities of lags and snags, dense canopies, and tall shrub cover. They may forage on small snags but prefer large snags (Schroeder 1982, Csuti 1997). The pileated woodpecker was chosen as a management indicator species for its association to mature and over mature habitat.

Mellen et al. (1992) found that the mean home range for pileated woodpeckers is 1,181 acres with approximately a 9 to 30 percent overlap (about 200 acres) between territories. Mellen et al. found that pileated woodpeckers selected habitat that was greater than 71 years of age. Therefore an average home range with overlap for pileated woodpeckers would be approximately 970 acres.

Since identification of the pileated woodpecker as a Management Indicator Species in the forest plan, several factors have contributed cumulatively to a trend of improving habitat. The following have changed since the species was identified in the forest plan:

- The establishment of late-successional reserves and riparian reserves has resulted in the retention of late-successional stands and the enhancement of younger stands to accelerate the development of late-successional conditions.
- The Northwest Forest Plan required the Forests to reassess the need for land allocations for pileated woodpeckers during Watershed Analysis. On the Forest, most of the B5 land allocations were removed during Watershed Analyses because the network of late-successional reserves, riparian reserves, and other land allocations would provide for the species. Currently, no pileated woodpecker land allocations occur within proximity of the project area.
- Several wilderness areas have been designated.
- Timber harvest even on Matrix has transitioned from reliance on regeneration harvest of mature stands to a program of thinning younger stands.
- The Forest has decommissioned several hundred miles of roads reducing disturbance.
- Hazardous fuels have been treated to reduce the potential impact of wildfire on the species.
- Insects have killed many trees thereby increasing available pileated woodpecker foraging habitat.

Existing Condition on the Mt. Hood National Forest

Currently, there are 405,092 acres of pileated woodpecker habitat on the Mt. Hood National Forest based on GIS query for 80 years and older habitat (Jamie Bradbury, 02/28/2001). By dividing the acres of pileated woodpecker habitat by the average home range with overlap of 970 acres, there are 418 potential home ranges on the national forest. An average clutch size of 4 (Marshall et al. 2003) would indicate that the summer population of pileated woodpeckers could be as high as 2,508 birds, including adults and fledglings. The current trend for habitat for pileated woodpeckers is an increase in available habitat for the last 10 years due to continued forest growth and aging, as well as increased levels of snags and down wood.

Habitat within the Project Area

The Government Camp parcels currently contain about 22 acres of advanced mid-late successional stands that would function as suitable habitat. Cooper Spur parcels are estimated to

contain approximately 30 acres of potential pileated woodpecker habitat, however, the amount of larger snags and down logs has not been identified in these parcels.

Environmental Consequences

No-action Alternative

There would be no impacts under the no-action alternative due to a lack of change in Federal ownership pattern and amount.

Proposed Action

Direct and Indirect Effects

The action alternative would result in the loss of 22 acres of suitable pileated woodpecker under Mt. Hood National Forest ownership within the Government Camp parcels. After ownership transfer, these lands would likely be developed resulting in loss of suitable habitat. In contrast, Federal acquisition of Cooper Spur parcels would offset, to a degree, habitat losses at Government Camp by gaining suitable habitat totaling about 30 acres. While stand structure appears suitable for pileated woodpecker, actual amounts of snags and down logs have not been verified in Cooper Spur parcels, therefore the habitat quality may not meet the species' needs. Existing habitat distribution and potential road-related disturbance factors indicate that habitat at Government Camp is currently less impacted by open roads and forested stands not currently suitable habitat will begin to become suitable in the short-term (less than 20 years) as stands continue to mature. Conditions at Cooper Spur consist of higher road densities and younger stands that would take longer to develop into suitable habitat.

Potential Snag Availability

Existing snags have not been surveyed for size class and abundance in either the Government Camp or Cooper Spur parcels. Based on past timber management as well as reconnaissance, it is likely that Government Camp parcels contain more and larger snags on a per-acre basis that lands in Cooper Spur.

To assess the effects of the proposed action on future snag availability, information contained in the DecAID Advisor (Mellon-McLean et al. 2012) is used to estimate and compare snag production potential under various vegetation management scenarios. Snag density and size class information provided in DecAID as gathered from all unharvested inventory plots pertinent to the Wildlife Habitat Type and Structural Condition categories applicable to the parcels was utilized to project and compare potential future snag outputs.

Density of snags by size class in DecAID is provided in the form of tolerance levels of 30 percent, 50 percent, or 80 percent. DecAID tolerance levels may be interpreted as three levels of "assurance": low (30 percent tolerance level), moderate (50 percent tolerance level), and high (80 percent tolerance level) for meeting species needs. The higher the tolerance level, the higher the "assurance" that snag and down wood habitat is being provided. For the purposes of this analysis, these tolerance levels are used to display snag densities under different vegetation management scenarios.

Snag Density Capabilities on a Per-Acre Basis

Wildlife habitat type within Government Camp parcels consists of Montane Conifer Forest while those at Cooper Spur consist of Eastside Mixed Conifer. The parcels contain both Larger Trees and Small/Medium Tree structural conditions; therefore, DecAID inventory plot data for both

structural conditions is displayed below. For the Government Camp habitat type, snag densities for Small/Medium structural condition range from 9 to 32.4 snags per acre for snags 10 inches diameter or larger and 1.1 to 7.4 snags per acre for snags 20 inches or larger (table 113). In stands managed for large trees, densities are slightly higher with snags 10 inches diameter or larger range from about 11 to 26 per acre and 20+ inch diameter snags ranging from about 6 to 15 per acre.

Table 113. Snag density capabilities, Government Camp Parcels, montane conifer habitat type

Snag Size Class	30% Tolerance Level (Snags/ac.)	50% Tolerance Level (Snags/ac.)	80% Tolerance Level (Snags/ac.)
Small/Medium Trees Structural Condition			
≥ 10 dbh	9	15.3	32.4
≥ 20 dbh	1.1	2.7	7.4
Large Trees Structural Condition			
≥ 10 dbh	10.7	15.3	25.8
≥ 20 dbh	5.8	8.6	14.9

By comparison, the Cooper Spur parcels are likely to support lower snag densities mainly due to drier site conditions. Density of snags 10 inches diameter or greater for the Cooper Spur habitat type in Small/Medium structural condition ranges from approximately 4 to 22 per acre, and snags 20+ inches in diameter range in density from 0 to 6.2 per acre (table 114). Densities in the Large Tree structural condition range for snags 10 inches or greater range from 1.5 to 14.4 per acre, while density of large snags 20 inches diameter or greater range from 0 to 7.3 per acre.

Table 114. Snag density capabilities, Cooper Spur Parcels, eastside mixed conifer habitat type

Snag Size Class	30% Tolerance Level (Snags/ac.)	50% Tolerance Level (Snags/ac.)	80% Tolerance Level (Snags/ac.)
Small/Medium Trees Structural Condition			
≥ 10 dbh	4.0	9.1	22.2
≥ 20 dbh	0.0	2.0	6.2
Large Trees Structural Condition			
≥ 10 dbh	1.5	5.3	14.4
≥ 20 dbh	0.0	2.4	7.3

Snag Number Capabilities by Parcel

Potential future snag availability on a per-acre basis are shown above to be potentially higher in Government Camp parcels. However, a comparison between parcels as a whole shows that Cooper Spur parcels have the capability to provide higher overall snag numbers due to the fact that those parcels contain an estimated 710 acres of forest-capable habitat, which is nearly 7 times the forest capable acreage contained in Government Camp parcels (estimated at 104 acres). Extrapolating the per-acre snag densities displayed above over the entire Government Camp parcel in Small/Medium Tree structural condition indicates a range of total snags ≥ 10 inches in diameter up to 3,370 and a range up to 770 snags ≥20 inches in diameter (table 115). In the

Large Tree structural condition, potential future snag availability ranges up to 2,638 snags 10 inches or larger in diameter, and up to 1,115 snags 20 inches or greater in diameter.

Potential future availability of snags on Cooper Spur parcels in the Small/Medium Tree structural condition is estimated to range up to 15,762 snags greater than or equal to 10 inches in diameter, and up to 6,106 snags greater than or equal to 20 inches in diameter. Although the upper range of potential snag availability is higher in Cooper Spur parcels, the zero value shown for snags greater than or equal to 20 inches in table 116 is a reflection of the lack of snags recorded in some unharvested plots. This indicates a higher potential for gaps in large snag availability in comparison to plots in the Montane Mixed Conifer habitat type represented in the Government Camp parcels.

Table 115. Snag total capabilities, Government Camp Parcels, montane conifer habitat type

Snag Size Class	30% Tolerance Level (Total Snags)	50% Tolerance Level (Total Snags)	80% Tolerance Level (Total Snags)
Small/Medium Trees Structural Condition			
≥ 10 dbh	936	1,591	3,370
≥ 20 dbh	114	281	770
Large Trees Structural Condition			
≥ 10 dbh	1,113	1,591	2,683
≥ 20 dbh	603	894	1,550

Table 116. Snag total capabilities, Cooper Spur Parcels, eastside mixed conifer habitat type

Snag Size Class	30% Tolerance Level (Total Snags)	50% Tolerance Level (Total Snags)	80% Tolerance Level (Total Snags)
Small/Medium Trees Structural Condition			
≥ 10 dbh	2,769	6,461	15,762
≥ 20 dbh	0	1,420	4,402
Large Trees Structural Condition			
≥ 10 dbh	1,065	3,763	10,224
≥ 20 dbh	0	1,704	5,183

Direct and Indirect Effects to Snag Availability

Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No transfer in ownership of existing amounts of snags or future available snag habitat would occur. No direct, indirect, or cumulative effects would occur as a result of the no-action alternative.

Implementation of the proposed action would have no direct effects on snag habitat. Indirectly, subsequent development of Government Camp parcels would remove an unknown existing number of snags and would preclude future snag development on 104 acres of forest. By comparison, forested stands in the Government Camp parcels are capable of supporting higher per-acre snag densities than stands within the Cooper Spur parcels for both Small/Medium and Large Tree structural conditions. However, due to the difference in size of parcels, the Cooper Spur parcels have the capability to develop a higher number of snags overall, although gaps may

exist at the stand level. In addition, snag development and retention would be emphasized under Forest Service management, whereas if managed as private timberlands, emphasis in managing to retain snag snags is unlikely in these parcels. Snag development in younger conifer stands, which are estimate to represent about 40 to 45 percent of forest stands in Cooper Spur parcels, will take decades whereas snag development is likely occurring at some level in denser mid-seral and mature stands.

Cumulative Effects

Similar to American marten, the area used to analyze cumulative impacts is the area within one mile of all parcels proposed for ownership transfer. In the Government Camp area, past development of National Forest System and lands of other ownership has decreased available pileated woodpecker habitat locally, but areas to the north and west remain primarily forested, with trees continuing advancing in age toward maturity. This is reflected in the existing condition. Ongoing and foreseeable activities listed in the Past, Present, and Reasonably Foreseeable Actions section consisting of recreation, residential use, infrastructure operations and maintenance are not expected increase habitat impacts, but may cause localized noise disturbance leading to pileated woodpecker temporary avoidance of some areas. The Mazama Lodge Parking Area Expansion has the potential to remove a small amount of potential tree roosting habitat (less than one acre). The Mirror Lake Trail Relocation Project may impact small amounts of habitat via parking lot construction and new trail construction. These activities may also increase noise disturbance locally, but because of the small scope of these activities, the additional effect is expected to be minor.

Determinations

The current trend for pileated woodpecker is increasing (see Forest-wide Analysis for Management Indicator Species). Transfer of lands at Government Camp would potentially decrease available habitat in the area by about 22 acres, which equates to approximately 2.5 percent of one home range. At the Forest-level, loss of 22 acres equates to less than 1/100th of 1 percent of available habitat. Acquisition of the Cooper Spur parcels would result in an additional 30 acres of potentially suitable habitat under Federal ownership, although pileated woodpecker suitable habitats would potentially be less effective due to roading, and younger forests taking longer to develop into suitable habitat. The very small magnitude of suitable habitats gained at Cooper Spur is similar to that lost at Government Camp. Therefore, this project would not contribute to negative trend in viability on the Forest for pileated woodpecker.

Deer and Elk

Affected Environment

In the forest plan, deer and elk were selected as management indicator species because they are economically important game animals. Deer and elk utilize early-successional forest habitat for foraging and were originally thought to require mature and old growth forest habitat for thermal cover.

Habitat

Thermal cover is defined as a stand of coniferous trees at least 40 feet tall with an average crown cover of 70 percent or more. Optimal cover is found mainly in multi-storied mature and old-growth stands. Elk herds exhibit a close association with riparian habitat in areas of gentle terrain and low road density. Forage is widely available but is generally of low quality. The low quality

of the forage, especially in winter range, and the lack of wetlands and permanent low-gradient streams within winter range are considered limiting factors for elk and deer.

The forest plan standards and guidelines contain minimum requirements for optimal and thermal cover habitat components, but no specific level for forage. There are currently 69,226 acres of early-successional habitat on the Mt. Hood National Forest.

High road densities can lead to harassment of elk herds. Harassed elk move more often than those left undisturbed and use of habitat decreases as road density increases (Witmer and deCalesta 1985). Elk within or moving through areas of high road density tend to move longer distances (Fiedler 1994).

Populations

Based on State and global rankings, deer and elk are common, widespread and abundant. They are both managed as game species in the state of Oregon. The Government Camp parcels are located within the Santiam Game Management Unit; the Cooper Spur parcels occur within the Hood Game Management Unit.

Elk populations within the Santiam Game Management Unit are currently lower in comparison to numbers estimated during the 2000s, but population numbers have stabilized over the past 5 years (figure 53). Elk population in the Hood Game Management Unit are low, but have increased slightly over numbers estimated from more than 10 years ago (ODFW 2016). Similar to elk populations, mule deer populations are down from previously higher levels, but stable over the past 5 years (figure 54). No population estimates are available for black-tailed deer within the Santiam Unit. At this time there is no concern for viability of the species by Oregon Department of Fish and Wildlife. If viability becomes a concern, the Department would limit or close the hunting season. Hunter success has been stable for the last 20 years indicating a stable deer and elk population in the state, although there has been a decline since the 1960s (ODFW 2016).

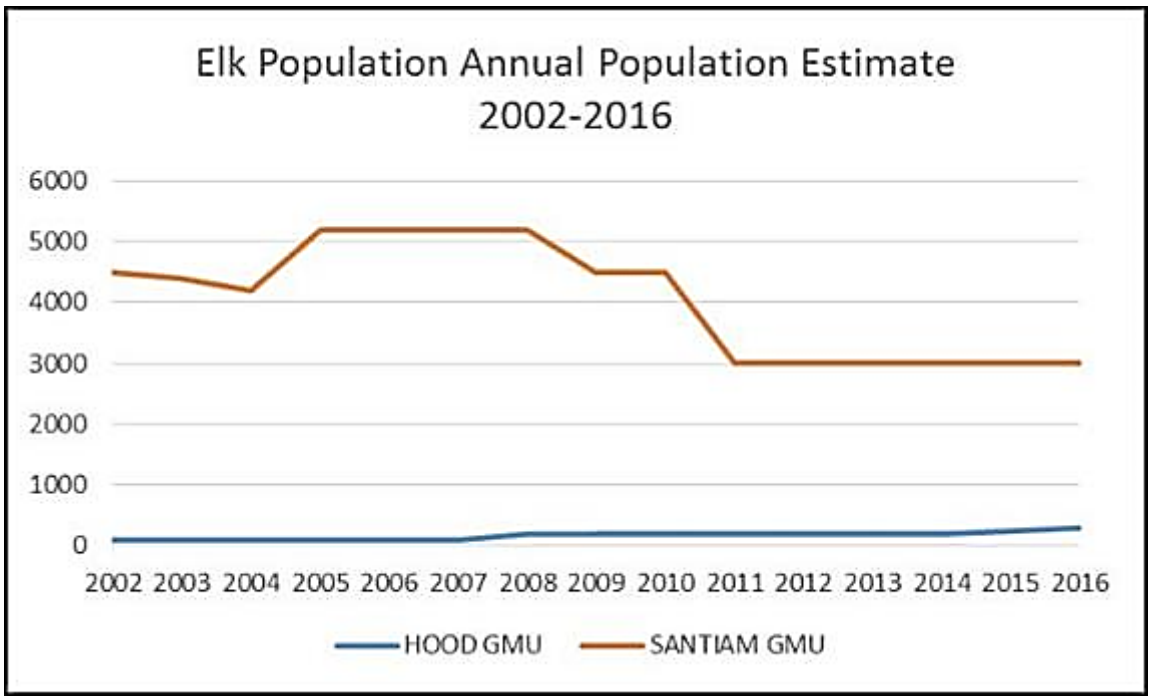

Figure 53. Elk trends, Hood and Santiam Game Management Units (source: ODFW 2016)

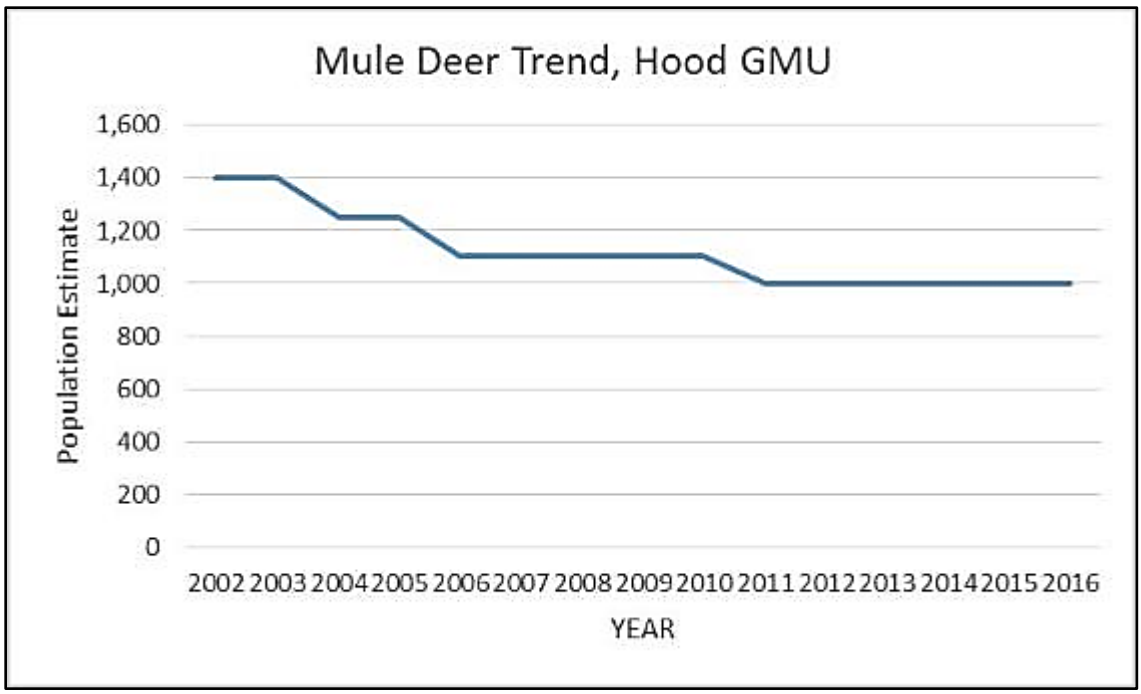

Figure 54. Mule deer trends, Hood Game Management Unit (source: ODFW 2016)

Habitat within the Project Area

Government Camp parcels currently contain approximately 78 acres of thermal cover and 13 acres of forage habitat (table 117). All Government Camp parcels occur within the distribution of deer and elk summer range. Cooper Spur parcels are estimated to contain about 279 acres of thermal cover and 63 acres in forage. Most acres (90 percent) occur within deer and elk winter ranges as mapped by Oregon Department of Fish and Wildlife (2009).

Table 117. Existing acres of deer and elk habitats

Parcel	Optimal Cover	Thermal Cover	Forage	Summer Range	Winter Range
Government Camp	0	78	23	120	0
Cooper Spur	0	279	132	74*	695*
MHNF Lands Net Change	0	201	109	-46	695

*Based on ODFW deer and elk winter range distribution maps
MHNF = Mt. Hood National Forest

Environmental Consequences

No-action Alternative

Under the no-action alternative, existing amounts of optimal, thermal, and foraging habitat on Federal lands would remain unchanged.

Proposed Action

Direct and Indirect Effects

After transfer of ownership, thermal cover, forage, and summer range habitat amounts in table 117 within the Government Camp parcels would be removed via development. Acquisition of

Cooper Spur parcels would increase Federal management of thermal cover, forage habitat, and winter range acres on the by amounts shown in table 117. Summer range acres on the Mt. Hood National Forest would decrease by approximately 46 acres, but thermal cover, forage, and winter range net acreage would all increase. On Cooper Spur parcels, about 28 acres currently in forage exists as dry meadow vegetation and would be expected to remain as effective forage habitat for the long-term (greater than 20 years) if managed to remove encroaching conifers. The remaining forage habitat consists of early successional forest and would be expected to provide forage only in the short-term (less than 20 years) as stands grow and conifer cover increases. Less than 1 acre within Government Camp parcels consist of dry meadow with potential to provide forage long-term.

Cumulative Effects

The area used to analyze cumulative impacts is the area within one mile of all parcels proposed for ownership transfer. In the Government Camp area, past development of national forest and lands of other ownership has decreased available deer and elk locally, but areas to the north and west remain primarily forested, with trees continuing advancing in age toward maturity. This is reflected in the existing condition. Ongoing and foreseeable activities listed in the Past, Present, and Reasonably Foreseeable Actions section consisting of recreation, residential use, infrastructure operations and maintenance are not expected increase habitat impacts, but may cause localized noise disturbance leading to elk avoidance of some areas. Ongoing maintenance of early seral habitat in ski runs and powerline corridors retains a forage source for both deer and elk. Winter activities would not impact either species because most or all individuals would be on winter range during this period. No measurable increase in impacts as a result of ongoing and foreseeable activities are expected.

Determinations

The current trend for deer and elk populations is stable (see Forestwide analysis for Management Indicator Species). Although the proposed action would augment available forage by 109 acres in the short term and 28 acres overall in the long term, this equates to less than one-tenth of 1 percent of forage at the national forest level. Existing distribution of deer and elk winter range as mapped by Oregon Department of Fish and Wildlife totals about 98,000 and 110,000 acres, respectively, on National Forest System lands. An additional 695 acres represents less than 1 percent of this area. Therefore, the proposed action would slightly increase forage and available winter range under Federal ownership and would not contribute to a negative trend in viability on the Mt. Hood National Forest for deer or elk.

Migratory Birds

Under the National Forest Management Act, the Forest Service is directed to “provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives.” (P.L. 94-588, Sec 6 (g) (3) (B)). The January 2000 Forest Service (FS) Landbird Conservation Strategic Plan, followed by Executive Order 13186 in 2001, in addition to the Partners in Flight specific habitat conservation plans for birds and the January 2004 Partners in Flight North American Landbird Conservation Plan all reference goals and objectives for integrating bird conservation into forest management and planning.

In late 2008, a memorandum of understanding between the Forest Service and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds was signed. The intent of the memorandum is to strengthen migratory bird conservation through enhanced collaboration and

cooperation between the Forest Service and the Fish and Wildlife Service as well as other Federal, State, tribal and local governments. Within the national forests, conservation of migratory birds focuses on providing a diversity of habitat conditions at multiple spatial scales and ensuring that bird conservation is addressed when planning for land management activities. In early 2016, both Forest Service and U.S. Fish and Wildlife Service have agreed to extend the memorandum as currently written and the extension document is in the process of review and signature.

Existing Situation

Close to 30 species of migratory birds may occur within the Government Camp portion of the project, some of which are likely present within the project area during the breeding season. Altman (1999, 2000) identified land bird focal species applicable to the Partners in Flight Physiographic Regions for western Oregon and Washington (Government Camp parcels) as well as the East Slope of the Cascade Mountains (Cooper Spur parcels). Those species with habitat affiliations found in the project area are listed in table 118. In addition, the U.S. Fish and Wildlife Service's list of Birds of Conservation Concern (USDI Fish and Wildlife 2008) was reviewed for species within Bird Conservation Region 5, which encompasses the entire project area, applicable to the project area (Wildlife Specialist Report, Table 21). Two species, the Rufous Hummingbird and Olive-sided Flycatcher are applicable to the Project Area. The hummingbird is found in a variety of habitats, most likely in brushy areas with flowers and forests with a well-developed understory; the fly-catcher in open conifer forests (greater than 40 percent canopy cover) and edge habitats where standing snags and scattered tall trees remain after a disturbance.

There are no known important bird areas such as nesting, wintering, or stop-over areas within the project area.

Table 118. Landbird focal species and habitats (Altman 1999, 2000)

Physiographic Area	Habitat/Forest Condition	Habitat Attribute	Focal Species Applicable to the Project Area
Western OR, WA	Mature	Large snags	Pileated woodpecker
Western OR, WA	Mature	Mid-story tree layers	Varied thrush
Western OR, WA	Young and Mature	Closed canopy	Hermit warbler
Western OR, WA	Young and Mature	Open mid-story	Pacific-slope flycatcher
Western OR, WA	Young and Mature	Deciduous understory	Wilson's flycatcher
Western OR, WA	Young and Mature	Forest floor complexity	Winter wren
Western OR, WA	Young and Pole	Deciduous canopy trees	Black-throated gray warbler
Western OR, WA	Pole	Deciduous subcanopy	Hutton's vireo
Western OR, WA	Early seral	Residual canopy trees	Olive-sided flycatcher
Western OR, WA	Early seral	Snags	Western bluebird
Western OR, WA	Early seral	Deciduous vegetation	Orange-crowned warbler
Western OR, WA	Early seral	Nectar producing plants	Rufous hummingbird
Western OR, WA	Unique	Montane wet meadows	Lincoln's sparrow
East slope Cascades	Mixed conifer	Large trees	Brown creeper
East slope Cascades	Mixed conifer	Large snags	Williamson's sapsucker
East slope Cascades	Mixed conifer	Grassy openings, dense thickets	Flammulated owl

Physiographic Area	Habitat/Forest Condition	Habitat Attribute	Focal Species Applicable to the Project Area
East slope Cascades	Mixed conifer	Multi-layered, structurally diverse	Hermit thrush
East slope Cascades	Mixed conifer	Fire edges and openings	Olive-sided flycatcher
East slope Cascades	Montane meadows	Wet and dry	Sandhill crane

Environmental Consequences

No-action Alternative

There would be no transfer of ownership or alteration of habitats under this alternative, and therefore, no potential impacts to migratory birds.

Proposed Action

Ownership transfer and subsequent development of Government Camp parcels would remove habitat on about 103 acres for species associated with mature and young forest habitat components (hermit warbler, Pacific-slope flycatcher, Wilson's warbler, and winter wren). Lesser amounts of early seral open habitat (2 acres) applicable to olive-sided flycatcher, western bluebird, orange-crowned warbler, and rufous hummingbird) would also be removed. Montane wet meadow (less than 1 acre, Lincoln's sparrow) habitat may be preserved or impacted depending upon the conservation easement strategy applied to wetlands after ownership transfer.

Mt. Hood National Forest acquisition of Cooper Spur parcels would increase Federal ownership of habitats potentially providing for brown creeper (approximately 30 acres) and non-breeding Sandhill crane (33 acres), although removal of encroaching conifers would be necessary to improve suitability to non-breeding Sandhill cranes. In the long term, growth and development of forested stands at Cooper Spur could provide almost 400 acres of habitat for species associated with mature east-side mixed conifer forest (brown creeper, Williamson's sapsucker, and hermit thrush). However, long-term stand growth would also diminish existing edge habitat and early successional areas that currently favor foraging by olive-sided flycatchers.

Cumulative Effects

Since migratory birds venture great distances and each species has a different range, cumulative effects can result from a vast array of activities and practices such as conversion of forests and wetlands to farms or developments. The use of chemical pesticides can affect birds. These practices and others can occur across both North and South America.

Both Federal and private land parcels proposed for ownership transfer constitute a very small portion of available land bird breeding habitat within and adjacent to the Mt. Hood National Forest. The majority of forested acres at Government Camp consist of mid-successional stands which are common in this portion of the national forest, particularly in adjacent wilderness areas. While there may be some local redistribution of birds to other suitable habitats within and adjacent to the Government Camp parcels due to project-level activities and those listed in the Past, Present, and Reasonably Foreseeable Actions section, these effects would be localized and minor at the landscape scale.

Determinations

The Government Camp-Cooper Spur Land Exchange project may affect habitat for individual migratory birds, but is not expected to have a measurable effect on their overall habitat or

populations because of the large amount of available habitat in proximity to the parcels. Habitat loses resulting from this project should not affect this group of species such that their ability to persist on the Mt. Hood National Forest or throughout their ranges would be compromised.

Survey and Manage Species

In January 2001, a Record of Decision for Amendments to the Survey and Manage, Protection Buffer and other Mitigation Measures Standards and Guidelines (2001 amendment) was signed. This decision amended the Northwest Forest Plan survey and manage and related standards and guidelines to add clarity, remove duplication, increase or decrease levels of management for specific species based on new information, and established a process for making changes to management for individual species in the future (USDA USDI 2001).

The 2001 amendment put into place a review process that would allow for the adding or dropping of species, based on new information. The 2001 amendment also grouped the species into six categories (A through F) based on level of relative rarity, ability to reasonably and consistently locate occupied sites during surveys prior to habitat disturbing activities, and the level of information known about the species or group of species. A complete description of the categories can be found in the 2001 amendment standards and guidelines pages 6 through 14.

This project applies the survey and manage species list published in December 2003 under direction resulting legal action and a district court's remedy order issued on 18 February 2014 (*Conservation Northwest v. Bonnie*, W.WA No. C08-1067-JCC) and thus meets the provisions of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, as modified by the 2014 court order. The following species listed in table 119 shows current survey and manage species whose known or suspected range includes the Mt. Hood National Forest. Field reconnaissance and GIS analysis was used to determine habitats that were present in the project area. Land exchanges are not themselves habitat-disturbing activities (see page 22 of the 2001 Survey and Manage Record of Decision standards and guidelines) and for this reason do not trigger survey and manage pre-disturbance surveys; therefore, pre-disturbance surveys were not required for this project.

Table 119. Survey and manage species within Oregon Western Cascades Geographic Area (December 2003 species list; May 2014 Direction)

Category[1]	Species	Potential Habitat Within the Project Area?	Potential Effects?	Additional Analysis Needed?
Amphibians				
A	Larch Mountain salamander *(Plethodon larselli)*	Yes; occurs on shady, moss-covered talus slopes and cave entrances at low to mid-elevations in late seral forests and moist forest where soils are derived from pumice.	Yes	Addressed as Sensitive Species

Category[1]	Species	Potential Habitat Within the Project Area?	Potential Effects?	Additional Analysis Needed?
Birds				
A	Great gray owl (*Strix nebulosa*)	Yes; associated with conifer and mixed forest, ponderosa pine, and lodgepole, most frequently in old-growth on north-facing slopes; adjacent to large open meadows.	No; There are no proposed activities within old-growth stands adjacent to large open meadows within the project area.	No
Mammals				
C	Red tree vole (*Arborimus longicaudis*)	No; Species distribution is restricted to areas below 3,500 feet elevation west of the Cascades crest. Project area is outside the known species distribution.	No	No
Mollusks				
A	Columbia oregonian (*Cryptomastix hendersoni*)	No; associated with moist areas under closed-canopy western hemlock forest and moist microclimates in semiarid habitat along the Columbia River. Project area is outside the known species distribution	No	No
A	Crater Lake tightcoil (*Pristiloma arcticum crateris*)	Yes; occurs in wetlands in moist forest, often in fens or sedge habitats near open water that experience long periods of snow cover.	Yes	Addressed as Sensitive Species
A	Dalles sideband (*Monadenia fidelis minor*)	Yes; usually found in moist rock talus near streams or springs and under moist woody debris or other litter near riparian corridors.	Yes	Addressed as Sensitive Species
B	Evening fieldslug (*Deroceras hesperium*)	Yes; typically inhabits low elevation, perennially wet meadows in forested habitats.	Yes	Yes, see discussion below
B	Panther jumping slug (*Hemphillia pantherina*)	No; found under and inside logs and other forest litter and in talus in moist forest and riparian areas below 3,000 feet elevation.	No; habitat not present within the project area.	No
A	Puget oregonian (*Cryptomastix devia)*	No; associated with forests where big-leaf maples occur within conifer overstory; often found on or under hardwood logs or leaf litter or rocks.	No; habitat not present within project area.	No

1. Survey and manage category definitions:
Category A = Manage all known sites; pre-disturbance surveys practical, strategic surveys
Category B = Manage all known sites; pre-disturbance surveys not practical and not applicable; strategic surveys
Category C = Manage high-priority sites; pre-disturbance surveys practical; strategic surveys

Deroceras hesperium

Affected Environment

The historic range of *D. hesperium*, known as the evening fieldslug, is northwestern Oregon through western Washington, to Vancouver Island, British Columbia, Canada. Recent documented locations indicate that the range also includes the western and eastern Oregon Cascades from Hood River to the Klamath River basin (Duncan 2005).

The evening fieldslug is associated with perennially wet meadows in forested habitats; microsites include a variety of low vegetation, litter and debris; rocks may also be used as refugia. Little detail is known about exact habitat requirements for the species, due to the limited number of verified sites. However, this species appears to have high moisture requirements and is almost always found in or near herbaceous vegetation at the interface between soil and water, or under litter and other cover in wet situations where the soil and vegetation remain constantly saturated. Because of the apparent need for stable environments that remain wet throughout the year, suitable habitat may be considered to be limited to moist surface vegetation and cover objects within 30 meters (98 feet) of perennial wetlands, springs, seeps and riparian areas. Areas with coastal fog may allow the species to occupy habitats farther from open water. Down wood may provide refugia sites for the species that remain more stable during drier periods of the year than the general habitat. Elevations of occupied sites range from coastal meadows to sites near the Cascade Crest (Duncan 2005).

Young and Doerr (2013) reported finding *Derocerus laeve*, a species potentially synonymous with *D. hesperium* (Roth et al. 2013), among stands of skunk cabbage on the Willamette National Forest up to 3,500 feet elevation, and suggested that skunk cabbage plants provide a critical reserve habitat during the summer dry period for *Deroceras* and other mollusks.

There are no documented locations of *Deroceras hesperium* within the project area.

Habitat within the Analysis Area

Wetland surveys conducted by Watershed Professionals Network (2010) reported wetlands totaling about 6 acres containing skunk cabbage in the Government Camp parcels (Wetland 5 and a portion of Wetland 10). Although the elevations (3,800 to 4,100 feet) of these parcels may be at the upper limit of this species' range, the presence of suitable wetland sites indicates that there is potential for species presence. No suitable habitat is expected to occur within Cooper Spur parcels.

Environmental Consequences

No-action Alternative

Under the no-action alternative, existing land ownership in the Government Camp and Cooper Spur parcels would remain unchanged. No transfer in ownership of existing amounts of potential *Deroceras hesperium* habitat would occur. No direct, indirect, or cumulative effects would occur as a result of the no-action alternative.

Proposed Action

Direct and Indirect Effects

Implementation of the proposed action would have no direct effects on this species or habitat. About 6 acres of suitable habitat is located within Government Camp parcels. The 2009 Omnibus Act prescribed as a mandatory condition to the land exchange that the Forest Service

reserve wetland and trail easements on the Federal parcels to be exchanged. More specifically, the Omnibus Act required the Forest Service to reserve a conservation easement on the Federal land to protect existing wetlands, as identified by the Oregon Department of State Lands that allows equivalent wetland mitigation measures to compensate for minor wetland encroachments necessary for the orderly development of that land following the exchange. The Clarification Act (which is now the proposed action) changed this provision from “shall reserve” to “may mutually agree to reserve”. Under both scenarios with or without a Federal conservation easement, some increased level of sediment delivery into wetlands is expected due to surrounding development (see Hydrology Specialist Report).

Under the proposed action, wetlands in the conveyance parcels would no longer be managed and conserved by the Forest Service as riparian reserves. Regulatory authority and oversight for the protection of these wetlands would switch to the Oregon Department of State Lands who share the responsibility implementing section 404 of the Clean Water Act, the principal statute for governing activities in wetlands, with the Oregon Department of Environmental Quality, the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency. Activities associated with residential development that could encroach upon the wetlands would have to undergo a review and permitting process according to Oregon Revised Statute before they would be authorized (see Supplement to the Watershed Resources Report).

Section 404 of the Clean Water Act protects wetlands from net loss regardless of ownership by the use of either on-site conservation easements or compensatory mitigation (funding the creation or restoration of wetlands at a different place and time and maintaining them in perpetuity). The proposed action would include conservation easements, so that the wetlands in the conveyed parcels would be protected according to regulation by the Department of State Lands. If on-site conservation easement is applied, retention of suitable *Deroceras hesperium* habitat is expected. In the event that compensatory mitigation is applied, residential encroachment of the site may occur, thereby reducing or removing habitat suitability on up to 6 acres. Based on data obtained from the National Wetlands Inventory (USDI Fish and Wildlife Service 2016b), Freshwater Emergent Wetland and Freshwater Forested/shrub Wetland habitats total 1,883 acres and 3,840 acres, respectively on the Mt. Hood National Forest. The 6 acres of habitat within the Government Camp parcel represents approximately 0.3 percent of freshwater emergent wetland habitat and 0.1 percent of all potential habitat on the national forest.

Cumulative Effects

The cumulative effects analysis area consists of the wetland vegetation in Wetland numbers 5 and 10 (Government Camp parcels), as well as perennial streams above these wetlands. This encompasses the potential disturbances and habitat impacts for *Deroceras hesperium*. Past activities such as timber harvest, road construction, development, wildfire, and other disturbances are reflected in the existing condition. Ongoing and foreseeable activities in proximity to the parcels are listed in the Past, Present, and Reasonably Foreseeable Actions section. No projects or activities listed are expected to contribute detrimental cumulative effects to peak streamflows, stream temperatures, or sediment delivery (see Hydrology Specialist Report).

Determinations

The Government Camp-Cooper Spur Land Exchange project may affect individuals (if present) and habitat suitable for this species on approximately 6 acres. Based upon the small amount of habitat involved and the position of the habitat at the upper range of elevational distribution, potential habitat impacts resulting from this project are not expected to impact *Deroceras*

hesperium such that their ability to persist on the Mt. Hood National Forest or throughout their range would be compromised.

Summary of Survey and Manage Species Analysis

- There are no known existing occurrences of species listed in table 119 within the project area.
- A total of four survey and manage animal species have potential to occur within the project area.
- Three species (Larch Mountain salamander, Crater Lake tightcoil, and Dalles sideband) were addressed in the biological evaluation as sensitive species.
- A total of 6 acres of potential suitable habitat for *Deroceras hesperium* occurs within the Government Camp parcels. Potential impacts to this site would depend upon conservation easement strategies that would take effect after transfer of ownership.

Wildlife Effects Summary

Table 120 provides a summary of effects determinations for threatened, endangered, proposed, sensitive, management indicator, migratory bird, and survey and manage species addressed in this analysis.

Table 120. Summary of impacts to wildlife addressed in this analysis

Species	Impact of No Action	Impact of Proposed Action
Federally Threatened, Endangered or Proposed		
Northern spotted owl (threatened)	No effect	May affect, and is likely to adversely affect
Northern spotted owl critical habitat	No effect	No effect
North American wolverine (proposed for listing)	No effect	Will not jeopardize
R6 Sensitive Species		
American peregrine falcon	No impact	No impact
Bald eagle	No impact	No impact
White-headed woodpecker	No impact	No impact
Lewis's woodpecker	No impact	No impact
Bufflehead	No impact	No impact
Harlequin duck	No impact	No impact
Sierra Nevada red fox	No impact	May impact*
Townsend's big-eared bat	No impact	May impact*
Fringed myotis	No impact	May impact*
Western pond turtle	No impact	No impact
Larch Mountain salamander	No impact	May impact*
Cope's giant salamander	No impact	May impact*
Johnson's hairstreak	No impact	May impact*
Mardon skipper	No impact	May impact*
Western bumble bee	No impact	May impact*
Beller's ground beetle	No impact	No impact
Puget Oregonian	No impact	No impact
Columbia sideband	No impact	No impact
Dalles sideband	No impact	No impact
Crater Lake tightcoil	No impact	May impact*
Crowned tightcoil	No impact	No impact
Shiny tightcoil	No impact	No impact
Mt. Hood National Forest Management Indicator Species		
Northern spotted owl	No impact	Addressed as threatened species
Pileated woodpecker	No impact	Will not contribute to negative trend in viability
American (pine) marten	No impact	Will not contribute to negative trend in viability
Silver gray squirrel	No impact	No impact

Species	Impact of No Action	Impact of Proposed Action
Merriam's turkey	No impact	No impact
Deer	No impact	Will not contribute to negative trend in viability
Elk	No impact	Will not contribute to negative trend in viability
Migratory Birds		
Applicable Birds of Conservation Concern and Focal Species	No impact	Will not compromise species persistence
Survey and Manage Species		
Deroceras hesperium	No impact	Will not compromise species persistence

* May impact = May Impact Individuals or habitat, but will not likely contribute to a trend toward Federal listing or cause a loss of viability to the population or species

Forest Plan Amendment Summary

A total of 1,109 acres would shift in Land Use Allocation from Winter Recreation to Wilderness, thereby reducing potential disturbance to wildlife from on and off-road motorized access. Approximately 769 acres of Cooper Spur acquired lands and 2,110 acres of existing Federal lands to be included in the Crystal Springs Watershed Special Resources Management Unit would be assigned additional management direction under the Forest Plan (see chapter 2). Management direction within the Crystal Springs Unit emphasizes watershed health as well as wildlife habitat restoration. Presence of large-diameter older trees within visible areas is also prescribed, which is expected to benefit a number of special status species including northern spotted owl, Johnson's hairstreak, fringed myotis, pileated woodpecker, American marten, and various migratory birds.

Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Unavoidable Adverse Effects

Alternative 2 would result in the following:

A loss of individuals or potential habitat for 234 Survey and Manage species and 37 sensitive plant species on the Regional 6 Regional Forester's Special Status Species list (Botany section of DEIS).

The loss of four potentially eligible cultural resources on the lands to be conveyed. The loss of ceded land for the Confederated Tribes of Grand Ronde and Warm Springs (Cultural Resources and Treaty Rights).

Elements of the project may indirectly effect (may affect, and is likely to adversely affect) Endangered Species Act (ESA)-listed fish species designated as threatened based on the potential for increases in sediment, turbidity, and embeddedness, which can impact spawning and rearing as well as food source availability (Fisheries).

The project "may adversely modify" designated critical habitat for Lower Columbia River Chinook, coho, and steelhead in the Zigzag Watershed. Three of the six physical and biological features that have been established for the critical habitat of the species are addressed here; freshwater spawning sites, freshwater rearing sites, and freshwater migration corridors (50 CFR Part 226 70 FAR 52664-5). The project would measurably modify these physical and biological features (Fisheries).

The proposed project would "adversely affect essential fish habitat" for Lower Columbia River Chinook and coho in the Zigzag Watershed (Fisheries).

At the site scale both Camp Creek and the unnamed tributary to the Little Zigzag River have predicted peak streamflows increases above 10 percent. Based on predicted increases in peak streamflows, streambed composition and stream gradient there may be impacts in the form of increased bank erosion, channel scour, channel widening, and sedimentation in these areas (Hydrology).

Implementation of the proposed action would result in a 3 percent increase in sediment yield from background levels in both the Camp Creek and Little Zigzag 7th field watersheds. In-stream fine sediment levels in both streams would increase (Hydrology).

The non-exclusive nature of the proposed trail easement would remove the ability of trail managers to use the preferred equipment for future ski trail grooming (trail width would be too narrow). This width would indirectly affect the future management of the trail system. The intent of the Government Camp Trails Project (2009) was to increase the amount of groomed trail on the Mt. Hood National Forest outside of developed ski areas for Nordic skiing. The width of the proposed trail easement would likely be insufficient to accommodate the appropriate equipment for winter grooming operations. Therefore, this alternative could directly and negatively affect the welfare of this community of users (Recreation and Socioeconomics).

The result of the development surrounding the Government Camp trail system could also negatively affect users' enjoyment and scenic beauty of these trails due to changes in location and nearby developments as well as potential trail discontinuity and changes in safety due to additional road crossings. If so, it could be that users may choose to use alternative sites and trails which might adversely impact local business, such as guiding businesses (Socioeconomics).

The number of acres considered as suitable for timber production would decrease by approximately 249 acres (Silviculture).

Visual quality as seen from the lands adjacent to the Government Camp parcels would decrease with the loss of the visual quality objective of Retention (Visuals).

Alternative 2 may affect, and is likely to adversely affect spotted owls, as it would result in a loss of northern spotted owl habitat totaling approximately 22 acres of suitable habitat. 60 acres of dispersal habitat would also be lost (Wildlife).

For nine species on the R6 Sensitive wildlife species list, Alternative 2 may impact individuals or habitat, but will not likely contribute to a trend toward Federal listing or cause a loss of viability to the population or species (Wildlife).

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

The proposed action would convey public land for private use. The lands to be conveyed expected to be developed. This is an irreversible action and would result in a loss of many of the uses and values formerly provided by this forested land. These values include the scenic beauty, amenity and existence values (Socioeconomics).

The proposed action would result in a proportion of the soils in the conveyed parcels to be converted to hardened surfaces such as roads, driveways, sidewalks, and rooftops. They would no longer be available nor capable of growing and maintaining vegetation. Soils would no longer support a contiguous forested cover type, nor function in quite the same capacity to support ecosystem functions. Instead, soils would have been committed to supporting buildings, structures, and infrastructure of a residential development for the life of its use (Soils).

Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders.”

National Historic Preservation Act

Regulations that support and enhance the National Historic Preservation Act include:

36 CFR 800 (Protection of Historic Properties, section 106).

Section 106 of the National Historic Preservation Act requires Federal agencies to take into account the effects of their undertakings on historic properties. The procedures in this part define how Federal agencies meet these statutory responsibilities. The section 106 process seeks to accommodate historic preservation concerns with the needs of Federal undertakings through consultation among the agency official and other parties with an interest in the effects of the undertaking on historic properties. This applies to this project to identify historic properties potentially affected by the undertaking, assess its effects and seek ways to avoid, minimize or mitigate any adverse effects on historic properties.

36 CFR 63 (Determination of Eligibility to the National Register of Historic Places).

These regulations have been developed to assist Federal agencies in identifying and evaluating the eligibility of properties for inclusion in the National Register.

36 CFR 296 (Protection of Archaeological Resources).

The regulation implements the Archaeological Resources Protection Act of 1979, by establishing the uniform definitions, standards, and procedures to be followed by all Federal land managers in

providing protection for archaeological resources, located on public lands and Indian lands of the United States.

1994 Programmatic Agreement (PA) (amended in 2004)

Agreement among the USDA Forest Service Pacific Northwest Region, the Advisory Council on Historic Preservation, and the Oregon State Historic Preservation Officer Regarding Cultural Resource Management in the State of Oregon by the USDA Forest Service.

Further legal authority that guides internal decisions related to cultural resources are:

Archaeological Resources Protection Act (ARPA) of 1979.

To secure, for the present and future benefit of the American people, the protection of archaeological resources and sites which are on public lands and Indian lands, and to foster increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals having collections of archaeological resources and data which were obtained before the d ate of the enactment of this Act. This Act would apply to any areas of importance to the tribe for traditional or cultural purposes within the project area.

Native American Graves Protection and Repatriation Act (NAGPRA) of 1990.

A Federal law passed in 1990, NAGPRA provides a process for museums and Federal agencies to return certain Native American cultural items—human remains, funerary objects, sacred objects, or objects of cultural patrimony—to lineal descendants, and culturally affiliated Indian tribes and Native Hawaiian organizations. This act would apply for any new or old discoveries for the lands to be acquired parcel or the conveyed lands parcel.

Executive Order 13007 (Indian Sacred Sites).

In managing Federal lands, each executive branch agency with statutory or administrative responsibility for the management of Federal lands shall, to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions, (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites. Where appropriate, agencies shall maintain the confidentiality of sacred sites. This act would apply to any areas of importance to the tribe for traditional or cultural purposes within the project area.

Environmental Justice Act

Environmental Justice, Executive Order 12898 of February 11, 1994 orders Federal agencies to identify and address any adverse human health and environmental effects of agency programs that disproportionately impact minority and low-income populations.

Migratory Birds

Executive Order 13186 was signed on January 10, 2001, directing Federal agencies that take actions directly or indirectly affecting migratory birds to develop a memorandum of understanding with U.S. Fish and Wildlife Service to promote the conservation of migratory bird populations. A memorandum of understanding between the Forest Service and U.S. Fish and Wildlife Service, signed 2008 (FS Agreement #08-MU-1113-2400-264) and extended in 2016, provides a framework to incorporate migratory bird conservation elements into national forest-level and project-level environmental analysis planning.

Incomplete or Unavailable Information

Land exchanges convey land, interests in land, and the resources associated with them. Of itself, the specific act of conveyance does not have environmental effects. Therefore, the Forest Service Handbook provides direction that states that the NEPA analysis should focus on the future use and management of the lands being conveyed (5409.13, Chapter 30, Section 33.14). For this reason, the NEPA analysis was largely focused on the potential development of the Government Camp parcels. Because no specific development plans have been finalized and/or approved by Clackamas County or any other applicable State permitting authorities, the interdisciplinary team identified a general list of assumptions about the development and use of the Government Camp parcels (see the list of Analysis Assumptions near the beginning of chapter 3). These assumptions are primarily based on zoning regulations required by Clackamas County. The effects of the conveyance on each resource evaluated are based on these assumptions and the other criteria described in the individual specialist reports.

The question of whether or not wetland conservation easements would be required, and the exact nature of them if they were to be agreed upon, was also unknown at the time of analysis. The exact nature of the trail easements was also unknown. Assumptions were developed regarding the elements of such easements, using the best information available, for the analysis of potential effects. A range of effects was disclosed when applicable to the resource evaluated, to account for the minimum to expected maximum size of any wetland conservation or trail easements that may be agreed upon in the future.

Chapter 4 – Preparers and Contributors

Consultation and Coordination

This chapter provides a list of preparers and agencies consulted during the development of the environmental analysis, as well as a distribution list of the DEIS. The following sections will list those involved in the consultation and coordination process of the project. The Interdisciplinary Team member section will name all specialists involved in the preparation process of this EIS and describe the education and brief experience of each member.

Federal, State and Local Agencies

The following sections describe the formal and informal consultation that was completed with Federal and State agencies as part of this project.

Consultation with U.S. Fish and Wildlife Service (USFWS)

Formal consultation is required with USFWS for disturbance of Northern spotted owls (*Strix occidentalis caurina*). Since the future development of the conveyed lands is likely to remove approximately 22 acres of suitable spotted owl habitat, the effects determination for this project is may effect, likely to adversely affect (LAA) northern spotted owls. Formal consultation with USFWS will be completed as part of this project and discussed in the FEIS.

Consultation with National Marine Fisheries Service (NMFS)

Elements of the project may indirectly effect (may affect, and is likely to adversely affect (LAA)) three Endangered Species Act (ESA) listed fish species designated as threatened that are present in the action area. The specific species include the Lower Columbia River Steelhead Trout (*Oncorhynchus mykiss*), Lower Columbia River Chinook (*Oncorhynchus tshawytscha*), and Lower Columbia River Coho (*Oncorhynchus kisutch*). This determination is based on the potential for increases in sediment, turbidity, and embeddedness, which can impact spawning and rearing as well as food source availability. Changes to water quality could impair navigation or reduce food sources. Increases in peak/base stream-flows could reduce suitable in-channel habitat for rearing, spawning, or migration. The project may adversely modify designated critical habitat and would adversely affect essential fish habitat for the same three species in the Zigzag Watershed. Three of the six physical and biological features that have been established for the critical habitat of the species are addressed in the Biological Evaluation; freshwater spawning sites, freshwater rearing sites, and freshwater migration corridors (50 CFR Part 226 70 FAR 52664-5). The project would measurably modify these physical and biological features. Formal consultation with NMFS will be completed as part of this project and discussed in the FEIS.

Consultation with Oregon State Historic Preservation Office (SHPO)

The National Historic Preservation Act and the National Environmental Policy Act both require consideration be given to the potential effect of Federal undertakings on historic resources, (including historic and protohistoric cultural resource sites). The guidelines for assessing effects and for consultation are provided in 36 CFR 800. To implement these guidelines, in 2004, Region 6 of the Forest Service entered a Programmatic Agreement (PA) with the Oregon State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP).

In accordance with the 2004 programmatic agreement, heritage resource surveys have been conducted and a site evaluation was completed for the Government Camp parcels, which were initially documented in Heritage Resource Report 2010-060609-001 (McClure 2010). Currently, the 2010 Heritage Report has been updated and was submitted to SHPO on August 2, 2016 for their review. An additional report on above ground resources will be submitted and discussed in the FEIS.

Since the laws regarding Section 106 do not apply to private entities, the assumption is that the land conveyance would result in an adverse effect to a known cultural resource on the Government Camp parcel. The potential for mitigation is currently under discussion with the State and Tribal Historic Preservation Offices.

Tribal Consultation

On December 4, 2009, both the Confederated Tribes of Warm Springs (CTWS) and Confederated Tribes of Grand Ronde (CTGR) were sent cultural resources reports for the project. A response was received from the CTWS in the form of a formal letter citing tribal concerns. A draft Memorandum of Agreement (MOA) was developed between the Oregon State Historic Preservation Office, US Forest Service and Mt. Hood Meadows. At this time, no response was provided by CTGR.

In 2016, the CTGR cultural resources staff were provided a copy of the initial cultural resources report. Forest Service staff met informally with cultural resources staff at CTGR to re-introduce the project on April 19, 2016. Comments pertaining to the cultural resources report were received by the Forest Service and documented. On June 17, 2016, Forest Service staff visited the CTWS and discussed the project. CTWS provided the Forest Service with comments relating to treaty rights. On July 11, 2016, both CTWS and CTGR were mailed revised cultural resources reports. CTGR responded with comments and a request for a meeting, which was held on August 3, 2016. CTWS responded with a request for a meeting, which was held on September 21, 2016.

Additional coordination with the Tribes will continue to discuss specific mitigation measures and ensure that Tribal interests are considered.

Preparers and Contributors

The following is a list of contributors to this DEIS. Numerous other Forest Service employees contributed to the completion of this document through their assistance in review and support functions, and/or by providing Forest Service-level data and other information needs. Their help was greatly appreciated and recognized. The members and roles of the interdisciplinary team are listed below and short biographies follow for each person.

Team Role	Person
Interdisciplinary Team Leader	Debra Proctor
Fish Biologist	Kathryn Arendt
Engineering / Facilities	Rithy Bein
Social-Economic	Allison Borchers
Recreation / Visual	David Fothergill
Writer-Editor	Patricia Goude
NEPA Specialist	Michelle Lombardo
Botanist / Invasive Species	David Lebo
Silviculture	Tom Lowell
Wildlife Biologist	Doug Middlebrook
Heritage Resources	Debbie Ortiz
Hydrology	Todd Parker
Soils / Hydrology	Todd Reinwald
Lands	Patricia Snyder
GIS	Kathryn Strawn
Heritage Resources / Tribal Coordination	Alexandra Wenzl

Debra Proctor. Environmental Coordinator, U.S. Forest Service, TEAMS Enterprise Unit. Education: B.S. in Water Resources, emphasis in Watershed Management. Experience: Environmental Analysis and NEPA Coordination, Deputy and Acting District Ranger, Forest Plan implementation, Watershed Specialist, and Soil Scientist with the Forest Service since 1988.

Kathryn Arendt. Eastside Zone Fish Program Manager, U.S. Forest Service, Mt. Hood National Forest, Hood River and Barlow Ranger Districts. Education: B.A. in Political Science, emphasis on international studies, M.S. in Environmental Studies (thesis unfinished), emphasis on Salmonid Ecology. Experience: Fisheries Biologist with the Forest Service for 11 years.

Rithy Bein. Civil Engineer, U.S. Forest Service, Mt. Hood National Forest, Supervisor's Office. Education: B.S. in Civil Engineering. Experience: Provide engineering support for multiple Interdisciplinary Team planning, design and implementation projects on the Mt. Hood National Forest and Columbia River Gorge National Scenic Area.

Allison Borchers. Economist, U.S. Forest Service, TEAMS Enterprise Unit. Education: B.A. in Economics; M.S. in Food and Resource Economics; Ph.D in Economics with a specialization in non-market valuation and environmental economics. Experience: Economic research and writing with the USDA since 2010.

David Fothergill. Forest Landscape Architect, U.S. Forest Service, TEAMS Enterprise Unit. Education: B.S. in Biology, emphasis in Evolutionary Ecology; M.L.A. in Landscape Architecture. Experience: Scenery and Recreation Planning and Design with the Forest Service since 2011.

Patricia Goude. Writer-editor, U.S. Forest Service, TEAMS Enterprise Unit. Education: B.A. in Technical Journalism with emphasis in Natural Resources. Experience: Writer-editor with the Forest Service since 2010.

Michelle Lombardo. Forest Environmental Coordinator, U.S. Forest Service, Mt. Hood National Forest, Supervisor's Office. Education: B.S. in Natural Science, emphasis in Geology; M.S. in Geography, emphasis in Natural Resource Management. Experience: Forest Plan implementation and NEPA coordination and writing with the Forest Service since 2005.

David Lebo. Westside Zone Botanist. U.S. Forest Service, Mt. Hood National Forest, Zigzag and Clackamas Ranger Districts. Education: B.A. in Humanities; M.A. in English; M.S. in Forest Ecology with emphasis in mycology. Experience: Ecologist with the Forest Service and Bureau of Land Management from 1993 to 2004; Botanist with the Forest Service since 2005.

Tom Lowell. Certified Silviculturist. U.S. Forest Service, TEAMS Enterprise Unit. Education: B.S. in Forest Resource Management. Experience: Vegetation management operations and planning since 1985.

Doug Middlebrook. Wildlife Biologist, U.S. Forest Service, TEAMS Enterprise Unit. Education: B.S. in Wildlife Biology. Experience: District Wildlife Biologist and TEAMS Enterprise Wildlife Biologist with the Forest Service since 1995.

Debbie Ortiz. West Zone Archeologist, U.S. Forest Service, Mt. Hood National Forest, Zigzag and Clackamas Ranger Districts. Education: B.A. in Anthropology; M.A. in Anthropology, emphasis in Archaeology. Experience: Archaeological survey, compiling Section 106, and NEPA compliance reports with the Forest Service since 2008.

Todd Parker. Westside Zone Hydrologist, U.S. Forest Service, Mt. Hood National Forest, Zigzag and Clackamas Ranger Districts. Education: B.S. in Forest Management, B.S. in Business Management, emphasis in Finance. Experience: Hydrologist on the Columbia Gorge and Zigzag Ranger Districts since 1992.

Todd Reinwald. Soil and Water Program Manager, U.S. Forest Service, Mt. Hood National Forest, Supervisor's Office. Education: A.S. in Forest Management, B.S. in Soil Science. Experience: Forest Service 1987 to 1997, Environmental Consultant 1997 to 2006, Oregon Department of Forestry 2006 to 2009, and Forest Service 2009 to present.

Patricia Snyder. Land Adjustment Program Manager, U.S. Forest Service, Pacific Northwest Regional Office. Education: AOS Marketing Management and AOS Business Administration; Multiple International Right-of-Way Association and continuing realty education courses. Experience: 36 years of experience as a Title Examiner, Commercial Title Officer, Right-of-Way Agent, Land Law Examiner and Realty Specialist. Specialized experience with the ALTA US Policy – Department of Justice Land Title Standards for Federal land acquisitions, title and risk analysis.

Kathryn Strawn. Geospatial Systems Specialist, U.S. Forest Service, Pacific Northwest Regional Office, Data Resource Management. Education: B.S. Political Science, emphasis in public administration and international relations; MEM Environmental Management, emphasis in advanced spatial modeling. Experience: Geospatial data analysis and geospatial systems management since 2011.

Alexandra Wenzl. Historian and Tribal Relations Advisor, U.S. Forest Service, Mt. Hood National Forest, Supervisor's Office. Education: B.A. in Art, emphasis in Art History; M.S. in Historic Preservation. Experience: Manager of Heritage Program from 2010 to present involving environmental compliance for a complex cultural resources program including over 2,000 sites, a National Historic Landmark, a National Historic Trail, and numerous historic districts. Historic Site Management including interpretive program development, volunteer management and restoration program management from 2003 to 2010. Additional work in the preservation trades with historic window restoration and masonry with a specialization in stonework from 1995 to 2003.

Distribution List for DEIS

This DEIS will be distributed to individuals and organizations that responded throughout this process, as well as Federal agencies, federally recognized tribes, State and local governments, and key partners. These organizations and agencies are listed below. Also, the mailing list includes several individuals that are not listed here. The complete mailing list is maintained in the project record, available at the Supervisor's Office in Sandy, Oregon.

Advisory Council on Historic Preservation

Bark

Bureau of Indian Affairs

Chief of Naval Operations

Clackamas County Board of Commissioners

Clackamas County Planning Department

Collins Lake Resort

Confederated Tribes of Warm Springs
Confederated Tribes of Grand Ronde

Cooper Spur Wild and Free Coalition

Crag Law Center

Department of Energy

Environmental Protection Agency, Office of Federal Activities

Environmental Protection Agency, Region 10

Federal Aviation Administration

Federal Highway Administration

Friends of Mt. Hood

Government Camp Community Planning Organization

Government Camp Water Company

Hood River Collaborative Stewardship Group

Hood River County Board of Commissioners

Hood River County Planning Department

Hood River Valley Residents Committee

Hoodland Fire District #74

Lower Columbia Canoe Club

Mazamas

Mt. Hood Meadows

Mt. Hood Skibowl

Mt. Hood Ski Patrol

National Agricultural Library

National Marine Fisheries Service

National Park Service

Natural Resources Conservation Service

North Willamette Watershed District

Northwest Environmental Defense Center

Northwest Power Planning Council

Oregon Chapter Sierra Club

Oregon Department of Fish and Wildlife

Oregon Department of Transportation

Oregon Nordic Club

Oregon Wild

Portland Water Bureau

Rhododendron Community Planning Organization

Timberline Lodge

U.S. Army Corps of Engineers

U.S. Coast Guard

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