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Final Supplemental Environmental Impact Statement

Wallowa-Whitman National Forest Invasive Plants Treatment Project

Wallowa-Whitman National Forest

Wallowa, Union, Baker, Malheur, Umatilla and Grant Counties in Oregon
Adams and Nez Perce Counties in Idaho

For Information Contact: Gene Yates
Wallowa-Whitman National Forest
PO Box 907
Baker City, OR 97814
(541) 523-1290
gyates@fs.fed.us

Wallowa-Whitman National Forest Invasive Plants Treatment Project Draft Supplemental Environmental Impact Statement

Wallowa, Union, Baker, Malheur, Umatilla and Grant Counties in Oregon
Adams and Nez Perce Counties in Idaho

Lead Agency: USDA Forest Service

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

For Information Contact: Gene Yates, Forest Botanist
Wallowa-Whitman National Forest
P.O. Box 907
Baker City, OR 97814
(541) 523-1290
gyates@fs.fed.us

Abstract: This Final Supplemental Environmental Impact Statement (Supplement) documents the supplemental analysis of the cumulative effects in the 2010 Wallowa-Whitman Invasive Plants Treatment Project Final Environmental Impact Statement. This Supplement has been prepared to provide additional information and analysis to address the inadequacies identified by the United States District of Oregon *in League of Wilderness Defenders/Blue Mountains Biodiversity Project v. Connaughton*, Case 3:10-CV-01397-SI (Amended Opinion and Order issued by Judge Simon, August 10, 2012) (Simon 2012), and by the United States Court of Appeals for the Ninth Circuit (Unpublished Memorandum, October 30, 2014) (Ninth Circuit 2014). The Supplement incorporates updated information about sensitive species and provides clarification of the previous cumulative effects analysis and compliance with PACFISH/INFISH. The project area is the 2.3 million acre Wallowa-Whitman National Forest in northeast Oregon, and western Idaho. The Forest encompasses portions of the Blue Mountains and Wallowa Mountains of Oregon, and includes the Hells Canyon National Recreation Area which straddles the Snake River and includes lands in Oregon, Idaho, and Washington.

Summary

This Final Environmental Impact Statement (Supplement) addresses the inadequacies identified by the District of Oregon in *League of Wilderness Defenders/Blue Mountains Biodiversity Project v. Connaughton*, Case 3:10-CV-01397-SI (Amended Opinion and Order issued by Judge Simon, August 10, 2012) (Simon 2012). This Supplement re-analyzes and discloses the potential cumulative effects of treating invasive plants across the Wallowa-Whitman National Forest. This Supplement also explicitly describes how the project complies with PACFISH and INFISH, which guide management of riparian habitats to protect native fish, in response to reversal of the District Court's affirmative decision on this point by the Court of Appeals, Ninth Circuit (Ninth Circuit 2014). Lastly, this supplement addresses effects of the action to sensitive species that were added in the December 2011 updated list issued by the Regional Forester. This Supplement includes only new or modified information from the 2010 FEIS relative to these three topics, and will result in a new Record of Decision (ROD) that will be signed by the Forest Supervisor (Responsible Official).

Location and Overview of the Area

The Wallowa-Whitman National Forest comprises 2.3 million acres in northeast Oregon, and western Idaho. The Forest encompasses portions of the Blue Mountains and Wallowa Mountains of Oregon, and includes the Hells Canyon National Recreation Area which straddles the Snake River and includes lands in Oregon, Idaho, and Washington.

Structure of the Supplement

Portions of the 2010 FEIS that were modified or replaced are identified and described in a shaded box, with reference to where the original text can be found in the 2010 FEIS. Portions of the 2010 FEIS that remain unchanged are not included in the Supplement, including Chapters 1 and 2, and portions of Chapter 3 addressing direct and indirect effects. The Final Supplement is distributed with a copy of the 2010 FEIS, as the two documents together serve as the complete analysis for the project, as well as the draft Record of Decision.

The 2010 FEIS, ROD, maps, and other supporting documents are located on the web at http://www.fs.usda.gov/detail/wallowa-whitman/landmanagement/planning/?cid=stelprdb5192845

Changes from Draft to Final

- Moved the discussion of newly designated sensitive plants from Appendix A to Chapter 3, section 3.2.3
- Added additional detail and analysis to newly designated sensitive plant direct, indirect and cumulative effects.
- Moved discussion of environmental impacts to newly designated sensitive wildlife species from Appendix B to Chapter 3, section 3.3.6.
- Comment Letters Received Added to Chapter 5.

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Introduction to the Supplement

The Wallowa-Whitman National Forest Invasive Plants Treatment Project Final Environmental Impact Statement (2010 FEIS) was published in March 2010 and the Record of Decision (2010 ROD) was signed by the Wallowa-Whitman National Forest Supervisor on April 2, 2010. The 2010 ROD authorized a variety of invasive plant treatments to contain, control or eradicate existing and new invasive plants on the Forest. This Supplemental Environmental Impact Statement has been prepared to provide additional information and analysis of cumulative effects, sensitive species added to the Regional Foresters Special Status Species list as of December 9, 2011, and compliance with PACFISH/INFISH.

Invasive plants continue to threaten the biological integrity, diversity, function and sustainability of native plant communities and other natural resources. This threat is of particular concern in the Hells Canyon National Recreation Area (HCNRA), which was established by an act of Congress to preserve and enhance the area's recreational and ecological values. The 2010 FEIS identified the need for action as: (1) implement treatment actions and site restoration to contain, control and eradicate the extent of invasive plants at existing inventoried sites, and (2) rapidly respond to new or expanded invasive plant sites as they are detected in the future (Early Detection, Rapid Response-EDRR). Left untreated, invasive plant populations will become increasingly difficult and costly to control, further degrading forest and grassland ecosystems, and could spread to neighboring lands.

The 2010 ROD was appealed on July 7, 2010. After administrative review, the decision was affirmed by the Regional Forester (Appeal Deciding Officer) on August 20, 2010.

On November 12, 2010, League of Wilderness Defenders/Blue Mountains Biodiversity Project (plaintiff) filed a complaint against the Forest Service in the United States District Court of Oregon, alleging that the 2010 ROD violated the National Environmental Policy Act (NEPA), the National Forest Management Act (NFMA) and the Clean Water Act (CWA). The complaint included several counts related to the effects of the project and the analysis process. On June 29, 2012, District Judge Simon issued an Opinion and Order, which he amended on August 10, 2012. Judge Simon found that the cumulative effects analysis was not adequate to meet the requirements of the National Environmental Policy Act (NEPA). The Court found the cumulative impacts section perfunctory, falling short of the "hard look" standard against which legal review is measured, and therefore inadequate. In his August 10, 2012 amended opinion and order, Judge Simon summarizes his review of cumulative effects:

"In short, "the potential for … serious cumulative impacts is apparent here, such that the subject requires more discussion" than the Project FEIS provides. . . . Because the Project FEIS does not present a "full and fair discussion of environmental impacts," . . . it is arbitrary and capricious in violation of the APA. (Simon - August 8, 2012, page 55 of 59)

The Court found that the cumulative impacts analysis in the 2010 FEIS was insufficient. Judge Simon found no other legal violations. The NEPA analysis was remanded to the Forest Service. The August 10, 2010 Amended Opinion and Order is available on request.

On December 10, 2012, the District Court vacated the 2010 ROD in part, allowing some treatment to move forward, with certain restrictions.

In 2013, Plaintiff's filed an appeal of several claims affirmed by the District Court. On October 30, 2014, the U.S. Court of Appeals for the Ninth Circuit issued an Unpublished Memorandum from two of the three reviewing Judges that affirmed in part and reversed in part, the points on appeal, finding this legal violation: "…we…cannot conclude that the Forest service fulfilled its obligation to analyze PACFISH/INFISH consistency in the EIS as required by NEPA."

Scope, Format, and Context of this Supplement

The scope of this Supplement is narrower than the scope of the 2010 FEIS because it is specifically focuses on the cumulative effects analysis and PACFISH/INFISH.

This Supplement documents compliance with the following laws, regulations and policies:

Wallowa-Whitman National Forest Land and Resource Management Plan, as amended (1990), including the Pacific Northwest Invasive Plant Program Final Environmental Impact Statement (May 2005), PACFISH (February 1995), and INFISH (July 1995).

The National Forest Management Act of 1976 (NFMA)

The National Environmental Policy Act of 1969 (NEPA)

The Council of Environmental Quality Regulations (CEQ) 36 CFR 800

Clean Water Act

Sections of the 2010 FEIS that are either completely replaced or modified are identified in the Supplement. Paragraphs from the 2010 FEIS that are unchanged are not included in this Supplement. Each supplemented section shares the same heading as the 2010 FEIS, and an introductory shaded paragraph identifies what is being changed with the Supplement.

Specific Consultation, Coordination, and Analyses Pertinent to Addressing the Inadequacies Identified in LOWD v USFS.

Addressing the inadequacies identified in LOWD v USFS involved expanding the analysis of cumulative effects for each of the resources addressed in Chapter 3 of the 2010 FEIS, as well as adding an explicit PACFISH/INFISH analysis. An interdisciplinary team (IDT) of agency specialists representing each of these resources was convened. The IDT is tasked with evaluation of the 2010 cumulative effects analyses and expanding those analyses to address specific inadequacies identified by the U.S. District Court. Fisheries biologists on the IDT are additionally tasked to clarify and describe compliance with PACFISH/INFISH amendments to the Wallowa-Whitman National Forest Land and Resource Management Plan.

The 2010 FEIS documented how the Forest Service complied with the Endangered Species Act (ESA) and National Historic Preservation Act with this project. Additionally, ESA consultation on the project specifically addressing newly listed designated critical habitat for bull trout was completed in 2011 (USDA FS 2011, USDI FWS 2011). It is anticipated that the previous ESA consultation with regulatory agencies (US Fish and Wildlife Service, National Marine Fisheries Service) will be adequate for the Supplement, as no additional federal listings have occurred since 2011. Additional, no new information included in this SEIS reveals effects to listed species or critical habitat of a manner or extent not previously considered. Activities proposed in the 2010 FEIS meet criteria listed Appendix C of the Programmatic Agreement among the United States Department of Agriculture Forest Service Pacific Northwest Region (Region 6), the

Advisory Council on Historic Preservation, and the Oregon State Historical Preservation Officer Regarding Cultural Resources Management in the State of Oregon by the USDA Forest Service (2004). The project would have no effect on heritage resources. The programmatic agreement for heritage remains in place and, given that actions analyzed in this Supplemental EIS are the same as considered in the 2010 FEIS and ROD, further consultation with State Historic Preservation Office is not anticipated.

Consultation with affected Indian Tribes is ongoing. In 2012, government to government consultation was reinitiated with the Nez Perce Tribe and Confederated Tribes of the Umatilla Indian Reservation (CTUIR) regarding this project and the preparation of this Supplemental EIS. Updates on progress of the analysis were presented to the governing bodies of both Tribes in 2013 and 2014.

Opportunity for Pre-decisional Objection

The Final SEIS and a Draft ROD are made available to the public and are subject to pre-decisional administrative review following regulations at 36 CFR 218 Subparts A and B. To request such a review, eligible parties must submit a qualifying Objection. Individuals or entities who have submitted timely, specific written comments regarding the project during a designated opportunity for public comment may file an objection.

Chapter 1. Purpose of and Need for Action

This chapter remains unchanged from the 2010 FEIS. The 2010 FEIS, ROD, and maps are located on the web at http://www.fs.usda.gov/detail/wallowa-whitman/landmanagement/planning/?cid=stelprdb5192845

Chapter 2. Alternatives, Including the Proposed Action

This chapter remains unchanged from the 2010 FEIS.

Chapter 3. Affected Environment and Environmental Consequences

Direct and indirect effects for all four alternatives are unchanged from those presented in Chapter 3 of the 2010 FEIS. The sections below describe expanded analysis of cumulative effects.

Sections of Chapter 3 not presented here remain unchanged from the 2010 FEIS.

3.1 Introduction

3.1.2 Basis for Cumulative Effects Analysis

This section in the 2010 FEIS, Chapter 3, pages 98-106, is replaced with the following:

Cumulative effects are the result of incremental impacts of the proposed actions/alternatives when added to other past, present, and reasonably foreseeable actions, both on NFS lands and adjacent federal, state, or private lands (40 CFR 1508.7). The baseline for cumulative effects analysis is the current condition as described in the affected environment sections throughout chapter 3.

When considering potential for cumulative effects, it is important to consider the context of the activities proposed, including the likelihood of overlapping effects in both time and space. This section discusses background information, relevant best available science, and other considerations (including assumptions) used in the cumulative effects analyses presented throughout Chapter 3.

Context for Cumulative Effects

Coordinated Treatment Efforts

Activities on neighboring lands can contribute to the spread of invasive plants on NFS lands, and vice versa. The effectiveness of the proposed invasive plants treatment project would be increased if coordination with adjacent landowners treats invasive infestation across land ownerships. The cumulative effects analysis assumes that this cooperative, coordinated effort will continue, and the release of biological control agents on adjacent lands by the Oregon Department of Agriculture, as analyzed by Animal Plant Health Inspection Service (APHIS), will continue, regardless of alternative.

Herbicide Use in Oregon

Beginning in 2007, the State of Oregon required Pesticide Use Reporting to a centralized database (ODA 2008) (http://www.oregon.gov/ODA/PEST/purs_index.shtml). A report was also produced for the 2008 season (ODA 2009). Reporting requirements applied to those who use pesticides in the course of business or any other for-profit enterprise, to government entities, and for use in a locations intended for public access. Herbicide use was reported at the large river basin scale. The reporting system has since been discontinued, and data inconsistencies were reported. However, the reports generated from this effort do provide a way to contrast the potential for herbicide use under the alternatives to total use at the statewide and river basin scales.

During the 2007 season, 40,473,773 pounds of pesticide use were reported. Approximately 551 active ingredients were used in the state. The top five active ingredients, by pounds, were:

- Metam-sodium (42%) [soil fumigant]
- Glyphosate (9%) [herbicide]
- Copper naphthenate (7%) [wood preservative]
- 1, 3-dichloropropene (5%) [soil fumigant]
- Aliphatic petroleum hydrocarbons (4%) [insecticide]

During the 2008 season, 19,696,784 pounds of pesticide was reportedly used in Oregon, a decrease of 20,776,989 pounds from the prior year. The top five active ingredients, by pounds, for the entire state were:

- Metam-sodium (20%) [soil fumigant], (down 21% from the prior year)
- Glyphosate (10%) [herbicide], (up 1% from the prior year)
- 1,3-dichloropropene (6%) [soil fumigant], (down 1% from the prior year)
- Sulfuric acid (6%) [desiccant], and (not in the top 5 during the prior year)
- Aliphatic petroleum hydrocarbons (4%) [insecticide]. Same percentage as the prior year.

Glyphosate second-most-used active ingredient and accounted for 9-10 percent of all pesticide use reported statewide for the 2007 and 2008 seasons. The vast majority was agricultural use. Statewide reported glyphosate use was over 3.5 million pounds during the 2007 season, and 1.9 million pounds during the 2008 season. In this project, glyphosate is proposed for use on a maximum of 8,000 acres per year on the Wallowa-Whitman National Forest (WWNF), which would amount to a maximum of 16,000 pounds per year.

The WWNF overlaps primarily the Lower and Middle Snake River Basins. Of the foremost five ingredients used in the Lower and Middle Snake River water basins, glyphosate is the only herbicide that is also proposed for use on the WWNF. Just over 107,416 pounds of glyphosate was used in the Lower Snake basin and 23,695 pounds in the Middle Snake-Powder Basin during the 2007 season. About 68,315 pounds of glyphosate was used in the Lower Snake basin in 2008. Glyphosate was not among the top 5 pesticides used in the Middle Snake-Powder Basin in 2008.

Three other herbicides proposed for use in the alternatives are within the top 100 reported statewide for the 2007 season: imazapyr, sulfometuron methyl, and triclopyr. Four other herbicides proposed for use in the alternatives are within the top 100 reported statewide for the 2008 season: clopyralid, imazapyr, sulfometuron methyl, and triclopyr. Proposed use of these herbicides on the project (assuming maximum use) would amount to less than 1 percent of the total reported use during 2007 and 2008.

These data demonstrate the low amount of herbicide use compared to river basin or statewide use. The Forest Service contribution to this amount would remain low in all alternatives. No water quality issues related to pesticides have been identified in the waters in the project area (none of the streams in the area are 303(d) listed for chemical contamination –see Soil and Water section later in this chapter). Any herbicide reaching the stream would be quickly diluted and as the herbicide moved downstream it would become less and less likely to cause impacts. For instance, research by Evans and Duseja (1973) found picloram concentrations diluted 85 to 98 percent within 100 meters (328 feet) below treatment areas. Although no water quality issues related to pesticides have been identified for the waters in the project area, pesticides are likely to be part of the background existing condition within the streams, based on the studies described below.

NWQAP Pesticide Study

Since 1991, the National Water Quality Assessment Program (NWQAP) has implemented interdisciplinary assessments in 51 of the Nation's most important river basins and aquifers, referred to as Study Units, and the High Plains Regional Ground Water Study. The USGS published a report: "Pesticides in the Nation's Streams and Ground Water, 1992–2001" (Gillom and others 2006) that presented evaluations of pesticides in streams and ground water based on findings for the first decadal cycle of NAWQA. The study found that undeveloped streams had one or more detectable pesticides or degradates 65 percent of the time. The study stated that presence of pesticide compounds in predominantly undeveloped watersheds may result from past or present uses within the watershed for purposes such as forest management or maintenance of rights-of-way, uses associated with small areas of urban or agricultural land, or atmospheric transport from other areas. None of the herbicides proposed for use in this project were detected in the national samples (however it is acknowledged that glyphosate is widely used but was omitted from the study).

The report discusses the many delivery mechanisms of pesticides to surface and ground water:

Pesticides are transported to streams and ground water primarily by runoff and recharge. Nonpoint sources of pesticides originating from areas where they were applied—rather than point sources such as wastewater discharges—are the most widespread causes of pesticide occurrence in streams and ground water (Modified from Majewski and Capel, 1995.) The atmosphere is often overlooked as a source of pesticides, which return to earth with precipitation and dry deposition and can reach streams and ground water. Streams are particularly vulnerable to pesticide contamination because runoff from agricultural and urban areas flows directly into streams along with both dissolved and particle-associated pesticides. Ground water is most susceptible to contamination in areas where soils and the underlying unsaturated zone are most permeable and drainage practices do not divert recharge to surface waters.

The study also stated:

Pesticide occurrence in streams and ground water does not necessarily cause adverse effects on aquatic ecosystems or humans. The potential for effects can be assessed by comparing measured pesticide concentrations with water-quality benchmarks, which are based on the concentrations at which effects may occur. No streams draining undeveloped land, and only one stream in a watershed with mixed land uses, had an annual mean concentration greater than a human-health benchmark.

This study supports the conclusion that this project, combined with other herbicide use off Forest, would not result in herbicide delivery to streams over a threshold of concern for people and/or the environment. The State of California also conducted monitoring on surface water where 40,631 pounds of active ingredient of 13 herbicides and 19 insecticides were applied within the privately-owned watersheds upstream of sampled locations. No detectable concentrations of any herbicides were identified (reliable detection limits ranged from 0.04 to 2.0 ppb). The analysis included glyphosate and triclopyr. The results could have been affected by several months passing between dry weather application and the first rain, potentially allowing chemical degradation or adsorption to soil; or dilution of stream flow between application and monitoring sites may have contributed to the lack of positive detections (Jones et. al. 2000).

Clackamas River Pesticide Study

Closer to home, a study about the background levels of pesticides in surface waters was done on the Clackamas River, part of the Willamette River Basin in western Oregon. The Pesticide occurrence and distribution in the lower Clackamas River basin, Oregon, 2000–2005 (Carpenter, K.D and others 2008) was done as part of the NWQAP.

The Clackamas study took place from 2000–2005. Within 119 water samples from the Clackamas and its tributaries, 63 pesticide compounds: 33 herbicides, 15 insecticides, 6 fungicides, and 9 pesticides degradates were detected. Fifty-seven pesticides or degradates were detected in the tributaries (mostly refers to urban and rural developments; roads and forest management activities that may be occurring in these areas during storms), whereas fewer compounds (26) were detected in samples of source water from the lower main stem Clackamas River, with fewest (15) occurring in drinking water.

The study stated that the two most commonly detected pesticides were the triazine herbicides simazine and atrazine, which occurred in about one-half of samples. It also said that the active ingredients in the "common household herbicides" RoundUP™ (glyphosate) and Crossbow™ (triclopyr and 2,4-D) also were frequently detected together. These three herbicides often made up most of the total pesticide concentration in tributaries throughout the study area.

The study stated that pesticides were most prevalent in the Clackamas River during storms, and were present in all storm-runoff samples averaging 10 individual pesticides per sample from these streams. Two tributaries contained 17–18 different pesticides each during a storm in May 2005. These medium-sized streams drain a mix of agricultural land (row crops and nurseries), pastureland, and rural residential areas. Two small streams that drain the highly urban and industrial northwestern part of the lower basin had the greatest pesticide loads. Streams draining predominantly forested basins contained fewer pesticide detections (2–5 pesticides). The study stated that pesticide use on the Mount Hood National Forest, which comprises most of the Federal land in the upper Clackamas River Basin, was a relatively insignificant contribution. Similar to the Mt. Hood National Forest, the WWNF contributes headwater sources to large river basins.

None of the detections related to any of the herbicides proposed for use on the WWNF were above a threshold of concern in the Clackamas study. However, the study noted that the thresholds do not account for simultaneous exposure to multiple pesticides and degradates and that it is difficult to determine the cumulative effect of such a mixture. It is possible, but unlikely, that synergistic effects could occur as a result of exposure to the herbicides considered in this analysis. Synergistic or additive effects, if any, are expected to be insignificant (R6 2005 FEIS pages 4- 1 to 4-3). Based on the Clackamas example, information in the R6 2005 FEIS, and the PDFs and buffers associated with this project, herbicide exposures would not combine with other chemical uses and cause cumulative adverse effects to people or the environment.

The Clackamas River has a different mix of land uses and is in a different biological region than rivers within the project area. However, similar to the Clackamas situation, the WWNF invasive species treatments are likely insignificant to the overall presence of pesticides in surface waters, and the type of herbicides proposed for use are those that have not been found to accumulate downstream in concentrations over a threshold of concern. The effects analysis acknowledges that storm runoff is a delivery mechanism from herbicides to surface waters; however the amount of herbicide predicted to reach streams is below a threshold of concern and water quality standards would be met (see Soil and Water Section 3.4.3).

Herbicide Use Adjacent to the Project Area

The following sections discuss what is known about herbicide use on other land ownerships adjacent to the project area, including BLM, tribal, state, and private lands. Past and ongoing herbicide use by the Forest Service is also discussed.

Counties are responsible for controlling noxious weeds along county roads and other county property outside of and within the WWNF. They also work with conservation districts, weed management areas, and watershed councils to control noxious weeds on private property.

BLM Herbicide Use Proposals

The Bureau of Land Management has made a decision regarding vegetation management using herbicides on BLM lands in Oregon (BLM/OR/WA/PL-10/088+1792; USDI, 2010). This decision made available 14 herbicides west of the Cascades (2,4-D, clopyralid, dicamba, dicamba + diflufenzopyr, diuron, fluridone, glyphosate, hexazinone, imazapic, imazapyr, metsulfuron methyl, picloram, sulfometuron methyl, and triclopyr) and 17 herbicides east of the Cascades (bromacil, chlorsulfuron, tebuthiuron, and the 14 herbicides available west of the Cascades):

- To treat noxious weeds and other invasive plants as necessary to meet Integrated Vegetation Management objectives.
- To treat any vegetation as needed to control pests and diseases in State-identified control areas, such as Sudden Oak Death in southwest Oregon.
- To treat any vegetation to meet safety and operation objectives in administrative sites, recreation sites, and rights-of-way.
- To treat any vegetation to achieve habitat goals specified in approved Recovery Plans or other plans specifically identified as part of recovery or delisting plans, Conservation Strategies, or Conservation Agreements (collectively referred to as Conservation Strategies) for Federally Listed, 5 proposed for listing, or Bureau Sensitive species (Special Status species).

This was a programmatic decision; actual projects will take place only after site-specific analysis and decision making at the field level, tiered to the Final EIS and this Record of Decision. The decision broadened the management objectives for which herbicides may be used. The decision is expected to eventually result in increased herbicide use on BLM lands across the state, although to-date no site-specific approvals have been made for BLM lands adjacent to the WWNF.

State and Private

Land management activities tend to be more intensive on state and private lands than on adjacent NFS lands. The NFS lands are generally in the upper portions of the affected watersheds. The largest use of herbicides in the planning area is on agricultural lands below the Forest boundaries. Nonpoint sources of herbicides in streams and groundwater result from agricultural use (USGS 2006).

Vectors and Invasive Plant Spread

The introduction, establishment and spread of invasive plants are expected to continue, with prevention practices and effective treatments slowing, but not stopping the rate of spread (R6 2005 FEIS). Ground disturbance associated with natural processes such as wildland fire, as well as human activities such as road use, may favor the spread of invasive species and discourage the reestablishment of native species.

Seastedt et al. (2008), note that human caused disturbance can change soil conditions to which native species have adapted, which further results in conditions that favor invasive plants. For example, repeated road clearing and graveling, the creation and maintenance of an open gravel pit, or a cleared compacted recreation area can create environments that favor ruderal invasive species, plants which germinate quickly, grow and establish in disturbed conditions, monopolizing the resources and dominating the site. Invasive species flourish in the loose gravels of roadsides (Gelbard and Belnap 2003). Generally, disturbed environments have greater available resources for invasive plants because of exposed soil, open light, and higher nutrient and water availability.

Shade under forest canopies substantially limits weed growth. Most of the primary target species on the WWNF do not invade shaded environments. Invasive plant density drops in shaded environments (Hansen and Clevenger 2005, Pauchard and Alaback 2006, Buonopane et al 2013). Buonopane et al. (2013) found high rates of noxious weed seeds in the topsoil and litter layer well within the forest adjacent to infested roadsides. This indicates that invasives would be readily introduced to nearby disturbed areas even if no invasive plants are visible under the existing forest canopy.

The relationship between OHV trail use, travel access management, and the introduction, establishment and spread of invasive plants was discussed in the R6 2005 FEIS. OHV use can influence the spread of invasive plants by disturbing soil and carrying seed over long distances, far greater than ‘conventional’ dispersal methods (R6 2005 FEIS p. 3-15). Vehicle traffic is considered a major vector for invasive plant seeds because long stretches of roadways can be infested with invasive plants allowing vehicles to collect and deposit seeds into new areas several miles away (Trombulak and Frissell 2000, Zouhar 2008, Flory and Clay 2009, Birdsall et al. 2011) and the roadside environment is conducive to establishing new infestations.

Table 1 displays the potential disturbance frequency and intensity of invasive plant spread associated with various pathways. Disturbance frequency and intensity and potential for spread (often referred to as propagule pressure) influence the rate at which invasive plants are likely to spread. The most applicable R6 2005 ROD Standard dealing with preventing the spread of invasive plants via each vector is also shown. Prevention is an important aspect of the invasive plant management program. National policies and regional standards have been enacted to reduce the potential for invasive plants to become introduced, established or to spread as a result of National Forest activities. The 2010 FEIS, Sections 3.1.4, Life of the Project and 3.1.7, Treatment Effectiveness, discusses how the location of infestations and surrounding vectors influence our treatment and restoration objectives.

Table 1 - Relative risk of invasive plant spread by vector.

Vector	Disturbance Frequency/ Potential Maximum intensity	Risk of Spread	Most Applicable R6 Mgt Direction*/ Prevention Considerations
Recreation Sites, Dispersed and Developed Sites; campgrounds, hunter camps, trailheads.	Perpetual/ low - moderate	High	R6 Goal 1, Objectives 1.2; 2.4, 2.5; Standards 1, 4; outreach and education, travel management, recreation management
Livestock grazing; Dry open grassland steppe, shrub lands, dry forestlands, streamsides	Seasonal/ moderate	Mod	R6 Goals 1, 2; Objectives 1.2, 2.1, 2.2; Objective 5.3; Standards 4,6; Grazing Allotment Management Plans and annual operating plans,

Vector	Disturbance Frequency/ Potential Maximum intensity	Risk of Spread	Most Applicable R6 Mgt Direction*/ Prevention Considerations
Vegetation Management (Thinning and brushing, logging, burning)	Periodic/ High (especially yarding – corridors, landings and pile burning)	High	R6 Goals 1,2; Objectives 1.1, 2.1, 2.2, Standards 1, 2, 3, 13 Prevention practices included in all contracts and stewardship agreements
Wildland fire and Incident Response	Periodic, low to high	Mod	R6 Goals 1, 2; Objectives 1.1, 1.3, 1.5 2.3; Standards 1, 2†, 3, 13 †although emergency situations like wildland fire are explicitly exempt from this equipment cleaning standard, Forests report that it happens routinely.
Roads (Road maintenance, construction, reconstruction and use)	Perpetual/ High	High	R6 Goals 1,2; Objectives 1.1, 2.4, 2.5; Standards 1, 2, 7, 8, 13 Forests report excellent coordination with engineering staff , quarries are inspected and road materials are weed free
Closing roads	Periodic/ Low	Mod	R6 Goal 2; Objective 2.4; Standards 1, 2, 3, 13
Restoring roads and landings	One time/ Low-High	Mod	R6 Goals 1, 2; Objective 1.1; 2.1, 2.4; Standards 1, 2, 3, 13
Adjacent Agriculture	Perpetual/ Low	High	R6 Goal 5; Objectives 5.1-5.3
Stream and Floodplain Condition Improvement, Stream Restoration (i.e. fish passage and habitat projects, riparian vegetation restoration),	Seasonal/ High	Low	R6 Goals 1, 2; Objectives 1.1, 1.3, 1.5, 2.1, 2.2; standards 1, 2, Keep equipment working near streams clean.
Minerals Exploration and Mining (primarily placer)	Seasonal/High	Low	R6 Goals 1, 2; Objectives 1.1, 1.3, 1.5, 2.1, 2.2; standards 1, 2,

*Preventing and Managing Invasive Plants, Record of Decision, Pacific Northwest Region, October 2005, R6-NR-FHP-PR-02-05. Available on the web at http://www.fs.usda.gov/detail/r6/forest-grasslandhealth/invasivespecies/?cid=stelprdb5302157

Cyclical Use of Herbicides

The activities listed in Table 2, even when conducted with the incorporation of the above standards to mitigate the introduction, establishment and spread of invasive plants, would still be expected to contribute to invasive plant spread, albeit at a slower rate. While this may imply a need for continued treatment, the need for treatment, especially the application of herbicides, would not mean more acres treated than has been analyzed under the direct/indirect effects in the corresponding of the FEIS and elsewhere in this document. The FEIS anticipated and analyzed the need for continued treatment, particularly under the early detection, rapid response portion of the action alternatives. In anticipating the need for continued treatment, the FEIS capped the treatments to a maximum of 8,000 acres per year. This threshold cap on treatment would remain in effect regardless of the need for continued treatment arising from other activities being conducted on the forest that, too, have created conditions leading to the introduction of invasive plants. Treatments may be moved around the forest over the duration of the project, but would not exceed the treatment cap of 8,000 acres annually, and therefore the effect of treating these 8,000 acres in a given year would never exceed what has been analyzed in the FEIS.

In addition, since existing infestations analyzed in the FEIS largely occur in the same types of disturbed environments (because that is where invasive plants grow) as would be expected to occur from these future disturbance activities, there are no unique or novel impacts expected from future treatments. That is, ongoing disturbance activities on the forest are likely to create conditions that could be exploited and occupied by invasive plants, but the treatment of those populations is expected to have the same kind of effects as were analyzed for existing treatment areas. The pattern of infestation is likely to remain constant; roadsides and other disturbed areas are most likely to become invaded and similar impacts would be expected.

In many sites herbicide treatments are expected to occur more than once over the course of several years. This would especially be true for sites with larger infestations. However, the amount of plants treated each year at a given site is expected to decline after the initial treatment. While this project may occur throughout the Forest and over an extended period of time, the impacts at any one time and place, if any, are very small. This limits the potential for this project to combine with another project and cause cumulative adverse effects on people, animals, or the environment. In addition, the early detection- rapid response strategy would also improve the ability to control infestations while small, thus reducing the amount of treatment at newly detected sites.

Despite the uncertainty inherent in treatment over multiple years, the cumulative effects of the project can be predicted because the project design features limit the extent and intensity of impact from this project at any one location, and the duration of adverse impacts would be relatively short. The 2010 FEIS notes the short duration of adverse impacts of invasive plant treatments to vegetation and habitat and the recovery of treated areas is expected within one-season (2010 FEIS pages 158, 287, 291-92). Because effects would not carry over from season to season, there would not be expected cumulative effects arising from a cyclical need to apply herbicides or the use of non-chemical methods to control invasive plants.

Potential Impacts to Non-Target Plants

Ongoing Activities and Reasonably Foreseeable Projects

The Forest Service has identified a variety of reasonably foreseeable actions that could overlap invasive plant treatments in time and space. Additional ongoing projects may overlap with invasive plant treatment (for instance road, trail, and administrative site maintenance; and vegetation and habitat management and restoration, etc.). Table 2 includes proposed projects as identified on the current Schedule of Proposed Actions (Winter 2015). These projects are in various stages of development (e.g. developing proposed action, under analysis, recently decided) and are considered reasonably foreseeable. New projects are being planned, others move to the implementation phase, and others are completed. Table 2 also lists ongoing activities such as road maintenance and mining, as well as broad categories of projects such as fuels treatments and trail construction that are expected to continue throughout the life of this project. For each type of project or activity, the approximate current level of annual accomplishment is provided, along with any change in the level of accomplishment anticipated over the next 10-15 years. While it is not reasonable to anticipate exactly where such activities will occur across the forest in future years, it is likely that some level of activity will occur and trends in the level of activity can be estimated based on current budgets and priorities. Cumulative effects analyses for individual resources, presented in the sections below, are based on the reasonably foreseeable actions and estimates of levels of ongoing activities presented in Table 2.

Table 2 - Ongoing activities and reasonably foreseeable actions in the project area.

Project or Activity Type	**Approx. Annual Level of Activity – Current**	**Anticipated Future Levels- Reasonably Foreseeable Projects[1] and Approx. Impacted Acres [2]**
Road maintenance - including grading, brushing , drainage repair, and spot gravelling	500 miles	Similar to current, potentially declining due to budget
Road reconstruction – relocation, improvement of existing roads		Similar – some increase from Eastside Restoration 51 Road Reconstruction (10 acres)
Road decommissioning Non-system roads	12 miles	Similar to current, potentially declining due to budget
Culvert replacement	3-6 culverts	Similar to current, potentially declining due to budget East Sheep FS Road 5184 (4 culverts) Muir Creek Culvert Replacement (NA)
Grazing Approving grazing permits and allotment management plans, range improvements (fences, water)	Active and vacant allotments totaling 1,412,000 acres (vacant allotments are not currently stocked)	Similar to current Lower Imnaha Rangeland Analysis Big Sheep Divide Range Analysis Whitman Range Improvements (<10 acres)
Mining Plans of Operations	60 approved Plans of Operation	Increasing with completion of environmental analysis and decisions on EISs Granite Creek Watershed Mining Plans (28 plans of operation) Hallelujah #1 (1 plan) Powder River Mining (24 plans) Upper N. Fork John Day Mining (14 plans)
Fire Suppression	Variable 40,000 acres	Increasing based on trend over last 10 years
Fire Rehab	Variable	May increase if acres burned by wildfire increases
Fuels Treatments –hand piling, machine piling, mastication	1,000 acres	Similar – some increase from Eastside Restoration

Project or Activity Type	Approx. Annual Level of Activity – Current	Anticipated Future Levels- Reasonably Foreseeable Projects[1] and Approx. Impacted Acres [2]
		East Face Restoration (6,900 acres) Limber Jim Muir Fuels Reduction (2,100 acres) Cold Canal Vegetation (3,400 acres)
Activity Fuels – brush disposal, prescribed burning on timber sale areas	1,000 acres	Similar – some increase from Eastside Restoration Little Dean Hazardous Fuels (9,100 acres) Wallowa Mountains Mechanical Fuel Piling (4,500 acres) Snow Basin Vegetation Management (5,100 acres) [Includes post-commercial treatment –same acres may be included as “commercial harvest”]
Prescribed burning – natural fuels and following mechanical	10,000 acres	Similar – some increase from Eastside Restoration Little Dean Hazardous Fuels (4,650 acres) East Face Restoration (6,300 acres) Bird Track Timber Stand Improvement (TSI) & Maintenance Burn (8,800 acres) Limber Jim Muir Fuels Reduction (4,250 acres) Ladd Canyon TSI and Prescribed Burn (NA) Lower Joseph Restoration (90,000 acres) Snow Basin Vegetation Management (15,000 acres) Cold Canal Vegetation (5,400 acres)

Project or Activity Type	Approx. Annual Level of Activity – Current	Anticipated Future Levels- Reasonably Foreseeable Projects[1] and Approx. Impacted Acres [2]
Pre/Non-commercial thinning – fuels reduction and timber stand improvement	3,000 acres	Similar – some increase from Eastside Restoration Little Dean Hazardous Fuels (575 acres) East Face Restoration (3,500 acres) Snow Basin Vegetation Management (10,000 acres) [Includes some post-commercial treatment –same acres may be included as "commercial harvest"]
Commercial Harvest Including hazardous fuels projects with commercial harvest and salvage	Average annual harvest of 25-35 mmbf, with 95% or greater from partial harvest (thinning)	Similar volume and prescription – some increase from Eastside Restoration East Face Restoration (6,700 acres) Cold Canal Vegetation (1,000 acres) Five Mile Fire Salvage (20 acres) Lower Joseph Creek Restoration (25,000 acres) Little Dean Fuels Managemen (9,100 acres) Bird Track Timber Stand Improvement (TSI) & Maintenance Burn (60 acres) Limber Jim Muir Fuels Reduction (425 acres) Snow Basin Vegetation Management Supplement (9,000 acres)
Access and Travel Management – Designation of roads, trails and areas for motorized travel; management of over-snow travel; permitted road uses		Wallowa Whitman National Forest Travel Management Plan (TMP)
Developed recreation site maintenance (e.g. cleaning toilets and campsites, removing hazard trees, replacing vandalized signs or non-functional camp structures)	207 developed recreation sites (e.g. campgrounds, trailheads, picnic areas, interpretive sites, boat launches)	Similar to current
Developed recreation site reconstruction and minor construction	Variable	Similar to current

Project or Activity Type	Approx. Annual Level of Activity – Current	Anticipated Future Levels- Reasonably Foreseeable Projects[1] and Approx. Impacted Acres [2]
e.g. toilet replacement, gate installation, accessible path construction)	5-10 projects per year	Cache Creek Septic Repair (<1 acre)
Trail maintenance e.g. restoring trail surface, removing hazard trees, cleaning out drainages structures, replacing signs	500-1000 miles	Similar to current
Trail reconstruction and reconstruction trail bridge replacement, restoration of flood damaged rail section, new trail construction to accommodate people with disabilities, designation of closed roads as OHV trails	Variable 2-3 projects	Similar to current Sheep Creek Bridge Replacement (<1 acre)
Term Outfitter and Guide special use permits e.g. horseback trips with gear and equipment in wilderness, jetboat and rafts trips with local and regional clients on Snake River	60 +/- outfitters in wilderness areas, backcountry, and Snake River	Similar to current
Annual recreation special use permits e.g. placement of temporary portable toilets, designating stops and overnight camps for rides, snowmobile races	Variable 3-5 projects	Similar to current
Non-recreation special use permits Public utilities, water collection and pipelines (public and private)	300 existing permits; 5-10 new permits approved annually	Similar to Current Boardman to Hemingway Transmission Line Project (200 acres) Cove Water Pipeline Replacement (10 acres) Asotin Telephone Company (<5 acres) Dumar Spring (<5 acres) Whitney Fiber Optic (<5 acres)
Watershed/Riparian/Aquatic Habitat Improvement Riparian fencing, planting, large woody debris placement, culverts for fish passage	Variable	Variable, funding dependent Beaver Creek Fish Passage Project (<10 acres) Five Points Creek Restoration, Phase 1 (75 acres) Limber Jim Large Woody Debris (<10 acres) Riparian Livestock Exclusion by Wood II (<10 aces)

Project or Activity Type	Approx. Annual Level of Activity – Current	Anticipated Future Levels- Reasonably Foreseeable Projects[1] and Approx. Impacted Acres [2]
		Upper McCoy Creek Restoration Project (NA) Devils Run Water Gap (10 acres) Bull Run Subwatershed Restoration, Phase 1 (100 acres) Granite Creek Culvert Replacement (100 acres)

[1]Projects are listed in the WWNF Winter 2015 Schedule of Proposed Actions.

[2]Acres are approximate treatment acres, based on description of a proposed action (e.g. as presented in scoping); NA indicates proposal still being developed, scoping pending.

All future projects and ongoing activities are designed and implemented consistent with invasive plant prevention strategies. (2010 FEIS Appendix B, 2010 ROD page 3)

The relationship between OHV trail use, travel management, and the introduction, establishment and spread of invasive plants was discussed in the R6 2005 FEIS, and recognized that OHV use can influence the spread of invasive plants by disturbing soil and carrying seed several orders of magnitude greater than ‘conventional’ dispersal methods (R6 2005 FEIS p. 3-15). Subpart B of the 2005 Travel Management Rule (TMR), published in the Federal Register (FR. Vol. 70, No. 216, pages 68264-68291) requires a system of roads, trails, and areas to be designated for motor vehicle use on NFS lands. Current regulations on NFS lands within the Hells Canyon NRA align with this direction, including the limiting of motorized vehicle travel to designated routes. It is anticipated that a travel management decision for the remaining areas of the forest not yet in compliance with Subpart B of the TMR will be made within the next five years. Regulating motorized travel to designated roads, areas, and trails (with possible exceptions for activities such as camping and permitted activities), in compliance with TMR, is expected to reduce the spread of weeds by managing cross-country travel across much of the forest. In addition, any trail and access plans must address prevention of invasive plants (R6 2005 ROD, Standard 1) and all alternatives must utilize prevention standards as described in the R6 2005 FEIS.

The TMR also addresses motorized oversnow travel, at Subpart C. The purpose of this subpart is to provide for regulation of use by oversnow vehicles on National Forest System (NFS) roads and NFS trails and in areas on NFS lands. Regulating oversnow travel is expected to reduce the spread of weeds, as seeds may be transported by vehicles (e.g. snowmobiles and the vehicles and trailers used to transport them to trailheads and snowparks), deposited on top of the snow, and find their way to bare soil below when snow melts in the spring. However, the rate of reduction in weed spread is expected to be less than that resulting from regulation of summertime cross-country travel under TMR Subpart B, as sources of weed seed are typically underneath the snowpack and transfer of seeds is expected to be less during the winter. Analysis of potential cumulative effects of implementing the TMR will focus on Subpart B.

On the WWNF, cattle are the major type of livestock that graze Forest Service land (sheep are a minor component). Approximately 74% of the WWNF is appropriated into range allotments. Many of the currently documented invasive plant sites (99%) are also located within these allotments. The following is an excerpt from the R6 2005 FEIS Appendix D, describing cattle cause-effect relationship with invasive plants:

> Herbivory by cattle can strongly influence vegetation composition and productivity in forest and range ecosystems. However, the role of cattle as contributors to the establishment and spread of non-native invasive plants is not well known. Ungulates spread seeds through endozoochory (passing through an animal's digestive tract) or epizoochory (attached to an animal's body); hence, animal-mediated spread of invasive plants is a common phenomenon. Manipulative experiments of ungulate grazing effects on non-native plant introduction, establishment, and spread are limited.
>
> Herbivory can alter successional patterns and rates when selective foraging favors survival, growth, and reproduction of plants with low palatability, although the impact can differ greatly among ecosystems. Descriptive studies in various habitats have shown that non-native species invade sites with or without livestock grazing, however other studies have shown that native bunchgrasses have a lowered ability to compete with invasive plants if grazed repeatedly.

As with other forest activities, grazing can cumulatively increase the spread and introduction of invasive plants, which could result in increased need for treatment. The early detection-rapid response strategy would improve the ability to control infestations, while small in size, to reduce the overall use of herbicide.

Invasive plant introduction and spread from OHV, timber harvest, prescribed burning, grazing, and other actions would continue, along with the primary vector – vehicle traffic. Prevention measures described in Appendix 1 of the R6 ROD (USDA 2005b), along with treatment efforts are expected to reduce invasive plants populations but would never eliminate them. Treatment of future populations would be within the scope of this project but are not expected to result in a greater level of herbicide use than predicted herein under the alternatives because of the annual treatment cap, budget constraints, and the EDRR strategy. The treatment cap of 8,000 acres is a maximum figure; however, at this point in time about 2,500 acres of herbicide treatment occurs annually on the Forest. Prevention measures would slow the rate of spread; however, the amount and location of future invasive plant treatments could be influenced by these up-coming projects. Treatment of invasive plant sites would be prioritized by species and location, as outlined in the EDRR herbicide use decision tree process (Figure 12 of the 2010 FEIS), which would guide the treatments of future locations. The EDRR strategy would play a critical role in keeping future infestations from spreading as a result of future actions.

Summary

In summary, factors that limit the potential for cumulative effects from herbicide use proposed in the alternatives include the following:

- The risk of adverse effects of invasive plant treatments in all action alternatives have been minimized by the project design features (PDFs). Buffers minimize risk of herbicide concentrations of concern near water (specific PDFs and buffers can be reviewed in the 2010 FEIS Chapter 2.2.3). The PDFs and buffers eliminate the potential for new infestations or spread of existing infestations to result in exposures beyond those analyzed in the EIS. These exposures are small in context of overall herbicide exposure likely found downstream and are not likely to cause harm to people or the environment.
- In general, invasive plant sites are small and scattered within 6th field watersheds. Sixth field watersheds within the project area containing more than 10 acres of riparian infestations were reviewed, and in all cases infestations near surface waters were also found to be small and scattered. This dilutes the potential for impacts at the 6th field watershed scale, which is the scale that is most meaningful as an indicator of cumulative effects to water quality.

- Assuming landowners off National Forest are using herbicides according to label directions, and based on the 2007 and 2008 data that shows glyphosate would likely make up the majority of use, potential for additive exposures to result in cumulative adverse effects is low. Glyphosate is not biologically active once it binds to organic matter and is rapidly absorbed by target plants.
- Early detection rapid response (EDRR) is part of all action alternatives, and is considered in the direct, indirect and cumulative effects analysis. Effects of treatments each year under early detection rapid response, by definition, would not exceed the annual and life of the project caps. These caps further restrict the spatial and temporal extent of impacts from this project.
- Multiple herbicide exposures on National Forest are unlikely to occur in close enough proximity in time or space with other applications to trigger cumulative effects beyond those analyzed and disclosed in the risk assessments and impact statements. Infestations that cross ownership boundaries are often treated cooperatively so the effects are limited to the existing infestation and immediately surrounding areas.

3.1.5 Herbicide Risk Assessments

Following publication of the Wallowa-Whitman NF Invasive Plant Treatment FEIS in 2010, four of the Herbicide Risk Assessments have been updated: glyphosate, imazapyr, picloram and triclopyr (TEA and BEE). A review of the updated hazard risk assessments determined that as long as project design features (2010 FEIS pages 58 -78)are followed, the findings under the 2010 FEIS section "Effects of Herbicide Use on Workers and the Public" remain valid, as no changed conclusions were documented.

The following table replaces Table 15 on page 109 of the FEIS:

Table 3 - Risk assessments for herbicides considered in this EIS

Herbicide	Date Final	Risk Assessment Reference
Chlorsulfuron	November 21, 2004	SERA[1] TR 04-43-18-01c
Clopyralid	December 5, 2004	SERA TR 04 43-17-03c
Glyphosate	March 25, 2011	SERA TR-052-22-03b
Imazapic	December 23, 2004	SERA TR 04-43-17-04b
Imazapyr	December 16, 2011	SERA TR-052-29-03a
Metsulfuron methyl	December 9, 2004	SERA TR 03-43-17-01b
Picloram	September 29, 2011	SERA TR-052-27-03a
Sethoxydim	October 31, 2001	SERA TR 01-43-01-01c
Sulfometuron methyl	December 14, 2004	SERA TR 03-43-17-02c
Triclopyr	May 24, 2011	SERA TR-052-25-03a
NPE	May 2003	USDA Forest Service, R-5

[1] SERA – Syracuse Environmental Research Associates, Inc. These reports can be downloaded at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

3.1.7 Treatment Strategy, Type, and Effectiveness Common to All Alternatives-

Cumulative Effects of All Alternatives

Discussion found under this heading on page 127 of the 2010 FEIS is now incorporated into the section "Basis for Cumulative Effects" above.

3.2.3 Botany- Environmental Effects

The paragraphs below replace the Cumulative Effects portion found on pages 158-159 of the 2010 FEIS; the remainder of this section is unchanged.

New Sensitive Plant Species

This section addresses effects to plant species designated sensitive by the Regional Forester Dec 11, 2011. With the issuance of the December 2011 Pacific Northwest Regional Forester's sensitive species list, some species were removed from sensitive status and several species were added. Table A-1 displays plant species newly designated on the 2011 RFSSS list for the Wallowa-Whitman National Forest but that were not analyzed as sensitive species in the 2010 FEIS. This table also displays the habitat conditions where the species may be found along with the likelihood of this habitat type to support or become infested by invasive plants.

Table A-1 – Newly designated Sensitive plant species. [1]

Scientific Name	Common Name	Habitat	Habitat Present in Invasive Plant Treatment Areas?
ANASTROPHYLLUM MINUTUM	LIVERWORT	Grows on peaty soil at relatively high elevations (> 5500 ft). In the *Tsuga mertensiana* zone, the colonies of *Anastrophyllum minutum* are typically associated with other bryophytes in tight mats on ledges or at the base of cliffs.	Habitat extremely unlikely to support invasive plants.
ANTHELIA JULACEA	LIVERWORT	Terrestrial on peaty soil, in Oregon associated with low ericaceous shrubs; high elevation where snow lies late, generally above 1500 m (5000 ft.) in Cascade Mts.	Habitat extremely unlikely to support invasive plants.
BARBILOPHOZIA LYCOPODIOIDES	LIVERWORT	Forming mats on peaty soil on damp ledges of rock outcrops and cliffs at higher elevations. Sites receive abundant snowfall. Elevations of known sites in Oregon and Washington range from 3400 to 7500 ft. Forest types include *Abies amabilis, Abies lasiocarpa, Abies procera, Abies lasiocarpa, Picea engelmannii, Pinus contorta* ssp. *latifolia*, and *Tsuga mertensiana* associations. On WWNF, Anthony Lake vicinity, >7000 ft.	Habitat extremely unlikely to support invasive plants.
HARPANTHUS FLOTOVIANUS	LIVERWORT	A bog and fen species, in Oregon associated with such genera as *Warnstorfia*, *Drepanocladus*, *Tomenthypnum*, and *Meesia*; moist humus, soil covered rocks, and decaying wood in forests and is frequently associated with *Cephalozia bicuspidata* and *Scapania undulata*.	Habitat extremely unlikely to support invasive plants.
JUNGERMANNIA POLARIS	LIVERWORT	Forming small to sometimes extensive mats, or hidden among other bryophytes, over peaty soil on damp ledges and crevices of rocks, sometimes along streams and rivulets, sometimes aquatic. Reportedly a calciphile and rare on igneous rocks. Partial shade to full exposure. Elevations for known locations in the Pacific Northwest range from 5000-7500 feet in the Blue Mountains and Cascade Range. Forest types include *Tsuga mertensiana* and *Abies lasiocarpa* associations.	Habitat extremely unlikely to support invasive plants.

Scientific Name	Common Name	Habitat	Habitat Present in Invasive Plant Treatment Areas?
LOPHOZIA GILLMANII	LIVERWORT	Found on peaty soil, usually associated with cliffs or ledges. It is an obligate calciphile; in Baker County the locality is on the limestone of the southern end of Elkhorn Ridge. The Umatilla National Forest site is located in a small wet subalpine meadow and surrounding forest edge and granite cirque at approximately 6500 ft.	Habitat extremely unlikely to support invasive plants.
PELTOLEPIS QUADRATA	LIVERWORT	Forming small mats on moist, exposed to shady soil or on ledges and crevices in talus slopes and outcrops. Usually a calciphile but sometimes occurring on igneous rocks. By extension, calciphilous bryophytes sometimes also occur on ultramafic rocks that are also rich in base elements. In the Pacific Northwest *Peltolepis* is alpine to subalpine, with a single known site at an elevation of about 7000 feet in the Elkhorn Mts (WWNF). Forest types range from *Abies lasiocarpa, Pinus albicaulis*, to above timberline.	Habitat extremely unlikely to support invasive plants.
PREISSIA QUADRATA	LIVERWORT	Grows on soil with little organic material, typically on ledges on cliffs or in crevices in rocky areas. Elevations in Oregon vary widely for this species, from relatively low (Columbia River Gorge) to high (Elkhorn Mountain). Generally strictly calciphilous. Damp soil and rocks of shaded creek banks and seepages; splash of creeks and cascades; often under willow; places that remain damp for long periods of time following snow-melt.	Habitat extremely unlikely to support invasive plants.
PTILIDIUM PULCHERRIMUM	LIVERWORT	Forming mats at the bases of trees, on decaying wood, among boulders in talus slopes, ledges of cliffs, and rarely on soil, *in cool moist habitats*. Details about the lone reported Oregon locality (Antone Creek) are unknown, but its location between 3800 and 8000 feet on the Wallowa-Whitman National Forest would include *Pseudotsuga menziesii*, *Abies grandis*, *Abies lasiocarpa*, and *Picea engelmannii* associations.	Habitat extremely unlikely to support invasive plants.

Scientific Name	Common Name	Habitat	Habitat Present in Invasive Plant Treatment Areas?
SCHISTIDIUM CINCLIDODONTEUM	MOSS	Forming large loose or dense sods on wet or dry rocks or on soil in crevices of rocks and boulders, often along intermittent streams, at elevations of 5000-11,000 feet. Little information is available on associated species. Habitats probably include *Pinus ponderosa*, *Abies grandis, Abies amabilis, Abies lasiocarpa* , and *Tsuga mertensiana* associations. At higher elevations it may also occur in *Pinus albicaulis, Phyllodoce empetriformis*, and *Cassiope mertensiana* associations.	Habitat extremely unlikely to support invasive plants.
ASPLENIUM TRICHOMANES-RAMOSUM	GREEN SPLEENWORT	Boreal species, very high elevation Wallowa Mountains.	Habitat extremely unlikely to support invasive plants.
CAREX CAPILLARIS	HAIRLIKE SEDGE	Calciphile, high elevation meadows Wallowa Mts.	Habitat extremely unlikely to support invasive plants.
CAREX LASIOCARPA VAR. AMERICANA	SLENDER SEDGE	Peaty soil of fens and bogs.	Habitat extremely unlikely to support invasive plants.
CAREX MEDIA	INTERMEDIATE SEDGE	Subalpine riparian habitat	Habitat extremely unlikely to support invasive plants.
CAREX RETRORSA	RETRORSE SEDGE	Montane riparian habitat. Streamsides and bars.	Habitat extremely unlikely to support invasive plants.
CAREX SAXATILIS	RUSSET SEDGE	Calciphile, high elevation lakes, Wallowa Mountains	Habitat extremely unlikely to support invasive plants.
CAREX SUBNIGRICANS	DARK ALPINE SEDGE	Very high elevation lake and streamside moist-wet meadow with calcareous substrate. Wallowa Mountains.	Habitat extremely unlikely to support invasive plants.
CAREX VERNACULA	NATIVE SEDGE	In moist or wet places at high elevations, especially at the edges of melting snowfields and in meltwater streams. Wallowa Mountains	Habitat extremely unlikely to support invasive plants.
CHEILANTHES FEEI	FEE'S LIP-FERN	Calciphile, Crevices of cliffs and outcrops. Elevation variable.	Could inhabit roadside rock outcrops near invasive plants, otherwise, habitat is unlikely to support invasive plants.

Scientific Name	Common Name	Habitat	Habitat Present in Invasive Plant Treatment Areas?
CYPERUS LUPULINUS SSP. LUPULINUS	GREAT PLAINS FLATSEDGE	Along Snake River; reported from grassy slopes up to 250 feet from shoreline, *Celtis* zone on first terrace above high water mark, rocky shoreline, and edge of riparian zone along dry creek bed tributary. Associated species include *Celtis reticulata, Opuntia polyacantha, Bromus tectorum, Pseudoreigneria spicata, Aristida longiseta, Sporobolus cryptandra, Panicum, Plantago patagonica, Galium parisiense, Poa bulbosa, Arenaria serpyllifolia, Phlox*. Some plants found growing under *Celtis*, but found most often in open areas. Snake and lower Grande Ronde rivers.	Habitat could support invasive plants
DELPHINIUM BICOLOR	FLATHEAD LARKSPUR	Low larkspur is found on sites ranging from open woods and grasslands to subalpine scree. It appears early in the spring, often at the edges of receding snowbanks. Low larkspur will grow in fairly dry to moist conditions but grows best in rich, black, sandy loams or clay loams and in soils of limestone or granitic origin. It is found on gentle to steep slopes. Low larkspur has been located in 1 site on the WWNF in a vernally moist opening in Ponderosa pine forest and on the Umatilla NF in an open edge of mixed conifer forest. (Matthews 1993)	Habitat could support invasive plants, mainly in grassland or open wooded sites.
JUNCUS TRIGLUMIS VAR. ALBESCENS	THREE-FLOWERED RUSH	High elevation, Wallowa Mts., wet, spring-fed alluvial fan at lakeside.	Habitat extremely unlikely to support invasive plants.
LIPOCARPHA ARISTULATA	ARISTULATE LIPOCARPHA	Low elevation moist sites along streams and or lakes on silty substrate; plant community dominated by *Juncus* and *Eleocharis* spp.	Habitat unlikely to support invasive plants.
PINUS ALBICAULIS	WHITEBARK PINE	Uppermost subalpine habitat. Forms the timberline in Elkhorn and Wallowa Mts.	Habitat extremely unlikely to support invasive plants.
PYRROCOMA SCABERULA	ROUGH PYRROCOMA	*Festuca idahoensis* - *Koeleria macrantha* grasslands generally below 5000 ft.	Habitat could support invasive plants.

Direct and Indirect Effects

Anastrophyllum minutum, Anthelia julacea, Barbilophozia lycopodioides, Harpanthus flotovianus, Jungermannia polaris, Lophozia gillmanii, Peltolepis quadrata , Preissia quadrata, Ptilidium pulcherrimum, Schistidium cinclidodonteum, Asplenium trichomanes-ramosum ,Carex capillaris, Carex lasiocarpa var. americana, Carex media, Carex retrorsa, Carex saxatilis, Carex subnigricans, Carex vernacula, Juncus triglumis var. *albescens, Lipocarpha aristulata, Pinus albicaulis.*

Alternatives B, C, and D

Most of the newly designated sensitive species in Table 1 grow in habitats not prone to infestation by invasive plants for a number of reasons: many inhabit alpine or upper subalpine areas, or grow in cool-moist mixed conifer forest, or inhabit unique environments, such as fens, peaty wetlands, or rock outcrops and cliffs, none of which has been observed to support invasive plants on the Wallowa-Whitman National Forest. No known sites of these species occur nearby mapped invasive plant sites. Because the habitats likely to support these species is unlikely to be infested by invasive plants, invasive plant treatments would not be conducted around or in the vicinity of these sensitive plant species; therefore, the invasive plants treatment project would have no impact to these sensitive plants.

Cheilanthes feei, Cyperus lupulinus ssp. *lupulinus, Delphinium bicolor, Pyrrocoma scaberula*

Cyperus lupulinus ssp. *lupulinus* and *Pyrrocoma scaberula* are reported to have invasive plants growing within or adjacent to the population. These sites would be avoided by herbicide application through project design features under alternatives B, C, and D. Under alternative A, continued management, sites would be avoided by herbicide spray as well. The effects to these species from herbicide applications would follow the same pathways and rationale for effects that have been described in the project biological evaluation and FEIS for the other sensitive plant species. The outcome determinations for these two species would be no different than for determinations made in the FEIS for other sensitive species: may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability for the population or species (MIIH) for the same rationale provided in the FEIS. These sites will be avoided by herbicide application, but there is a small risk of exposure to herbicides when conducting applications in close proximity to sensitive plants. Manual and mechanical methods would not impact sensitive plants, because hand methods would be targeted to weed species and the required pre-treatment surveys (PDF I-1) would identify sensitive plants to be avoided by mechanical treatments.

No additional design features are warranted. Annual implementation planning (2010 FEIS Chapter 2.2.3, pages 84-85) requires that resources of concern be listed and additional surveys completed as needed for species of local interest and/or their habitats.

Alternative A

None of the newly listed sensitive plant species are in proximity to invasive plant treatment sites listed under alternative A (1992 and 1994 EA's). Therefore, under alternative A, there would be no impact to any of the plant species listed above in Table A-1.

Cumulative Effects

Introduction

Chapter 3 of the FEIS describes effects to botanical species of local interest (SOLI), which include federally listed threatened and endangered plants and Forest Service sensitive plants, fungi, lichens and bryophytes, as well as Hells Canyon National Recreation Area rare and endemic plants. Project design features (PDFs) I-1 through I-7 are designed to reduce to nearly zero, the effects of treatments to SOLI, by incorporating pre-treatment surveys, buffers and herbicide application methods to avoid the direct effects of trampling, pulling, cutting and mowing that might result from manual, mechanical and biological control methods, plus the effects of accidental spray or drift of herbicide onto SOLI. Additional PDFs, I-8 through I-12, are designed to monitor treatments and provide a feedback loop in the effectiveness of the prescribed methods and buffers and to modify them accordingly if unanticipated direct or indirect effects are encountered during and following treatment operations. The FEIS found beneficial effects to SOLI with the removal of invasive plants and subsequent recovery of habitat. Direct and indirect effects to SOLI were limited to the inadvertent impacts, not impacts arising directly from project design. In other words, with properly implemented treatments following all project design features, there would be no impacts, but given some buffers allow for working within 10 feet of SOLI, the accidental or inadvertent impacts would be possible. Therefore, the FEIS concluded that individual SOLI or their habitat may be impacted by the action alternatives, but these impacts would not lead to a trend toward federal listing or a loss of viability to any population or species. Alternative A – No Action determined there would be no significant impacts to SOLI in the short term. In the long term, SOLI and may be impacted with the continued spread of invasive plants into their habitats because of the lower effectiveness of this alternative in controlling invasive plants.

For botanical SOLI, cumulative effects are considered to be similar for all action alternatives (alternatives B, C, and D) because the potential for direct and indirect effects is similar for each alternative based on implementation of PDFs (2010 FEIS pages 142 -164). Determinations are the same for the three action alternatives for every species (2010 FEIS Table 28, pages 161-164). The effects of the actions proposed under these three alternatives, when added to the same set of past, ongoing, and reasonably foreseeable actions, would be indistinguishable. The cumulative effects of Alternative A (No Action) would be less than for the action alternatives because the direct and indirect effects, as described in the 2010 FEIS (pages 149-151) and fewer acres of infested sites adjacent to SOLI would be treated.

Chapter 3.1.2 discussed what is known about herbicide use on all ownerships. While the schedule or type of herbicide use off NFS land cannot be precisely known, the potential adverse effects of past, present and foreseeable future treatments on non-target plants, when combined with the effects of any of the alternatives (including the No Action), would be minor and short term. The cumulative effects analysis area is limited to the WWNF land and immediately adjacent lands. Actions occurring on non NFS lands have little or no affect to SOLI that inhabit the WWNF. Most populations of SOLI are simply too distant from non-Forest Service land to be affected by actions occurring off the National Forest. In the few instances where a sensitive or listed plant population straddles the National Forest boundary, and the viability of the population depends on individuals inhabiting both National Forest and non-National Forest ownerships, would actions off-forest contribute cumulatively to this action in maintaining the viability of the population.

Due to a lack of historical reference conditions for rare plant species, it is not possible to determine whether past actions, such as grazing, vegetation management projects, fuel wood harvest, fire suppression/prescribed fire, motorized access, mining, or recreation activities have impacted populations of SOLI in this analysis area. The existing condition described in the FEIS under Affected Environment (Section 3.2.2) is assumed to reflect the effects to SOLI of past and present management actions, as well as environmental forces.

As described above, some damage to individual nontarget plants from manual and mechanical treatments is possible from all treatment methods. While crews treating weeds on NFS land would be trained to identify and avoid damage to SOLI, the effect on SOLI of manual/mechanical treatments could vary on other ownerships.

Biological control agents cross land ownership boundaries. Though biocontrol agents introduced anywhere near the project area could occasionally affect nontarget plants, the potential impacts are controlled by restrictions on releasing agents that only affect the host (target) species. Coordination with Oregon Department of Agriculture would ensure releases meet Forest Service standards.

The more acres treated on and off NFS land, the more nontarget plant damage and mortality is possible, especially from broadcast or aerial spraying [1] However, given the PDFs and buffers that would be applied on NFS lands, potential for direct and indirect effects to nontarget plants from invasive plant treatments in any alternative is low, even when the potential actions on land of other ownerships are considered. The differences between alternatives regarding risk from spraying to nontarget plants are not significant at the project scale. Compared to No Action, the action alternatives would treat more acres; but this would not necessarily lead to more impacts on nontarget species. Treatments would still occur on a small percentage of the Forest's total area, and nontarget plant communities would likely recover quickly because damage would be limited to individual plants. Botanical SOLIs would receive more protection than common plants and sites would be visited following treatment to evaluate whether nontarget vegetation was affected, and buffers would be adjusted if needed to minimize future impacts (see PDFs I-8 through I-12).

Drift associated with herbicide treatments near Forest System land is possible, and adjacent land owners would not necessarily add as many layers of caution to herbicide use; however, the analysis assumes all herbicide use would conform to label guidance. The cumulative effect of treating non NFS lands with herbicides would be limited to the immediate adjacent lands, within 300 feet for aerial applications, and less than 100 feet for broadcast applications, and not more than 30 feet for spot applications. Herbicide applications effects would be limited to drift, which could deliver herbicide to native vegetation on NFS land, but in low volume, are not likely to result in mortality. The risks to nontarget vegetation and botanical SOLIs from treatments off forest would be very minimal and outweighed by the benefit of reducing the incidence of invasive plants on adjacent non NFS lands, because the nearby sources for invasion would be reduced, thereby reducing the rate of infestation.

Ongoing and reasonably foreseeable future (Forest Service) actions, as detailed in Table 2, would be subject to Forest Plan standards and guidelines. Currently these standards direct that project impacts be evaluated and described during environmental analysis. Furthermore, Forest Service policy is not to approve projects where the effects to sensitive species would create a trend to

[1] Alternative A (No Action) allows 5,172 acres of broadcast application and no aerial. Alternative B (proposed action) would allow broadcast on 17,535 acres and aerial application on 875 acres. Alternative C proposes 14,431 acres of broadcast (no broadcast in riparian areas) and 875 acres of aerial. Alternative D would allow broadcast on 16,600 acres and no aerial application (2010 FEIS page 95). For alternatives B, C, and D an 8,000 acre annual treatment cap would apply (2010 FEIS pages 82, 84).

federal listing (under the ESA) or cause a loss of population viability for significant stocks or populations.

Vegetation Management

Vegetation management, including, both commercial and non-commercial thinning and occasional regeneration harvest, has the potential to impact SOLI. Actions associated with vegetation management, such as thinning trees, hauling logs, scattering and burning slash and creating landings impact soils and the plants that depend on them. Because the locations of SOLI can be identified during project analysis and easily protected through design features and layout, potential impacts to SOLI from vegetation management can be reduced to very low levels, even to having no effect. In instances where impacts might occur, impacts would be incidental and limited to individual plants, not whole populations, and cumulatively would contribute little.

Firewood collection is a common practice on the WWNF. Felling, bucking and loading of wood could potentially impact SOLI in permitted areas. SOLI restricted to non-forest habitat would not be impacted, as firewood would not be found in this habitat type. SOLI within 300 feet of fish bearing streams or 150 feet of other waterways, wilderness areas, wild and scenic rivers, or along scenic byways would not be impacted because firewood collection is not permitted in these areas. Because firewood cutting is limited to forested areas outside riparian zones and is a widely dispersed activity across the National Forest, anticipated impacts to SOLI are slight. At most, only a few individuals in a population would reasonably be expected to be impacted.

Livestock Grazing

Livestock grazing has the potential to add most of the cumulative effects expected to accrue and, combined with the action, impact SOLI. Presently 61 percent of the WWNF is appropriated into active and vacant cattle grazing range allotments. Livestock grazing would likely continue in active allotments during the life of this project, may or may not continue in vacant allotments and would not likely be resumed in closed allotments. Present and reasonably foreseeable livestock grazing is assumed, for this analysis, to occur on 61 percent of the National Forest. Livestock grazing directly impacts SOLI via herbivory and trampling. Indirect effects include soil compaction, which would hinder germination of seeds. Grazing can indirectly impact SOLI through disturbance of soil crusts and creation of bare soil as well as increase input rate of nitrogen to the soil by dung and urine. Along with herbivory and trampling, these factors play a role in limiting the abundance of palatable species (Augustine and McNaughton, 1998), thereby increasing the “invasibility” of a plant community (Lonsdale, 1999) potentially altering the habitat supporting SOLI. Ungulate grazing and browsing can function as a chronic disturbance, exerting continuous influence over long periods (Parks et al., 2005) so their effects are not temporary and would continue from year to year. SOLI occupying capable, suitable rangeland – principally grasslands, shrub lands, meadows and riparian zones, are mainly at risk from livestock grazing. It is difficult to quantify impacts to SOLI from livestock grazing, but livestock are likely to impact individuals. Grazing is assumed to be conducted according to Forest Plan standards, and any additional measures needed to maintain the viability of SOLI would be addressed during allotment management planning or during the annual operating instructions. Given this, SOLI viability would be maintained in concert with invasive plant treatments.

Wildfire/Fire Suppression/Prescribed Fire

Wildfires, whether originating on the National Forest or arising from adjacent lands then spreading to within the plan area may impact SOLI. SOLI dependent on forest habitats are at the greatest risk of lethal effects from wildfire. Wildfires with severe or perhaps even moderate intensities would likely kill plants in this habitat group. Following severe wildfire, suitable habitat for species in the conifer habitat group may not return for several decades. SOLI inhabiting in wetlands wet meadows habitat groups would probably be least affected from wildfire because these groups are expected to withstand the effects of wildfire, suffering damage only to crowns of graminoid plants, but not the basal meristem tissues of the root crown. Species occupying the grasslands habitat group are largely adapted to periodic wildfire, and may benefit from them. Increases in non-native exotic plants, such as cheatgrass, may increase fire frequencies in the grasslands habitat group favoring increase in exotic species cover to the detriment of native bunchgrasses, though this pattern, widely reported from the basin and range, has not been observed in the Blue Mountains. In sagebrush shrubland, *Castilleja flava* var. *rustica* may experience decline because sagebrush may be a necessary host plant for this hemiparasite. Species inhabiting the talus, cliffs, and rock outcrop habitats could be threatened by wildfire. These species' strategy of avoidance by occupying areas with light, discontinuous fuels is not foolproof as wind driven wildfires spot through these habitats. Many species occupying this group have no inherent defenses for fire, particularly the cryptic nonvascular plants that grow on peaty soil on ledges and in crevices. Species occupying the seeps/springs, riparian, and intermittent stream habitats could either survive or be killed by wildfires, depending on fire severity. Most species occupying moist meadows are not expected to be significantly impacted by wildfire.

Ongoing or future prescribed fires would be designed to insure the continued viability of SOLI. Prescribed fire would impact only individuals, except in actions where the fire would be used to improve SOLI habitat. Here, there may be short term impacts to SOLI, but longer term benefit to the habitat and species.

Motorized Access – Transportation System – Road Closures

Driving on roads, regardless of whether the road is paved or unimproved, presents no risk to SOLI, except only when parking or pulling off the roadside onto native vegetation. These impacts are expected to be nearly zero. There is a small chance of SOLI being driven over as few SOLI populations are immediately adjacent to roads. Most impacts would be associated with off road travel. The reasonably foreseeable future action of regulating motorized travel to designated routes, with some exceptions to accommodate camping or other permitted activities, would substantially reduce these impacts. Even with an outright ban of off road motorized travel, these impacts could likely impact individual SOLIs, but not rise to a level where whole populations would be impacted. Road closures are not expected to provide significant benefit to SOLI as few SOLI populations are immediately adjacent roads. Some small benefit may accrue to *Botrychium* species of SOLI, as some species are able to colonize disturbed areas after a period of ten to twenty years.

Minerals Exploration and Mining

Mining actions have the potential to impact SOLI where located in or immediately adjacent to the mine operation. Mineral mining is largely confined to areas of historical gold mining on the Whitman Ranger District. Most mining occurs as placer mining along creeks: SOLI at risk are almost entirely limited to riparian dependent plants, particularly *Botrychium* spp. These creeks sustained most of their impact during the euro-settlement period and may no longer provide habitat for SOLI. Ongoing and future minerals operations are subject to environmental analysis and Forest Plan standards for the conservation of SOLI. Past, ongoing and future rock quarry operations may have impacted some SOLI but to a very small degree given the very small proportion of land used for this activity. Because of the relatively limited amount of minerals operations from past, future and current mining and minerals exploration on the National Forest, these actions are expected to contribute only a very small impact toward cumulative effects to SOLI.

Recreation

Recreational activities in the analysis area include, game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. Hunting involves walking across terrain and is not expected to impact SOLI except in rare cases where an individual plant might be stepped on or trampled. Mushroom and berry gathering are broadly dispersed activities, disturbing a very small amount of ground, and not expected to impact SOLI. Hiking and livestock packing occurs on developed trails with little or no impact to SOLI. Developed campsites provide no habitat for SOLI. Dispersed camp sites provide no habitat for SOLI. Both developed and dispersed campsites are but a tiny fraction of the total National Forest land base and cumulatively are estimated to have impacted much less than 1% of the total SOLI habitat. Most impacts from recreation would be from trampling near developed sites, especially those near lakes. Here lake margins are often trampled by the user trail circling the lake, but also by anglers. These impacts are limited to riparian and wetland dependent SOLI, but this is still expected to be a very small number of acres and primarily associated with more heavily trafficked areas near developed sites. Furthermore, SOLI wetland habitat in the subalpine/alpine areas of the Elkhorn Mountains and Wallowa-Mountains have not shown to be infested by invasive plants, so recreation impacts to SOLI in these areas would not add cumulative effects to this action because there would be no spatial overlap of effects. Cross-country foot travel (bushwhacking) is expected to disturb at most a very small amount of terrain. Thus, there may be some cumulative effects to SOLI from recreational activities but they are expected to be small and difficult to quantify.

Climate Change

Climate change is affecting the Pacific Northwest. Projections are for the climate to warm 0.2 to 1 degree Fahrenheit per decade for the foreseeable future (OCCRI 2010). Precipitation levels may be more difficult to predict, but there is some confidence to expect decreases in winter snowpack, earlier spring snowmelt, earlier initiation of growing seasons, increase in growing season length, but under drier conditions, and increases in extreme weather events. Gradual warming and drying is expected to change species composition and community structure, possibly resulting in a decline in biodiversity. The most significant effects of climate change on biological diversity are expected to be in response to increasing summer temperatures (Currie 2001), although there is too much uncertainty about potential climate change effects on rare plant populations to confidently distinguish differences between the alternatives.

Species occupying the alpine fell fields and subalpine parklands are most at risk from climate change as this habitat has been and are expected to continue to decline in the next century. As invasive plants do not occupy this habitat, there would be no spatial overlap of effects in these habitats, and thus no cumulative effects. Species or habitats dependent on snowmelt runoff, such as the cottonwood habitat group, may decline in abundance. Cottonwoods depend on periodic flooding and sediment deposition for seedling germination (Rood and Mahoney 1995). With reduced peak spring stream flows, cottonwood seedlings may not have proper conditions to germinate on floodplains. Where germination has been successful, reduced late summer discharge may not provide sufficient moisture for seedlings to survive through the first growing season and establish (Naiman et al. 2005). Many other species within the plan area are endemic to small ranges or comprise disjunct populations beyond the species' contiguous range, regardless of their habitat group. These species are at risk of local extinction due to factors cited earlier.

The assessment of current environmental conditions in the affected environment incorporates the combined effects of past action. When National Forest activities are considered within a context of climate change, an additional factor is added to the cumulative effects analysis. Reid and Lisle (2008) identified two issues regarding cumulative impacts and climate change:

1. Human-induced climate change is itself a cumulative impact of multiple human activities. Prediction of the local magnitude, style, and timing of climate changes will require an understanding of how the many influences on climate interact.
2. Outcomes from this episode of climate change will differ from those of previous episodes in part because of interactions with environmental changes that humans have already caused—outcomes will be a cumulative effect. For example, Pleistocene climate changes resulted in elevational and latitudinal shifts of ecosystem boundaries. However, ecosystems now are highly fragmented by land-use activities, so climate change is more likely to result in extirpations than in the past because incremental shifts along a gradient may no longer be possible. In addition, geomorphic and ecosystem processes have been extensively modified by land-use activities, impairing some systems' mechanisms for resilience and thereby increasing their sensitivity to change.

Aggregate Cumulative Effects

The combined effects of all past, present and reasonably foreseeable future actions, when considered in addition to the direct and indirect effects of the project are the aggregate cumulative effects. Aggregate cumulative effects occur when the effects of the project action overlap in time and space with the effects of one of more of the types of activities discussed above. As these other activities have been assumed to result in only minor impacts to individuals, the aggregate cumulative impacts are the sum of all the minor impacts to individuals added to the impacts to individuals that might occur from the project. It is not possible to quantify how many individuals may be impacted or establish a threshold where patch or population viability for SOLI might be exceeded. What can be concluded is that, given the project design features crafted to minimize, if not eliminate, effects to SOLI, and that other forest activities are presumed planned and implemented to provide protections resulting in only minimal, if any, impacts to individual SOLI, the combined cumulative effect of impacts to individuals are not expected to rise to a level where they would contribute to a trend towards federal listing or cause a loss of viability to the population or species. Consultation with the U.S. Fish and Wildlife Service on the proposed action, (Alternative B) confirmed that the threatened species, *Mirabilis macfarlanei* and *Silene spaldingii*, though minor impacts might inadvertently adversely affect individual plants, would not jeopardize either species. Any cumulative impacts would result from short term impacts. In the long term, invasive plant treatments in a nearby SOLI are expected to improve habitat over time, and therefore restoration of habitat in and near SOLI should result in improved conditions and, thus, fewer cumulative impacts in the long term.

The short-term adverse cumulative effects resulting from Alternative A would be somewhat less than any for Alternatives B, C, and D, because direct and indirect effects would be less due to treatment of fewer acres adjacent to SOLI. However, long-term beneficial effects would be less than for the action alternatives because less habitat in and near SOLI would be improved.

3.3.4 Terrestrial Wildlife – Environmental Effects- General Effects and Considerations

The table below replaces Table 37 on pages 210-212 of the 2010 FEIS. The status of gray wolf has been changed from "threatened and endangered" to "sensitive".

Table 4 Wildlife determination summary

Species/Habitat	Determination All Alternatives	Rationale
Threatened and Endangered Species		
Canada lynx	No Effect	Forest is unoccupied habitat. Not present in treatment areas.
Sensitive Species		
Gray wolf	No Impact	Multiple PDFs (including J2a through c) minimize potential for disturbance in close proximity to known denning or rendezvous sites and minimize exposure to herbicides. Habitat for prey maintained. [2]
California wolverine	No Impact	Not likely to be present in treatment areas. PDFs and foraging behavior minimize potential for adverse effects from herbicide exposure and disturbance.
Pacific Fisher	No Impact	No recent documentation on the forest. Not present in treatment areas.
Rocky Mountain Bighorn Sheep	MINL[1]	Small amount of suitable habitat proposed for treatment. Short-term disturbance possible. PDFs minimize potential for adverse impacts from herbicide.exposure. Maintenance of foraging habitat[2].
Spotted Bat	No Impact	PDFs and foraging behavior effectively eliminate potential for adverse effects from herbicides. No treatment effects anticipated. Foraging habitat maintained[2]
Horned grebe	In Impact	No documented breeding. Not present in treatments.
Bufflehead	No Impact	No documented breeding. Not present in treatment areas.
Bald eagle	MINL[1]	No nest habitat adversely affected. PDFs minimize potential for adverse effects to roosting and foraging birds from herbicide exposure and disturbance.
American peregrine falcon	MINL[1]	No nest habitat adversely affected. PDFs minimize potential for adverse effects to foraging birds from herbicide exposure and disturbance.

Species/Habitat	Determination All Alternatives	Rationale
Greater sage grouse	No Impact	No documentation on the forest and not likely to be present in treatment areas. Small amount of suitable habitat proposed for treatment. PDFs minimize potential impacts to nesting and foraging birds and herbicide exposure. Preferred cover/forage maintained.[2]
Columbia sharp-tailed grouse	No Impact	Not documented on the forest and unlikely to occur within treatment areas. PDFs minimize potential impacts from herbicide exposure, disturbance and mortality. Small amount of suitable habitat proposed for treatment. Preferred cover/forage improved. [2]
Greater yellowlegs	No Impact	No documented breeding on the forest. Not present in treatment areas.
Upland sandpiper	No Impact	No documentation on the forest. Not present in treatment areas.
Gray flycatcher	MINL[1]	Small amount of suitable habitat proposed for treatment. PDFs minimize potential for adverse effects from herbicide exposure, disturbance and mortality.
Tricolored blackbird	No Impact	No documentation on the forest. Not present in treatment areas.
Bobolink	No Impact	No documentation on the forest. Not present in treatment areas.
Northern Leopard frog	No Impact	No documentation on the forest. Not present in treatment areas.
Columbia spotted frog	MINL[1]	No occupied habitat affected. Small amount of suitable habitat proposed for treatment. PDFs minimize potential for adverse effects from herbicide exposure anddisturbance/mortality. Riparian/wetland habitat improved. [2]
Painted Turtle	No Impact	No documentation on the forest and unlikely to occur within treatment areas. Small amount of suitable habitat proposed for treatment. PDFs minimize potential for adverse effects from herbicide exposure and disturbance/mortality. Riparian/breeding habitat maintained. [2]
Management Indicator Species		
Rocky mountain elk	No effects to local populations; Distribution and use of the Forest maintained.	Short-term disturbance; implementation of PDFs and widely scattered nature of treatment areas make adverse effects associated with herbicide exposure unlikely; long-term maintenance of suitable habitat[2]
Northern goshawk Pileated Woodpecker	No effects to local populations; Distribution and use of the Forest maintained.	No treatments proposed within preferred nest habitat. Short-term disturbance to foraging birds. PDFs, habitat requirements and foraging behavior minimize potential for adverse effects from herbicide exposure.
Cavity Excavators	No effects to local populations; Distribution and use of the Forest maintained.	Small amount of habitat proposed for treatment. Short-term disturbance possible. PDFs, habitat requirements and foraging behavior minimize potential for adverse effects.
Pine Marten	No effects to local populations; Distribution and use of the Forest maintained.	Not likely to be in treatment areas. Short-term disturbance possible. PDFs and foraging behavior minimize potential for adverse effects.
Landbirds and Partner In Flight Habitat		

Species/Habitat	Determination All Alternatives	Rationale
Landbirds	No effects to local populations or distribution across the Forest.	Scattered treatment areas, small amount of treatment within any single vegetative community and PDFs reduce risks and minimize potential for herbicide exposure.
Dry Forest, Riparian woodland/shrub, Steppe Shrubland, mountain meadow	Ecological community and habitat for associated species maintained or improved.	Treatments would reduce invasive plants and maintain native plant and wildlife diversity. [2]
Mesic Mixed Conifer, subalpine forest, aspen, alpine	No change to the ecological community or associated wildlife.	Invasive plants do not threaten this community and little or no treatments are proposed.

[1]– MINL - May Impact Individuals or Habitat, but Not Likely to cause a trend in federal listing or a loss of viability.

[2] – Maintenance/Improvement would only occur under the Action Alternatives

3.3.5 Effects to Threatened, Endangered and Sensitive (TES) Species

Since publication of the 2010 FEIS, the status of gray wolf on the WWNF has changed from “Threatened” to “Sensitive”. On May 5, 2011, a Final Rule was published in the Federal Register (Vol. 76, No. 87, Pages 25590-25592) removing the Northern Rocky Mountain populations of gray wolf from protection under the Endangered Species Act (including eastern Oregon). The species was then added to the Region 6 Regional Forester’s Sensitive Species list. Discussion of gray wolf has been moved to Section 3.3.6 Sensitive Species.

Discussion of Canada lynx on pages 168-169 of the 2010 FEIS is unchanged, as the status of the species has not changed since publication.

3.3.6 Effects to Sensitive Species

The paragraphs below replace the Cumulative Effects discussions for the following Region 6 Sensitive Species found on the corresponding pages of the 2010 FEIS indicated below.

Gray wolf, pages 214-215

Painted turtle, page 247

Columbia spotted frog, pages 244 – 245

Gray flycatcher, page 239

Sharp-tailed grouse, page 236

Greater sage grouse, page 232

American peregrine falcon, page 229

Bald eagle, page 227

Spotted bat, page 225

Bighorn sheep, page 222

California wolverine, page 218

In 2011, a revised list of sensitive species was issued by the R6 Regional Forester. Species added to the list at that time are discussed following the section for California wolverine.

For terrestrial wildlife, cumulative effects are considered to be similar for all action alternatives (B, C, and D) because the potential for direct and indirect effects is similar for each alternative based on implementation of PDFs (2010 FEIS pages 193 – 261) . The effects of the actions proposed under these three alternatives, when added to the same set of past, ongoing, and reasonably foreseeable actions, would be indistinguishable.

Gray Wolf

Cumulative Effects

Many ongoing and reasonably foreseeable Forest Service activities (Table 2), as well as activities conducted by other entities within and outside of NFS land, cause ground disturbance which can create conditions favorable to invasive plants. Potentially, this disturbance could create a continual or increasing need to treat invasive plants. These activities are potential sources of disturbance to wolves and could create a cumulative effect in combination with the disturbance created by invasive plant treatments, particularly those treatments that occur away from roads. Treatment caps limit the amount of treatment that would be approved annually regardless of invasive species spread.

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph. These projects, and other similar projects to be implemented in the next 10-15 years are expected to result in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually across the forest. Prescribed fire and vegetation management, including both commercial and non-commercial thinning, has the potential to impact gray wolf prey including mule deer and elk. While there would be some removal of big game hiding cover that could leave deer and elk more vulnerable to predation, each project would comply with Forest Plan standards that require leaving a sufficient amount of hiding cover within each analysis area. In general, vegetation and fuels treatments create more nutritious forage for deer and elk and are considered beneficial. Increasing the amount of available forage would not likely result in a measurable increase in elk populations on the forest. However, it may influence the distribution of elk across the landscape over the next decade, which in turn, would influence the distribution of wolves.

Firewood Collection

The collection of firewood occurs across the forest, primarily adjacent to roads. Any impact to wolves from firewood collection would result from the short-term disturbance that occurs while woodcutters are actively cutting wood. Disturbance from firewood collection, when combined with the short-term disturbance associated with invasive species treatments, could cause displacement of individual wolves or packs while these activities are occurring.

Livestock Grazing

Grazing occurs across the forest within suitable wolf habitat. Although grazing does not directly impact wolves, it has the ability to influence wolf distribution and increase the potential for wolf/human conflict. Cattle have been known to displace deer and elk, causing them to use the landscape differently. Big game may use steeper slopes in the presence of livestock than they would otherwise. Wolves would alter their use of the landscape in accordance with changes in prey behavior. While this change in distribution has the potential to influence wolves' hunting success, it is unlikely to translate into a measureable change in wolf populations on the forest. Wolves may also alter their use of an area to specifically target livestock, which may lead to mortality of individual wolves or packs when lethal control is authorized. Although wolves may be killed when they consistently depredate livestock, the Oregon Department of Fish and Wildlife (ODFW) would only authorize lethal removal of wolves when doing so would not jeopardize the recovery goals set forth in the Oregon Endangered Species Act and the Oregon Wolf Plan. In addition, as a result of recent negotiations, ODFW and other parties have established criteria for lethal removal. Lethal removal would not be used until after ODFW confirms four qualifying incidents within a 6-month time period. Disturbance associated with the proposed invasive species treatments, when combined with potential impacts from grazing, may further influence distribution of wolves on the landscape in the short-term while invasive species treatments are actively occurring.

Mining

Mining occurs across the forest within suitable wolf habitat. The activities associated with mining may cause disturbance to wolves and their prey, causing them to leave the immediate vicinity of an active mining claim in the short term while mining is actively occurring.

Motorized Access /Transportation System

Driving on roads causes disturbance to wolves and can cause direct mortality to individual wolves from vehicle collisions. Most wolves would avoid roads with high rates of traffic so mortality of wolves is expected to be a rare occurrence. The reasonably foreseeable future action of regulating motorized travel to designated roads, trails, and areas, with some exceptions to accommodate camping or other permitted activities, would substantially reduce these impacts.

Recreation

The projected increases in the human population in Oregon would likely increase recreation on the National Forests. This could increase human disturbance and potential sources of mortality to wolves. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. Game hunting has the potential to impact wolves because hunting pressure influences the distribution of both wolves and their prey. In addition to the disturbance created by hunters using the same areas as wolves, the potential exists for a wolf to be mistaken as a coyote and shot, or to be intentionally poached.

Boardman to Hemingway (B2H) Transmission Line

Effects on wolves and their prey could include temporary displacement of animals from crucial seasonal habitats into less suitable habitats, behavioral disruption, and additional stress due to construction noise and activity. Impacts associated with operation and maintenance could include temporary behavioral disturbance and displacement from crucial seasonal habitats to less suitable habitats during routine inspections and maintenance activities. Prey animals could also experience modification of forage resources as a result of project construction and right-of-way vegetation maintenance, some of which may be beneficial for big game species (e.g., tree removal that results in an increase in understory grasses and forbs).

Herbicide Use

Wolves may be exposed to herbicides on other ownerships because they travel large distances. Herbicide use outside of national forests is not reported and the amount of exposure is unknown.

Within and near the forest, invasive plant treatments are likely the primary target for herbicide use on private, agricultural, utility corridors, County, State and other lands. Glyphosate is the only herbicide for which we have sufficient data to conclude that there may be a potential for cumulative (additive) doses to wildlife (see Basis for Cumulative Effects section). The potential for additive doses from other herbicides, or synergistic effects from combinations of herbicides or other pesticides, would be speculative because there is insufficient data to address these issues (see also Incomplete and Unavailable Information section).

This project would use a maximum of 16,000 lbs of glyphosate per year, on 8,000 acres across the entire forest. The most sensitive effect from glyphosate ingestion on experimental mammals is diarrhea, which occurs at 350 mg/kg. A medium sized wolf weighs about 100 lbs., or about 45 kg. A 100 lb. wolf would need to consume over 15,000 mg to experience this affect. In the exposure scenario where a canid consumes an entire days diet of directly sprayed prey (glyphosate at 2 lbs/acre), the dose received was 4.2 mg/kg, or 189 mg for a 100 lb wolf. An individual wolf would need to receive a dose almost 80 times the estimated dose from the exposure scenario to experience a toxic effect from glyphosate. Given the wide distribution of invasive plant treatments, the low amount of glyphosate in each treatment, and the extremely low likelihood that a wolf prey item would be contaminated by glyphosate, there is no indication that a cumulative dose of glyphosate is likely, and therefore no cumulative effect to wolves from herbicide use.

Effects of repeated herbicide use on the same acreage would be based on the rate of the herbicide used and its persistence in the environment. Project Design Features do not allow repeated use within a year (sulfometuron methyl – PDF H7) or two years (picloram – PDF H6), two of the most persistent herbicides among those proposed for use on the WWNF. In addition, herbicide use on treated acres would decline as target populations became smaller. Thus, there is no indication that repeated treatments on the same acreage would have cumulative effects on the wolf.

Spread of weeds

Current and future activities, as well as natural disturbances such a fire, floods, and actions by wildlife, create bare ground which can be colonized by invasive plants. These disturbances would create the need for future weed treatments, under the Early Detection/Rapid Response protocol in the EIS, and these treatments would likely overlap the ranges of wolf packs. As discussed above, there is no indication that these additional treatments, even if done with herbicides, would pose a risk to wolves. Invasive plant infestations would likely alter some habitat for wolf. There are no data suggesting that actual ranges of wolf packs are influenced by invasive plant infestations. Future invasive plant infestations could modify the distribution of wolf prey as the deer and elk seek out more palatable forage. Given the very wide range of wolf packs, there is no indication that this would limit food availability for the wolves. EDRR treatments of new infestations would prevent invasive plants from influencing prey distribution.

Aggregate Cumulative Effects to wolf

In summary, the past, present and future activities on the landscape, when added to the activities in the proposed project, can create stressors such as disturbance, changes in prey distribution, and potential herbicide exposure. The potential for these stressors to affect wolves has been discussed above and there is no indication that this would result in a cumulative effect for wolves because there is no indication of contribution to wolf mortality, reduced reproduction, altered availability of prey, or reduction in available and suitable habitat for the wolf. Project Design

Feature J-2 ensures that disturbance to wolves with pups is avoided for any activity ("treatments within 1 mile of active wolf dens would be timed to occur outside the season of occupancy (April 1 through June 30"). The use of herbicide is not expected to reach of level of concern because even additive exposures are all below an HQ = 1 (i.e. less than the No Observed Adverse Effect Level, or NOAEL). Wolves do not ingest invasive plants directly. Wolf prey does not substantially graze on invasive plants. Over 99% of wolf habitat would remain untreated. The herbicides proposed for use do not bio-accumulate. Wolves generally avoid busy, disturbed areas where most invasive plant treatment would occur. Treatment caps limit the total acres treated in any one year, whether it is an existing or new infestation. Prevention measures in the WWNF LRMP reduce the introduction, establishment and spread of invasive plants from management activities. Invasive plant treatments, particularly EDRR on new infestations, would help alleviate impacts to forage for prey animals, reducing risks to wolves from prey availability.

Painted Turtle

Many other ongoing Forest Service activities (see Table 2), as well as activities conducted by other entities within and outside of NFS land, cause ground disturbance which can create conditions favorable to invasive plants. Potentially, this disturbance could create a continual or increasing need to treat invasive plants. This additional treatment could add to the treatments already proposed in this project to create a cumulative effect. The activities described below could disturb turtles and could create a cumulative effect in combination with the disturbance created by invasive plant treatments. Treatment caps limit the amount of treatment that would be approved annually regardless of invasive species spread.

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph.. These projects, and other similar projects to be implemented in the next 10-15 years, are expected to result in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually forest-wide. These treatments typically do not occur within ponds, lakes and wetlands that provide turtle habitat, thus, little potential for invasive plant treatments to combine with effects of these projects to cause a cumulative effect on turtles.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. Disturbance from firewood collection could overlap with disturbance from invasive species treatments. This disturbance could cause turtles to temporarily change their behavior during the time the disturbance is occurring but it would be short-term and would not have any lasting effects on turtles, thus, little potential for invasive plant treatments to combine with effects of these projects to cause a cumulative effect on turtles.

Livestock Grazing

Livestock grazing occurs across the forest and does occur within painted turtle habitat. Grazing has the potential to alter painted turtle habitat either beneficially or adversely depending on the timing and intensity of the grazing. However, the proposed invasive species treatments would not impact painted turtle habitat so there would be no cumulative impact.

Motorized Access /Transportation System

Driving on roads has the potential to cause direct mortality to dispersing turtles from vehicle collisions. The reasonably foreseeable future action of regulating motorized travel to designated roads, trails, and areas, with some exceptions to accommodate camping or other permitted activities, would likely have no impact on painted turtles because motorized travel is not currently believed to be impacting painted turtles because there are currently no turtles present on the forest and vehicle collisions are expected to be a rare occurrence so there would be no cumulative effect when combined with the proposed invasive species treatments.

Recreation

The projected increases in the human population in Oregon would likely increase recreation on the National Forests. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. None of these activities have the potential to impact painted turtle habitat but could cause temporary disturbance to individuals.

Herbicide Use

Very little research has been done on the effects of herbicides to reptiles. Due to the limited and well-defined nature of painted turtle habitat on the WWNF, the turtles would not likely be exposed to herbicides other than those that may be applied within suitable habitat from the proposed action in the 2010 FEIS. There are no other past, present or reasonably foreseeable future actions that would add to herbicide exposure for painted turtle within the WWNF. The herbicides proposed for use do not bioaccumulate, so follow-up treatments would not add to previous treatments. Therefore, there are no cumulative effects from herbicide exposure to painted turtles.

Cumulative Effects – Spread of weeds

Current and future activities, as well as natural disturbances such as fire, floods, and actions by wildlife, create bare ground which can be colonized by invasive plants. These disturbances would create the need for future weed treatments, under the Early Detection/Rapid Response protocol in the EIS, and these treatments may overlap painted turtle habitat. These additional treatments, even if done with herbicides, would not pose a risk to painted turtles. Invasive plant infestations could potentially alter habitat for painted turtles. Timely and effective treatments would prevent invasive plants from significantly altering painted turtle habitat.

Aggregate Cumulative Effects to the Painted Turtle

In summary, the past, present and future activities on the landscape, when added to the activities in the proposed project, could create stressors such as disturbance and potential herbicide exposure. The potential for these stressors to affect painted turtles has been discussed above and there is no indication that this would result in a cumulative effect for painted turtles because there is no documentation they are present on the forest and there is only a small amount of suitable habitat proposed for treatment. PDFs J-4 and H-10 provide protection measures that limit potential for effects or herbicide exposure should turtles be found on the WWNF at a later date. There is no indication of contribution to painted turtle mortality, reduced reproduction, altered availability of insect prey, or reduction in available and suitable habitat for the painted turtle. Proposed treatments would result in the long-term maintenance of painted turtle habitat. Prevention measures in the WWNF LRMP reduce the introduction, establishment and spread of invasive plants from management activities. Invasive plant treatments, particularly EDRR on new infestations, would help alleviate impacts to vegetation, reducing risks to painted turtles and their insect prey. PDFs minimize potential for adverse effects from herbicide exposure and disturbance/mortality. There are no anticipated effects from herbicide, and no likely additional exposures from other sources that would contribute to a cumulative effect.

Northern Leopard Frog

Northern leopard frogs do not occur on the WWNF, so no cumulative effects from the action would occur.

Columbia Spotted Frog

Cumulative Effects

Many other ongoing Forest Service activities and reasonably foreseeable actions described in Table 2, as well as activities conducted by other entities within and outside of NFS land, cause ground disturbance which can create conditions favorable to invasive plants. Potentially, this disturbance could create a continual or increasing need to treat invasive plants. These activities are potential sources of degradation of frog habitat and mortality to Columbia spotted frog and could create a cumulative effect in combination with the effects created by invasive plant treatments. Treatment caps limit the amount of treatment that would be approved annually regardless of invasive species spread.

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph. These projects, and other similar projects to be implemented in the next 10-15 years, are expected to result in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually forest-wide. Project design features protect the breeding, foraging, and overwintering habitat of spotted frogs, but frogs are vulnerable to disturbance and mortality when migrating between those habitats. During migration, spotted frogs frequently travel 500meters and up to 2000 meters through dry, upland forest (Pilliod et al. 2002). During this time period, disturbance and/or mortality could result from operation of equipment and road reconstruction associated with logging operations and prescribed fire. However, spotted frogs spend a relatively small proportion of their life cycle out of water so mortality is expected to be a rare occurrence. It is possible that invasive species treatments could cause additional disturbance and mortality to spotted frogs but the contribution would be minor because disturbance from invasive plant treatments is short-term, limited in spatial scale, and of low intensity.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. These treatments have the potential to create disturbance and cause direct mortality to migrating juveniles and adults, but because firewood collection occurs at such a small scale and not in wetland habitats, it is not likely to impact more than a few individual frogs.

Livestock Grazing

Livestock grazing occurs across the forest and does occur within spotted frog habitat. Livestock have been observed to cause direct injury or mortality by trampling spotted frogs and eggs and to impact frog movement by defoliating and dewatering migration corridors and collapsing banks along ponds used for over wintering sites (Ross et al. 1999; Engle 2001). Livestock use of ponds has the potential to introduce sediment, increase turbidity, and introduce feces and urine, potentially decreasing survival and growth of frogs (Jofre and Karasov 1998). However, grazing has also been shown to have beneficial impacts on spotted frogs in northeastern Oregon. By reducing the density of bank vegetation, grazing can allow increased solar input and raised water temperatures, thereby benefiting egg and larval development and providing basking sites for adults (Bull 2005). Artificial livestock ponds may also serve as breeding and dispersal sites if they are maintained to a proper depth and provide shallow, vegetated shorelines. The relationship between livestock grazing and spotted frog habitat is complex, due in part to the wide variety of grazing regimes on the landscape and the various life stages of the spotted frog. Studies in northeastern Oregon have not demonstrated any adverse impacts to spotted frogs from livestock grazing (Adams et al. 2009, Bull 2005, Bull and Hayes 2000) so it is unlikely there would be any adverse effects to spotted frogs from grazing on the WWNF and thus any cumulative effect from invasive species treatments.

Mining

Many of the spotted frog breeding ponds on the forest are settling ponds located within active mining claims. Mining has had a beneficial impact on spotted frogs by creating additional breeding habitat. However, settling ponds are not always maintained as suitable breeding habitat when ponds are filled in or water is drawn down or diverted. In many cases though, district wildlife biologists work with miners to mitigate losses of spotted frog habitat by altering or maintaining settling ponds to provide suitable breeding habitat. Potential adverse impacts to spotted frogs include disturbance from operation of heavy equipment, which could alter activity patterns or distribution of frogs. Direct mortality of adult frogs could occur if they were crushed by heavy equipment and mortality of tadpoles could occur from suction dredging.

Motorized Access /Transportation System

Driving on roads has the potential to cause direct mortality to dispersing frogs. The reasonably foreseeable future action of regulating motorized travel to designated roads, trails, and areas, with some exceptions to accommodate camping or other permitted activities, would likely have little impact on spotted frogs because motorized travel is not currently believed to be impacting spotted frog populations.

Recreation

The projected increases in the human population in Oregon would likely increase recreation on the National Forests. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. None of these activities have the potential to impact spotted frog habitat but could cause temporary disturbance to individuals.

Boardman to Hemingway (B2H) Transmission Line

Effects to spotted frogs from this project are very unlikely because there are no spotted frog locations within a mile of proposed or alternative routes.

Herbicide Use

Due to the limited and well-defined nature of Columbia spotted frog habitat on the WWNF, the frogs would not likely be exposed to herbicides other than those that may be applied in suitable habitat from the proposed action in the 2010 FEIS. There are no other past, present or reasonably forseeable future actions that would add to herbicide exposure for Columbia spotted frogs within the WWNF. The herbicides proposed for use do not bioaccumulate, so follow-up treatments would not add to previous treatments. Therefore, there are no cumulative effects from herbicide exposure to Columbia spotted frogs.

Cumulative Effects – Spread of weeds

Current and future activities, as well as natural disturbances such a fire, floods, and actions by wildlife, create bare ground which can be colonized by invasive plants. These disturbances would create the need for future weed treatments, under the Early Detection/Rapid Response protocol in the EIS. Very few of these additional treatments would overlap Columbia spotted frog habitat because they target upland weeds. As discussed above, there is no indication that these additional treatments, even if done with herbicides, would pose a risk to Columbia spotted frogs.

Aggregate Cumulative Effects to the Columbia Spotted Frog

Past, present and future activities on the landscape, when added to the activities in the proposed project, could create stressors such as disturbance, trampling, and potential herbicide exposure for Columbia spotted frog. The potential for these stressors to affect spotted frogs has been discussed above and there is no indication that this would result in adverse cumulative effects for spotted frogs because invasive plant treatments do not remove suitable or occupied habitat, so they do not contribute to habitat loss. There is no occupied Columbia spotted frog habitat proposed for treatment. As a result and considering the small amount of suitable habitat proposed for treatment (105 acres) and that an existing PDF (A-1) requires that the presence of species be confirmed prior to treatment, it is unlikely that the Columbia spotted frog would occur within a treatment site. Herbicide exposure to spotted frogs is unlikely because no aquatic or emergent plants are proposed for treatment and limited dispersal habitat (105 acres) is scheduled for treatment. Due to the isolated nature of the spotted frog habitats, spotted frogs on the WWNF would only be exposed to herbicide from the planned treatments and not cumulate with herbicide applications elsewhere. The herbicides proposed for use do not bioaccumulate, so multiple treatments of sites within the WWNF would not create higher concentrations of herbicide within the amphibians. PDFs effectively reduce the potential for adverse effects from treatment and exposure to herbicides/surfactants, so cumulative exposure is very unlikely.

Gray Flycatcher

Cumulative Effects

Many other ongoing Forest Service activities and reasonably foreseeable actions (described in Table 2), as well as activities conducted by other entities within and outside of NFS land, cause ground disturbance which can create conditions favorable to invasive plants. Potentially, this disturbance could create a continual or increasing need to treat invasive plants. These activities are potential sources of disturbance to Gray Flycatchers and could create a cumulative effect in combination with the disturbance created by invasive plant treatments. Treatment caps limit the amount of treatment that would be approved annually regardless of invasive species spread.

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph. These projects, and other similar projects to be implemented in the next 10-15 years, are expected toresult in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually forest-wide. These treatments primarily occur in forested habitat where Gray Flycatchers are not present so there would be no impact to Gray Flycatchers.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. These treatments primarily occur in forested habitat where Gray Flycatchers are not present so there would be no impacts.

Livestock Grazing

Livestock grazing occurs across the forest and could occur within Gray Flycatcher habitat. Grazing has the potential to impact Gray Flycatchers by altering the sagebrush plant community they depend on and has the ability to influence the habitat of insects they prey on.

Mining

Mining occurs across the forest and could occur within Gray Flycatcher habitat. The activities associated with mining could cause disturbance to Gray Flycatchers, causing them to leave the immediate vicinity of an active mining claim in the short term while mining is actively occurring. Mining could impact individual plants that the Flycatcher's insect prey depends on but it would occur at such a small scale that there would be no impact to Gray Flycatcher populations.

Motorized Access /Transportation System

Driving on roads has the potential to cause direct mortality to individual birds from vehicle collisions. The reasonably foreseeable future action of regulating motorized travel to designated roads, trails, and areas, with some exceptions to accommodate camping or other permitted activities, would likely have no impact on Gray Flycatchers because motorized travel is not currently believed to be impacting Gray Flycatcher populations.

Recreation

The projected increases in the human population in Oregon would likely increase recreation on the National Forests. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. None of these activities have the potential to impact foraging or roosting habitat of Gray Flycatchers but could cause temporary disturbance to individuals.

Boardman to Hemingway (B2H) Transmission Line

Migratory birds could experience modification of foraging and nesting habitat due to construction of access roads, tower structures, and maintenance. Mortality of birds could occur due to collisions with the transmission line or towers. Birds may abandon nests during breeding season as a result of increased stress from human presence and construction activities. Construction of tall structures that could be used by raptors for perching or nesting in habitats where perches are otherwise limited could increase raptor hunting success and predation on Gray Flycatchers.

Herbicide Use

Gray flycatchers may be exposed to herbicides on other ownerships because they travel large distances. Herbicide use outside of National Forests is not reported and the amount of exposure is unknown. Within and near the forest, invasive plant treatments are likely the primary target for herbicide use on private, agricultural, utility corridors, County, State and other lands. Glyphosate is the only herbicide for which we have sufficient data to conclude that there may be a potential for cumulative (additive) doses to wildlife (see Basis for Cumulative Effects section). The potential for additive doses from other herbicides, or synergistic effects from combinations of herbicides or other pesticides, would be speculative because there is insufficient data to address these issues (see also Incomplete and Unavailable Information section, Chapter 3 in FEIS, and Appendix P of the R6 2005 FEIS).

For glyphosate, acute dietary exposures up to 5000 mg/kg did not result in toxic effects to birds. Estimated acute exposure from one day's worth of ingesting contaminated insects was 810 mg/kg at the highest application rate – well below the highest doses tested. Since this dose estimates an entire day's worth of food, there is no cumulative effect from foraging on other lands where glyphosate may have been used. That is, a gray flycatcher is unlikely to ingest substantially more food in one day, so regardless of where contaminated insects may be encountered; there is no indication of cumulative acute risk to birds.

There is no data available on long-term residues of herbicides on insects, so risk of chronic exposure to contaminated insects cannot be quantitatively evaluated. However, it appears unlikely for their prey to be contaminated. This project would target only invasive plants for herbicide treatments and there is no indication that insect prey of gray flycatchers is found on invasive plants.

Spread of weeds

Current and future activities, as well as natural disturbances such as fire, floods, and actions by wildlife, create bare ground which can be colonized by invasive plants. These disturbances would create the need for future weed treatments, under the Early Detection/Rapid Response protocol in the EIS, and these treatments would likely overlap the ranges of Gray Flycatchers. As discussed above, there is no indication that these additional treatments, even if done with herbicides, would pose a risk to Gray Flycatchers. Invasive plant infestations could potentially alter habitat for Gray Flycatchers. EDRR treatments of new infestations would prevent invasive plants from significantly influencing insect prey distribution.

Aggregate Cumulative Effects to the Gray Flycatcher

In summary, the past, present and future activities on the landscape, when added to the activities in the proposed project, could create stressors such as disturbance, a shift in insect prey distribution, and potential herbicide exposure. The potential for these stressors to affect Gray Flycatchers has been discussed above and there is no indication that this would result in a cumulative effect for Gray Flycatchers because there is no indication of contribution to Gray Flycatcher mortality, reduced reproduction, altered availability of insect prey, or reduction in available and suitable habitat for the Gray Flycatcher. Proposed treatments would result in the long-term maintenance of gray flycatcher habitat. Over 98 percent of suitable gray flycatcher habitat would be unaffected by treatment and the possibility that a bird would occur within a treatment unit is low. Gray Flycatchers do not ingest invasive plants directly. There is no indication that gray flycatchers utilize insects from invasive plants, so it is unlikely that the project would contaminate their prey. Use of herbicide is not expected to reach a level of concern because even additive exposures are all below an HQ = 1 (i.e. less than the NOAEL). Aerial broadcast application of herbicides would occur largely in areas with larger invasive plant infestations, which would less likely be selected for nesting or foraging habitat (gray flycatchers use shrubs and trees). The herbicides proposed for use do not bioaccumulate and treatment caps limit the total acres treated in any one year, whether it is an existing or new infestation.

Prevention measures in the WWNF LRMP reduce the introduction, establishment and spread of invasive plants from management activities. Invasive plant treatments, particularly EDRR on new infestations, would help alleviate impacts to vegetation, reducing risks to Gray Flycatchers and their insect prey.

Sharp-tailed Grouse

Cumulative Effects

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph. These projects, and other similar projects to be implemented over the next 10-15 years, are expected toresult in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually forest-wide. These treatments primarily occur in forested habitat where Sharp-tailed Grouse are not present and so there would be no cumulative impacts to Sharp-tailed Grouse under any of the alternatives.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. Firewood collection occurs in forested habitat where Sharp-tailed Grouse are usually not present and so there would be no cumulative impacts to Sharp-tailed Grouse under any of the alternatives.

Livestock Grazing

Livestock grazing occurs across the forest and within Sharp-tailed Grouse habitat. Grazing has the potential to impact Sharp-tailed Grouse populations by altering the plant community they depend upon. Fences associated with livestock grazing can cause direct mortality when Sharp-tailed Grouse collide with fences. However, livestock grazing according to Forest Plan standards ensures that suitable habitat remains for Sharp-tailed Grouse and so there would be no additive effect when combined with any changes in the plant community that result from the proposed invasive species treatments. Invasive plants threaten the native plant communities on which Sharp-tailed Grouse depend so impacts from the proposed treatments would generally be beneficial. There may be some displacement of individuals or groups of Sharp-tailed Grouse in the short-term while invasive species treatments are actively occurring but this disturbance would not lead to a trend toward federal listing for Sharp-tailed Grouse under any of the alternatives.

Mining

Mining does not occur within suitable Sharp-tailed Grouse habitat so there would be no cumulative effects.

Motorized Access – Transportation System

Motor vehicle traffic causes disturbance and can cause direct mortality to Sharp-tailed Grouses from vehicle collisions. Most Sharp-tailed Grouse would avoid roads with high rates of traffic so mortality of Sharp-tailed Grouse is expected to be a rare occurrence. When combined with the impacts from roads and any associated travel management, the disturbance created from the proposed invasive species treatments would not lead to a trend toward federal listing for Sharp-tailed Grouse under any of the alternatives.

Recreation

The projected increases in the human population in Oregon would likely increase recreation on the National Forests. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. This could increase human presence in sharp-tailed grouse habitat and potential disturbance. The proposed project would contribute very low levels of human activity in addition to other general activities and human presence in potential habitat. This is not expected to result in impacts to sharp-tailed grouse reproductive success or behavior because the disturbances are short-term, very limited in spatial scale, and low intensity so there would be no cumulative effects to sharp-tailed grouse.

Herbicides

Greater sharp-tailed grouse are not known to occur on the WWNF, and the potential for their future occurrence is considered low because suitable habitat is limited and scattered, making occupancy unlikely. Also, the project contains PDFs which would minimize disturbance and exposures to herbicides. Therefore, there are no cumulative effects from herbicide exposures to greater sharp-tailed grouse.

Aggregate Cumulative Effects to Sharp-Tailed Grouse

In summary, the past, present and future activities on the landscape, when added to the activities in the proposed project, create stressors such as disturbance, changes to vegetation, and potential herbicide exposure. The potential for these stressors to affect sharp-tailed grouse has been discussed above and there is no indication that this would result in a cumulative effect for sharp-tailed grouse because the control of invasive plants does not add to potential vegetation changes from vegetation management, prescribed fire, and grazing because invasive plant control does not remove habitat components (e.g. food, cover) required by sharp-tailed grouse. The control of invasive plants does add to general human presence on the landscape from recreation or other projects, but is not expected to result in adverse cumulative effects because invasive plant treatments in sharp-tailed grouse habitat are very limited in spatial area, duration and intensity, and sharp-tailed grouse are currently not present on the forest. Sharp-tailed grouse are unlikely to be exposed to herbicides from this project and from herbicide use on other lands because they do not migrate or move large distances in a day and invasive plant treatments in sharp-tailed grouse habitat are very limited in spatial area.

Greater Sage Grouse

Cumulative Effects

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph. These projects, and other similar projects to be implemented in the next 10-15 years, are expected toresult in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually forest-wide. These treatments primarily occur in forested habitat where Sage Grouse are not present and so there would be no cumulative impacts to Sage Grouse under any of the alternatives.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. Firewood collection occurs in forested habitat where Sage Grouse are usually not present and so there would be no cumulative impacts to Sage Grouse under any of the alternatives.

Livestock Grazing

Livestock grazing occurs across the forest and within Sage Grouse habitat. Grazing has the potential to impact Sage Grouse populations by altering the sagebrush plant community they depend upon. Fences associated with livestock grazing can cause direct mortality when Sage Grouse collide with fences. However, livestock grazing according to Forest Plan standards ensures that suitable sagebrush habitat remains for Sage Grouse and so there would be no additive effect when combined with any changes in the plant community that result from the proposed invasive species treatments. Invasive plants threaten the native plant communities on which Sage Grouse depend so impacts from the proposed treatments would generally be beneficial. There may be some displacement of individuals or groups of Sage Grouse in the short-term while invasive species treatments are actively occurring but this disturbance would not lead to a trend toward federal listing for Sage Grouse under any of the alternatives.

Mining

Mining occurs across the forest and could occur within suitable Sage Grouse habitat. Mining could remove some habitat for Sage Grouse but on such a small scale that it would not impact individuals or populations and so there would be no cumulative effect when combined with the changes in the plant community resulting from invasive species treatments. The activities associated with mining may cause disturbance to Sage Grouse, causing them to leave the immediate vicinity of an active mining claim in the short term while mining is actively occurring. This disturbance, when combined with the disturbance created from the proposed invasive species treatments, may temporarily displace Sage Grouse but would not lead to a trend toward federal listing under any of the alternatives.

Motorized Access – Transportation System

Motor vehicle traffic causes disturbance and can cause direct mortality to Sage Grouses from vehicle collisions. Most Sage Grouse would avoid roads with high rates of traffic so mortality of Sage Grouse is expected to be a rare occurrence. When combined with the impacts from roads and any associated travel management, the disturbance created from the proposed invasive species treatments would not lead to a trend toward federal listing for Sage Grouse under any of the alternatives.

Recreation

The projected increases in the human population in Oregon would likely increase recreation on the National Forests. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. This could increase human presence in sage grouse habitat and potential disturbance. The proposed project would contribute very low levels of human activity in addition to other general activities and human presence in potential habitat. This is not expected to result in impacts to sage grouse reproductive success or behavior because the disturbances are short-term, very limited in spatial scale (6 acres for invasive plant treatments), low intensity, and potential impacts are avoided due to PDF J-5.

Herbicides

Greater sage grouse are not known to occur on the WWNF, and the potential for their future occurrence is considered low because suitable habitat is limited and scattered, making occupancy unlikely. Potential treatments in the suitable habitat are limited to about 6 acres, and the project contains PDFs which would minimize disturbance and exposures to herbicides. Therefore, there are no cumulative effects from herbicide exposures to greater sage grouse.

Aggregate Cumulative Effects to Sage Grouse

In summary, the past, present and future activities on the landscape, when added to the activities in the proposed project, create stressors such as disturbance, changes to vegetation, and potential herbicide exposure. The potential for these stressors to affect greater sage grouse has been discussed above and there is no indication that this would result in a cumulative effect for sage grouse because the control of invasive plants does not add to potential vegetation changes from vegetation management, prescribed fire, and grazing because invasive plant control does not remove habitat components (e.g. food, cover) required by sage grouse. The control of invasive plants does add to general human presence on the landscape from recreation or other projects, but is not expected to result in adverse cumulative effects because invasive plant treatments in sage grouse habitat are very limited in spatial area, duration and intensity, and PDF J-5 limits disturbance to breeding birds or habitats. Sage grouse are unlikely to be exposed to herbicides from this project and from herbicide use on other lands because they do not migrate or move large distances in a day and invasive plant treatments in sage grouse habitat are very limited in spatial area.

American Peregrine Falcon

Cumulative Effects

Many other ongoing Forest Service activities and reasonably foreseeable actions (described in Table 2) , as well as activities conducted by other entities within and outside of NFS land, cause ground disturbance which can create conditions favorable to invasive plants. Potentially, this disturbance could create a continual or increasing need to treat invasive plants. However, prevention standards that apply to NFS lands would minimize invasive plant spread. Treatment caps limit the amount of treatment that would be approved regardless of invasive plant spread. This project could add to the amount of habitat or individual birds that may be disturbed by human activities as described categorically by type of work below.

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph. These projects, and other similar projects to be implemented in the next 10-15 years, are expected to result in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually forest-wide. Prescribed fire and vegetation management, including both commercial and non-commercial thinning would not impact peregrine falcon nesting habitat because these projects avoid cliff faces where these raptors nest. However, silviculture and burning treatments do have the capability to impact peregrine foraging habitat. When more forest openings are created there may be an increase in peregrine foraging habitat and hunting success. In addition, bird species that peregrine falcons prey on may respond positively to vegetation treatments. It is less likely that bird species that peregrine falcon prey on would respond negatively to vegetation treatments because peregrine falcons do not generally prey on species that require a dense forest canopy, due to the increased difficulty of hunting in dense forest. Any of the vegetation management projects that have the potential to disturb Peregrine Falcons would be mitigated by operation restrictions during nesting season (WWNF Forest Plan Standard p. 4-46). The proposed project may improve habitat for prey of peregrine falcon and potentially compliment beneficial changes in hunting habitat from vegetation management or prescribed fire projects.

Firewood Collection

Firewood collection does not affect Peregrine Falcons because it does not occur near the cliffs on which peregrine falcons nest, nor impact their hunting habitat or prey availability. Because there are no effects to peregrine falcons from firewood cutting, there would be no cumulative effects when combined with this project.

Livestock Grazing

Livestock grazing occurs across the forest within suitable peregrine foraging habitat. Grazing does not directly impact peregrine falcons and grazing management plans consider habitat needs of migratory birds, so impacts to Peregrine prey populations are unlikely. Because there would be no impacts to Peregrines from grazing, there would be no cumulative effects when combined with this project.

Mining

Mining occurs across the forest within suitable peregrine falcon foraging habitat. The activities associated with mining may cause temporary disturbance to peregrine falcons, causing them to avoid hunting in the immediate vicinity of an active mining claim in the short term while mining is actively occurring. The cumulative impact could result in additive temporary disturbance to foraging Peregrines. However, the contribution of invasive plant treatments would be minor, especially considering the PDF J-3 and because disturbance from invasive plant treatments is short-term (a few days per peregrine territory), limited in spatial scale (no treatments within 1.5 miles of nest sites), and of low intensity. Mining has no effect on nesting peregrines because Forest Plan standards protect all raptor nests sites in use.

Motorized Access /Transportation System

Driving on roads could cause direct mortality to individual peregrine falcons if a vehicle collision were to occur. Most peregrine falcons would avoid roads so collisions are expected to be a rare occurrence. The proposed project does not create a risk of mortality to peregrine falcons, so there would be no cumulative effect from motorized access or the transportations system.

Recreation

The projected increases in the human population in Oregon would likely increase recreation on the National Forests. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. This could increase human presence in habitat used by peregrine falcons. However, peregrine falcons become accustomed to various levels of activity within their habitat, as evidenced by their residence and nesting in large urban areas. The density of human presence and activity within the WWNF is extremely low compared to other areas inhabited by peregrine falcons (e.g. Portland, OR). The proposed project would contribute very low levels of human activity in addition to other general activities and human presence in hunting habitat, but is not expected to result in a substantial change in peregrine falcon hunting or reproductive success because disturbance is short-term, very limited in spatial scale, and avoids impacts to nesting due to PDF J-3.

Boardman to Hemingway (B2H) Transmission Line

Peregrine falcon foraging habitat is known to occur within the proposed powerline right-of-way. The project would remove vegetation along the right-of-way, potentially causing a shift in peregrine hunting patterns and prey distribution. Vegetation removal and other activities associated with the transmission line would not impact peregrines or their prey species at the population level because the scale of activities is small relative to the amount of suitable peregrine foraging habitat on the forest, and peregrines are generalist predators utilizing several species of birds. Construction of the transmission line could cause disturbance, causing peregrines to forage elsewhere during construction. Invasive plant treatments could add to this, but are very minor in comparison. Invasive plant treatments are not expected to contribute to a significant cumulative effect because the treatments are short in duration (days) compared to the relatively long construction timeframe, limited in extent (none within 1.5 miles of known nests), and low intensity. Because the transmission line would not adversely impact peregrine falcons, there would be no cumulative effect when combined with this project.

Herbicide Use

Peregrine falcons may be exposed, via their prey, to herbicides and other pesticides used on other ownerships because they and their prey travel large distances. Herbicide use outside of National Forests is unpredictable so the amount of exposure is unknown. Within and near the forest, invasive plant treatments are likely the primary target for herbicide use on private, agricultural, utility corridors, County, State and other lands. Based on 2007 and 2008 statewide pesticide use reports glyphosate is the only herbicide for which we have sufficient data to conclude that there may be a potential for cumulative (additive) doses to wildlife (see Basis for Cumulative Effects section). The potential for additive doses from other herbicides, or synergistic effects from combinations of herbicides or other pesticides, would be speculative because there is insufficient data to address these issues (see also Incomplete and Unavailable Information section).

Glyphosate did not produce a toxic effect to birds at the highest doses tested for acute exposures. Estimated dose from one day's diet of contaminated prey was 0.01 mg/kg, while the NOAEL for birds is 540 mg/kg (SERA 2011). Thus, even if exposure to contaminated prey as a result of glyphosate use on other lands occurred, toxic effects would be highly unlikely because peregrine falcons could not consume enough prey in one day to receive an acute toxic dose.

Chronic or cumulative doses to a predatory bird cannot be quantified but doses exceeding a level of concern are also unlikely because the proposed herbicides do not bioaccumulate and are rapidly excreted.

Peregrine falcons could be exposed to herbicides, via their prey, from other uses outside of the WWNF, but using glyphosate as an indicator, additive or cumulative doses are unlikely to cause an effect. Also, the proposed invasive plant treatments are of short duration (a few days), limited in spatial scale, and low intensity, minimizing the likelihood that their prey could be contaminated from the project.

Spread of invasive plants

Current and future activities, as well as natural disturbances such a fire, floods, and actions by wildlife, create bare ground which can be colonized by invasive plants. These disturbances would create the need for future weed treatments, under the Early Detection/Rapid Response protocol in the EIS, and these treatments would likely overlap the ranges of peregrine falcons. As discussed above, there is no indication that these additional treatments, even if done with herbicides, would pose a risk to peregrine falcons. Invasive plant infestations would likely alter some foraging habitat for peregrine falcons. Future invasive plant infestations could modify the distribution of peregrine falcons as their prey seeks out more palatable forage. Given the wide range of foraging peregrine falcons, there is no indication that this would limit food availability. EDRR treatments of new infestations would prevent invasive plants from influencing prey distribution.

Aggregate Cumulative Effects to the Peregrine Falcon

In summary, the past, present and future activities on the landscape, when added to the activities in the proposed project, could create stressors such as disturbance to foraging peregrines, a shift in prey distribution from vegetation changes, and potential herbicide exposure. The potential for these stressors to affect peregrine falcons has been discussed above and there is no indication that this would result in a cumulative effect for peregrine falcons because other projects and activities within the WWNF follow the same guidelines with respect to seasonal and spatial restrictions within nest zones, so the proposed project is not expected to add to disturbance to nesting peregrines from vegetation management, prescribed fire projects, the B2H Transmission line or other projects. The low intensity of activity associated with the project, the widely dispersed treatment sites, and adherence to PDF J-3 would ensure that project activity does not add appreciably to general human activity and potential disturbance as a result of dispersed recreation. Potential vegetation changes from vegetation management, prescribed fire, grazing, and the B2H Transmission when added to control of invasive plants from the proposed project could be beneficial to prey species, and open up additional hunting habitat.

Cumulative or additive exposures to herbicides from the project combined with potential exposures to their prey from uses outside of the WWNF are not expected to cause a cumulative effect because peregrines could not eat enough contaminated prey in one day to reach a toxic dose (e.g. all exposures are well below the NOAEL). Proposed herbicides are rapidly excreted and do not bioaccumulate, so cumulative exposures are unlikely. Less than 1% of peregrine falcon habitat would contain invasive plant treatments, reducing the likelihood that their prey would be exposed. Treatment caps limit the amount of invasive plant treatment in any given year, so spread of invasive plants from other ground-disturbing activities would not result in a greater percentage of peregrine falcon habitat being treated. Prevention measures required of all projects on the WWNF reduce the introduction, establishment and spread of invasive plants from other management activities, also limiting the percentage of peregrine falcon habitat that would be treated.

Bald Eagle

Contributions to potential cumulative effects

Many other ongoing Forest Service activities and reasonably foreseeable actions (described in Table 2) , as well as activities conducted by other entities within and outside of NFS land, cause ground disturbance which can create conditions favorable to invasive plants. Potentially, this disturbance could create a continual or increasing need to treat invasive plants. These activities are potential sources of disturbance to bald eagles and could create a cumulative effect in combination with the disturbance created by invasive plant treatments. Treatment caps limit the amount of treatment that would be approved annually regardless of invasive species spread.

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph. These projects, and other similar projects to be implemented over the next 10-15 years, are expected toresult in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually forest-wide. Prescribed fire and vegetation management, including both commercial and non-commercial thinning would not impact bald eagle nesting habitat because these projects avoid conducting activities near nesting eagles and do not remove nest trees, per Forest Plan direction.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. Any impact to bald eagles from firewood collection would result from the short-term disturbance that occurs while woodcutters are actively cutting wood.

Livestock Grazing

Livestock grazing occurs across the forest but grazing activities are not a source of disturbance to bald eagles.

Mining

Mining occurs across the forest but not within suitable bald eagle nesting habitat. The activities associated with mining may cause temporary disturbance to bald eagles foraging in the area, causing them to leave the immediate vicinity of an active mining claim in the short term while mining is actively occurring.

Motorized Access /Transportation System

Driving on roads can cause some disturbance, but bald eagles are known to become habituated to normal traffic patterns. Infrequent use of some roads could temporarily disturb a nesting eagle, but is not expected to cause harm due to the very short duration of the disturbance. Vehicle collisions could cause direct mortality to individual bald eagles if a vehicle collision were to occur.

Recreation

The projected increases in the human population in Oregon would likely increase recreation on the National Forests. This could increase human disturbance to bald eagles. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping.

Herbicide Use

Bald eagles may be exposed to herbicides on other ownerships because they travel large distances. Herbicide use outside of National Forests is not reported and the amount of exposure is unknown. Within and near the forest, invasive plant treatments are likely the primary target for herbicide use on private, agricultural, utility corridors, County, State and other lands. Glyphosate is the only herbicide for which we have sufficient data to conclude that there may be a potential for cumulative (additive) doses to wildlife (see Basis for Cumulative Effects section). We do not have sufficient data to address how a bald eagle might be affected if they already had a body burden of some chemicals and were then exposed to herbicides from this project. Therefore, the potential for additive doses from other herbicides, or synergistic effects from combinations of herbicides or other pesticides, would be speculative because there is insufficient data to address these issues (see also Incomplete and Unavailable Information section).

Since glyphosate is so widely used, it is used as an indication of potential cumulative effects of herbicide exposure. Glyphosate did not produce a toxic effect to birds at the highest doses tested for acute exposures. Estimated dose from one day's diet of contaminated fish was 0.000002 mg/kg, while the NOAEL for birds is 540 mg/kg (SERA 2011). Exposure to possible contaminated prey as a result of glyphosate use on other lands could occur, but any toxic effects are highly unlikely. Bald eagles could not consume enough prey in one day to receive a toxic dose, regardless of how many different land ownerships on which they might have foraged.

Estimates of chronic doses to fish-eating birds resulted in extremely low values (e.g. 0.0000005 mg/kg for the glyphosate). The chronic NOAEL for birds from glyphosate is 43 mg/kg. It is not possible for the herbicide use in this project to add to potential other sources of herbicide exposure and cause a cumulative effect (SERA 2011).

Spread of weeds

Current and future activities, as well as natural disturbances such a fire, floods, and actions by wildlife, create bare ground which can be colonized by invasive plants. These disturbances would create the need for future weed treatments, under the Early Detection/Rapid Response protocol in the EIS, and these treatments would likely overlap the ranges of bald eagles. Because treatments of new infestations are subject to the same annual treatment cap and PDFs (e.g. PDF J-1a&b), there is no indication that these additional treatments, even if done with herbicides, would pose a cumulative risk to bald eagles.

Aggregate Cumulative Effect to Bald Eagles

In summary, the past, present and future activities on the landscape, when added to the activities in the proposed project, create stressors such as disturbance and potential herbicide exposure. The potential for these stressors to affect bald eagles has been discussed above and there is no indication that this would result in a cumulative effect for bald eagles because there is no indication of contribution to bald eagle mortality, reduced reproduction, altered availability of prey, or reduction in available and suitable habitat. PDFs J-1a & J-1b would ensure that treatments would not occur near any nesting eagles and no harmful disturbance would occur. Use of herbicide is not expected to reach of level of concern because even additive exposures would be well below an HQ = 1 (i.e. less than the NOAEL). Bald eagles are unlikely to be exposed to herbicides from this project. Over 99% of Peregrine habitat would remain untreated. The herbicides proposed for use do not bioaccumulate and so are unlikely to add to exposure to other chemicals from other sources. Treatment caps limit the total acres treated in any one year, whether it is an existing or new infestation. Prevention measures in the WWNF LRMP reduce the introduction, establishment and spread of invasive plants from management activities.

Spotted Bat

Cumulative Effects

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph. These projects, and other similar projects to be implemented in the next 10-15 years, are expected toresult in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually forest-wide. However, there would be no measurable impact to spotted bats from elimination of roosting habitat because they primarily roost in cottonwoods and rock crevices, neither of which is impacted by vegetation and fuels treatments. Therefore, there would be no cumulative effect to spotted bats from vegetation and fuels treatments when combined with proposed invasive species treatments.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. Any impact to spotted bats from firewood collection would result from removing a roost tree. Because spotted bats primarily roost in cottonwoods and rock crevices, there would be no measurable impact to spotted bats from elimination of roosting habitat and therefore no cumulative impact to spotted bats from the proposed invasive species treatments.

Livestock Grazing

Livestock grazing occurs across the forest and could occur within spotted bat habitat. Although grazing does not directly impact spotted bats, it has the ability to influence the habitat of the moths they prey on. However, it is unlikely there would be a cumulative effect from the proposed invasive species treatments because most invasive plant species are not that palatable to cattle.

Mining

Mining occurs across the forest and could occur within spotted bat habitat. The activities associated with mining could cause disturbance to roosting spotted bats, causing them to leave the immediate vicinity of an active mining claim in the short term while mining is actively occurring. However, spotted bats typically roost in cottonwoods and rock crevices rather than mines like some other species of bats. Furthermore, there would be no disturbance to roosting or foraging spotted bats from proposed invasive species treatments so there would be no cumulative impact to spotted bats.

Motorized Access – Transportation System

Driving on roads has the potential to cause direct mortality to individual bats from vehicle collisions. However, this is expected to be an extremely rare occurrence because rates of traffic on forest roads are typically low at night when bats are active and spotted bats tend to forage at higher elevations than other bats, typically at or above tree height. The reasonably foreseeable future action of regulating motorized travel to designated roads, trails, and areas, with some exceptions to accommodate camping or other permitted activities, would likely have no impact on spotted bats because motorized travel is not currently believed to be impacting spotted bat populations. Because there are no predicted impacts to spotted bats from roads and any travel management other than the remote possibility of a vehicle collision with an individual bat, the proposed invasive species treatments would not have a cumulative effect on the spotted bat.

Recreation

The projected increases in the human population in Oregon would likely increase recreation on the National Forests. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. None of these activities typically occur at night so impacts to foraging spotted bats would be nonexistent. Because there would be no impact to spotted bats from recreation, there would be no cumulative effect from proposed invasive species treatments.

Herbicides

Spotted bats show fidelity to foraging areas and have been documented using the same foraging area and access routes night after night (Wai-Ping 1989). This foraging behavior, coupled with the unlikely contamination of prey items, and because spotted bats have not been documented on the forest, make it implausible for spotted bats to receive cumulative doses of herbicide from the proposed treatments.

Spread of weeds

Current and future activities, as well as natural disturbances such a fire, floods, and actions by wildlife, create bare ground which can be colonized by invasive plants. These disturbances would create the need for future weed treatments, under the Early Detection/Rapid Response protocol in the EIS, and these treatments could overlap spotted bat habitat. As discussed above, there is no indication that these additional treatments, even if done with herbicides, would pose a risk to spotted bats. EDRR treatments of new infestations would help prevent invasive plants from adversely influencing spotted bat habitat.

Aggregate Cumulative Effects to Spotted Bats

In summary, the past, present and future activities on the landscape, when added to the activities in the proposed project, create stressors such as changes to vegetation and potential herbicide exposure. The potential for these stressors to affect spotted bats has been discussed above and there is no indication that this would result in a cumulative effect to spotted bats because the spotted bat does not currently occur on the Forest and any future occurrence would involve very low numbers. Less than 1 percent of suitable spotted bat habitat on the forest would be treated and it is unlikely that they would occur within a treatment area. There are no disturbance/mortality related effects to roosting or foraging bats anticipated. With implementation of PDFs and considering this species foraging behavior, spotted bats would not be exposed to levels of herbicide that would result in adverse (exceeded the reported NOAEL) effects. Cumulative exposures to herbicides from the proposed action are not plausible because of their limited foraging range and the unlikely contamination of prey items.

Bighorn Sheep

Cumulative Effects

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph. These projects, and other similar projects to be implemented in the next 10-15 years, are expected toresult in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually forest-wide. These treatments primarily occur in forested habitat where bighorn sheep are not present and so there would be no cumulative impacts to bighorn sheep.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. Firewood collection occurs in forested habitat where bighorn sheep are not present and so there would be no cumulative impacts to bighorn sheep.

Livestock Grazing

Livestock grazing occurs across the forest and within bighorn sheep habitat. Grazing has the potential to impact bighorn sheep populations through the direct competition for forage as well as disease transmission between domestic sheep and bighorns. Livestock grazing according to Forest Plan standards would ensure that adequate forage remains for bighorn sheep. Invasive plants threaten the native plant communities on which bighorn sheep depend so impacts from the proposed treatments would be beneficial to forage availability. Invasive plant treatments do not add to the risk of disease transfer between domestic livestock and bighorn sheep, nor do they add to competition for forage, therefore invasive plant treatments do not create an adverse cumulative effect to bighorn sheep when combined with livestock grazing.

Mining

Mining occurs across the forest within suitable bighorn sheep habitat. Mining could remove some forage for bighorn sheep but on such a small scale that it does not impact individuals or populations. Invasive plant treatments do not remove suitable forage or habitat. The activities associated with mining may cause disturbance to bighorn sheep, causing them to leave the immediate vicinity of an active mining claim in the short term while mining is actively occurring. This disturbance, when combined with the disturbance created from the proposed invasive species treatments, could cumulatively add to total disturbance experienced by the bighorn sheep. However, this cumulative effect is not expected to be significant because invasive plant treatments are of short duration (a few days), limited in spatial scale (less than 1% of bighorn sheep habitat), and low intensity.

Motorized Access – Transportation System

Driving on roads causes disturbance to bighorn sheep and can cause direct mortality to bighorns from vehicle collisions. Most bighorn sheep would avoid roads with high rates of traffic so mortality of bighorns is expected to be a rare occurrence. The reasonably foreseeable future action of regulating motorized travel to designated roads, trails, and areas, with some exceptions to accommodate camping or other permitted activities, would reduce these impacts. Invasive plant treatments would not add to mortality risk from the presence of roads. Invasive plant treatments could cumulatively add to the disturbance to bighorn sheep from roads, but approximately 24 percent (623 acres) of the bighorn sheep habitat with invasive plants is adjacent to roads and trails, where they would be fairly accustomed to human disturbance and noise. The cumulative effect of disturbance is not expected to be significant because invasive plant treatments are of short duration (a few days), limited in spatial scale (less than 1% of bighorn sheep habitat), and low intensity.

Recreation

The projected increases in the human population in Oregon would likely increase recreation on the National Forests. This could increase human disturbance and potential sources of mortality to bighorn sheep. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. Game hunting has the potential to impact bighorns due to the disturbance created by hunters using the same areas as bighorn sheep. There may be some displacement of individuals or groups of bighorn sheep while invasive species treatments are actively occurring and cumulatively add to the disturbance caused by the presence of people. However, cumulative effect of disturbance is not expected to be significant because invasive plant treatments are of short duration (a few days), limited in spatial scale (less than 1% of bighorn sheep habitat), and low intensity.

Herbicides

Bighorn sheep may be exposed to herbicides on other ownerships because they travel large distances. Herbicide use outside of National Forests is not reported and the amount of exposure is unknown. Within and near the forest, invasive plant treatments are likely the primary target for herbicide use on private, agricultural, utility corridors, County, State and other lands. Glyphosate is the only herbicide for which we have sufficient data to conclude that there may be a potential for cumulative (additive) doses to wildlife (see Basis for Cumulative Effects section). The potential for additive doses from other herbicides, or synergistic effects from combinations of herbicides or other pesticides, would be speculative because there is insufficient data to address these issues (see also Incomplete and Unavailable Information section).

This project would use a maximum of 16,000 lbs of glyphosate per year, on 8,000 acres across the entire forest. The most sensitive effect from glyphosate ingestion on experimental mammals is diarrhea, which occurs at 350 mg/kg. Males weigh 125-300 pounds (56-135 kg); females weigh 75-200 pounds (34-90 kg). Assuming a conservative 154 lb. (70 kg) sheep (smaller animals eat more food/day), the animal would need to consume over 24,500 mg to experience this affect. In the exposure scenario where a large mammal consumes an entire days diet of directly sprayed grass (glyphosate at 2 lbs/acre), the dose received was 37 mg/kg, or 2,590 mg for a 154 lb bighorn. An individual bighorn would need to receive a dose almost 10 times the estimated dose from the exposure scenario to experience a toxic effect from glyphosate. In an acute exposure scenario, the bighorn would have to eat 10 times more than they normally do in one day to receive a toxic dose.

Given the very small percentage of bighorn habitat infested by invasive plants (about 1 percent), the scattered nature of the infestations, the very high amount of sprayed forage that a bighorn would need to eat to receive a toxic effect, and because bighorn sheep do not graze substantially on invasive plants, there is no cumulative effect to bighorn sheep from herbicide use.

Spread of weeds

Weeds are present and spreading on other ownerships. Currently about 600 acres of bighorn sheep habitat on the WWNF is infested with yellow starthistle, which is not edible by bighorn sheep, reducing forage availability. Yellow starthistle is spreading on other ownerships as well. Treating the starthistle in the proposed project would provide a benefit to bighorn sheep habitat, which could alleviate to some extent, losses of habitat on other ownerships, or combine with improvements on other ownerships if those infestations are treated.

Aggregate Cumulative Effects to Bighorn Sheep

There are no significant cumulative effects to bighorn sheep from the proposed project because disturbance from invasive plant treatments may add to disturbance caused by mining, recreation, and roads, but is not a significant cumulative effect because the invasive plant treatments are very limited in scope, scale and duration. There is no indication of contribution to bighorn sheep mortality, reduced reproduction, reduction in available forage, or reduction in available and suitable habitat for the bighorn sheep. Invasive plant treatments provide a positive benefit to forage availability, which may offset somewhat the declines in forage due to mining or livestock grazing and are therefore not cumulative with mining and grazing. Herbicide exposure from proposed invasive plant treatments could cumulatively add to exposures that might occur outside of the WWNF. However, there is no indication that additive exposures would create a toxic dose, and therefore no adverse cumulative effect is expected. Also, since bighorn sheep do not ingest the target invasive plants within their habitat on the WWNF, the risk of any exposure is very low.

California Wolverine

Cumulative Effects

Many other ongoing Forest Service activities and reasonably foreseeable actions (described in Table 2) , as well as activities conducted by other entities within and outside of NFS land, cause ground disturbance which can create conditions favorable to invasive plants. Potentially, this disturbance could create a continual or increasing need to treat invasive plants. These activities are potential sources of disturbance to wolverines and could create a cumulative effect in combination with the disturbance created by invasive plant treatments. Treatment caps limit the amount of treatment that would be approved annually regardless of invasive species spread.

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph. These projects, together with similar projects to be implemented in the next 10-15 years, are expected to result in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually forest-wide. Prescribed fire and vegetation management, including both commercial and non-commercial thinning, has the potential to impact wolverine prey including mule deer and elk. While there would be some removal of big game hiding cover that could leave deer and elk more vulnerable to predation, each project would comply with Forest Plan standards that require leaving a sufficient amount of hiding cover within each analysis area. In general, vegetation and fuels treatments create more nutritious forage for deer and elk and are considered beneficial. Increasing the amount of available forage would not likely result in a measurable increase in elk populations on the forest. However, it may influence the distribution of elk across the landscape over the next decade, which in turn, could influence the distribution of wolverines. The short-term disturbance associated with the proposed invasives treatments could combine with the disturbance created by vegetation and fuels management activities and the associated habitat alteration to further influence the distribution of wolverines, but this would not impact population size or lead to a trend toward federal listing for the wolverine.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. Any impact to wolverines from firewood collection would result from the short-term disturbance that occurs while woodcutters are actively cutting wood. Disturbance from firewood collection, when combined with the short-term disturbance associated with invasive species treatments, could cause displacement of individual wolverines while these activities are occurring but it would not lead to a trend toward federal listing.

Livestock Grazing

Livestock grazing occurs across the forest within suitable wolverine habitat. Grazing does not directly impact wolverines but it has the ability to influence distribution of their prey. Cattle have been known to displace deer and elk, causing them to use the landscape differently. Big game may use steeper slopes in the presence of livestock than they would otherwise. This potential change in prey distribution is unlikely to translate into a measureable change in wolverine populations on the forest. Disturbance associated with the proposed invasive species treatments, when combined with potential impacts from grazing, may displace individual wolverines in the short-term while invasive species treatments are actively occurring. However, the combined effects would not lead to a trend toward federal listing for the wolverine.

Mining

Mining occurs across the forest within suitable wolverine habitat. The activities associated with mining may cause disturbance to wolverine and their prey, causing them to leave the immediate vicinity of an active mining claim in the short term while mining is actively occurring. This disturbance, when combined with the disturbance created from the proposed invasive species treatments, may temporarily displace wolverines but would not lead to a trend toward federal listing.

Motorized Access – Transportation System

Driving on roads creates disturbance and can cause direct mortality to individual wolverines from vehicle collisions. Most wolverines avoid roaded areas so mortality of wolverines from vehicles is expected to be a rare occurrence. The reasonably foreseeable future action of regulating motorized travel to designated routes, with some exceptions to accommodate camping or other permitted activities could reduce these impacts and create additional suitable wolverine habitat. When combined with the impacts from roads and any associated travel management, the disturbance created from the proposed invasive species treatments would not lead to a trend toward federal listing for the wolverine.

Recreation

The projected increases in the human population in Oregon would likely increase recreation on the National Forests. This could increase human disturbance and potential sources of mortality to wolverines. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. Game hunting has the potential to impact wolverine because hunters use areas of suitable wolverine habitat and hunting pressure can influence the distribution of their prey. The disturbance that may occur as a result of proposed treatments, when added to the disturbance resulting from recreation on the forest, may displace individual wolverines and cause them to temporarily leave an area but is not likely to lead to mortality of individual wolves or a trend toward federal listing.

Boardman to Hemingway (B2H) Transmission Line

Wolverines would not be impacted by the transmission line because it does not intersect any suitable wolverine habitat.

Herbicides

Wolverines may be exposed to herbicides on other ownerships because they travel large distances. However, due to their preference for very remote areas, the likelihood of this occurring is very low. Herbicide use outside of National Forests is not reported and the amount of exposure is unknown. Within and near the forest, invasive plant treatments are likely the primary target for herbicide use on private, agricultural, utility corridors, County, State and other lands. Glyphosate is the only herbicide for which we have sufficient data to conclude that there may be a potential for cumulative (additive) doses to wildlife (see Basis for Cumulative Effects section). The potential for additive doses from other herbicides, or synergistic effects from combinations of herbicides or other pesticides, would be speculative because there is insufficient data to address these issues (see also Incomplete and Unavailable Information section).

This project would use a maximum of 16,000 lbs of glyphosate per year, on 8,000 acres across the entire forest. The most sensitive effect from glyphosate ingestion on experimental mammals is diarrhea, which occurs at 350 mg/kg. A wolverine weighs about 24 to 40 lbs (11 to 18 kg). A 30 lb. wolverine would need to consume over 4,760 mg to experience this affect. In the exposure scenario where a canid/carnivore consumes an entire days diet of directly sprayed prey (glyphosate at 2 lbs/acre), the dose received was 4.2 mg/kg, or 57 mg for a 30 lb wolverine. An individual wolverine would need to receive a dose 83 times the estimated dose from the exposure scenario to experience a toxic effect from glyphosate. Given the wide distribution of invasive plant treatments, the low amount of glyphosate in each treatment, and the extremely low likelihood that a wolverine prey item would be contaminated by glyphosate, there is no indication that a cumulative dose of glyphosate is likely, and therefore no cumulative effect to wolverines from herbicide use.

Effects of repeated herbicide use on the same acreage would be based on the rate of the herbicide used and its persistence in the environment. Project Design Features do not allow repeated use within a year (sulfometuron methyl - PDF H7) or two years (picloram - PDF H6), two of the most persistent herbicides among those proposed for use on the WWNF. In addition, herbicide use on treated acres would decline as target populations became smaller. Thus, there is no indication that repeated treatments on the same acreage would have cumulative effects on the wolverine.

Spread of weeds

Current and future activities, as well as natural disturbances such a fire, floods, and actions by wildlife, create bare ground which can be colonized by invasive plants. These disturbances would create the need for future weed treatments, under the Early Detection/Rapid Response protocol in the EIS. By far, most of the new infestations are not expected to occur in wolverine habitat, so there would be minimal overlap of the treatments and wolverines. There is no indication that these additional treatments, even if done with herbicides, would pose a risk to wolverines because carnivores are unlikely to receive toxic doses of herbicides and disturbance is not a significant issue in their remote habitat. Most disturbance and weed spread would be along roads, which are not present to a large degree in wilderness areas. There are no data suggesting that actual ranges of wolverines are influenced by invasive plant infestations.

Aggregate Cumulative Effects to California Wolverine

In summary, the past, present and future activities on the landscape, when added to the activities in the proposed project, create stressors such as disturbance and potential herbicide exposure. The potential for these stressors to affect wolverines has been discussed above and there is no indication that this would result in a cumulative effect for wolverines because over 99% of wolverine habitat would remain untreated. Wolverines generally avoid busy, disturbed areas where most invasive plant treatment would occur. There is no indication of contribution to wolverine mortality, reduced reproduction, altered availability of prey, or reduction in available and suitable habitat for the wolverine. Wolverines do not ingest invasive plants directly. Wolverine prey does not substantially ingest invasive plants. The herbicides proposed for use do not bioaccumulate. Use of herbicide is not expected to reach of level of concern because even additive exposures are all below an HQ = 1 (i.e. less than the NOAEL). Treatment caps limit the total acres treated in any one year, whether it is an existing or new infestation. Prevention measures in the WWNF LRMP reduce the introduction, establishment and spread of invasive plants from management activities.

Newly Designated Sensitive Species

Black Swift

The black swift is a nearctic-neotropical migrant that is one of the least known breeding species in North America (Altman 2003). The aerial lifestyle of the black swift makes it difficult to observe, thus little is known about their behavior. Detection is difficult as individuals often feed high in the sky. Observations at nest sites are challenging, as possible nest locations are difficult to observe and the adults are not present when observers are most likely to be surveying. The black swift leaves the nest site well before dawn, not returning until dusk (Combs 2003). Most of what is known about the black swift is limited to breeding and distributional records (Knorr 1961, Foerster and Collins, 1990).

The black swift is a summer breeding visitor to western North America. It nests in small colonies at sites behind waterfalls, in caves or deep gorges, or sea cliffs and sea caves. Moisture and deep shade are associated with nest site location.

Nests are shallow cups made of moss, fern, liverworts and algae that are bound with mud (Dixon 1935, Marin 1999, Montana Animal Field Guide 2007, Michael 1927, Natureserve 2007, Smith 1928). The black swift is strongly associated with waterfalls in mountainous areas. It is considered primarily a mountainous species, occurring over a range of habitats, particularly over rugged terrain and coastal cliffs. Black swifts nest on canyon walls near water, sheltered by overhanging rock or moss, preferably near waterfalls or on sea cliffs (Audubon Watchlist). Factors for nest location appear to be temperature moderation from dripping water, little solar exposure, and high humidity to help attach the nesting material to substrate. There are many potential breeding sites, including coastal rocky areas, waterfalls and damp canyons, and high-elevation cliffs with moisture from snowmelt (Combs 2003, Foerster and Collins 1990, Knorr 1961, Marin 1997, Michael 1927).

Nesting

Five criteria have been described for black swift nesting sites; these characteristics were present at all active nest sites in southern California (Foerster and Collins 1990, Knorr 1961):

1. Water, varying from a trickle to a torrent;

2. High relief, offering a commanding position above surrounding terrain;
3. Inaccessibility to terrestrial predators;
4. Darkness, with no direct sunlight that falls on an occupied nest; and
5. Unobstructed flyways, which must be free of obstruction.

Many black swifts do not build a nest at all, with eggs laid directly on ledges, especially in coastal sites. This might be related to the lack of the proper nesting materials (mosses and liverworts). One egg is laid, with one clutch per breeding season (Marin 1999).

During incubation, one adult is on the nest with the other adult present. Several times during incubation and the early part of brooding, adults have been observed giving food to each other. During this food transfer, the pair usually rotates incubation or brooding chores. During the latter part of the nestling stage both adults roost together on the cave walls (Marin 1997).

Incubation is 24-27 days; fledging occurs 45-49 days after the young hatch. In California, the black swift breeds from May to September, with the peak of egg-laying in mid-June, hatching mid-July, and fledging from mid-to late August (Marin 1999).

The black swift forages on the wing over forests and open areas, often at great heights, feeding on airborne insects and ballooning spiders (Combs 2003, Marin 1999). They travel large distances to forage opportunistically on aerial insects. During the reproductive season, swifts accumulate insects and arachnids in the back of the throat and bind them with saliva to produce a sticky assortment of insects. This insect food bolus is produced exclusively to feed the nestling (Marin 1999), and with high protein and fat content allows the nestling to attain up to 148% of adult body mass within 16 days after hatching (Marin 1997).

The adults will make two foraging trips a day while the nestling is young. They will make short foraging trips during early morning hours and longer trips from early to late afternoon. These short trips have been observed during the early part of the nestling period; during the latter part the adult swifts make one foraging trip per day that lasts up to 12 hours. These long foraging trips are not only for feeding the young but also for parental energy storage. The single foraging trip, during the mid- and late nestling period, might also serve to store fat for migration by the adults. Black swift migration occurs immediately after the nestlings fledge (Marin 1999).

Range, Distribution, and Abundance

The black swift has an extensive range, from Central America and the West Indies north to southern British Columbia and SE Alaska, but within this range occurs in rather isolated pockets, sometimes separated from each other by hundreds of miles.

In North America, the black swift breeds mostly in mountains from southeastern Alaska through northwestern and central British Colombia and southwest Alberta, south to southern California, and across the west through parts of Montana, Colorado, Arizona, and New Mexico (Audubon Watchlist, Combs 2003); it also breeds in Mexico and parts of Central America in highlands from Nayarit, Puebla, and Veracruz south to Guatemala, Honduras, and Costa Rica; locally in the West Indies in Cuba, Jamaica, Hispaniola, Puerto Rico, Montserrat, Guadeloupe, Dominica, Martinique, St. Lucia, and St. Vincent (Sibley and Monroe 1990).

The black swift migrates south through the western U.S. and Mexico and through Central America (Combs 2003). Their winter range is poorly known; northern populations may winter in South America, and the supposedly resident populations in Middle America and the Antilles may in fact also winter in South America, though direct evidence is lacking (Stiles and Negret 1994).

In general the species never occurs in very high abundance, although occasionally flocks of thousands have been seen in its British Columbia range. Though the species is difficult to survey because of its inaccessible nest sites and high-flying habits, Breeding Bird Survey (BBS) trend analysis shows a 6.3% per year rangewide decline from 1966-2001. Of greatest concern is the fact that some of the greatest declines are in its British Columbia breeding range where it has traditionally occurred in highest abundance (Audubon Watchlist). According to recent survey data, there are two black swift sites located on the Willamette National Forest and four sites on the Umpqua NF. As surveys in Oregon have not been conducted on a large scale, it is difficult to determine how widespread the species is and how many waterfalls may support nesting black swifts. While this species is difficult to survey for, even with a lack of information it appears they are not particularly abundant.

Threats

The general relative inaccessibility of nest sites suggests that problems at these sites are currently not a major problem, although increasing numbers of recreational rock-climbers, hikers and cave explorers using areas near waterfalls may disturb birds (Audubon Watchlist). Threats might also include activities such as forest management adjacent to these sites or elsewhere in the watershed where activities may impact stream flows (Altman, 2003).

It is speculated that a decrease in aerial insect abundance due to habitat loss and use of pesticides on breeding and wintering grounds may be a range-wide threat. Ingestion of some pesticides may bio-accumulate in tissues, which may cause decreases in reproductive output and increases in adult mortality, especially under extreme weather conditions (Audubon Watchlist). However, there is a lack of basic knowledge about the species' life history and the factors contributing to population declines.

Project Area Information

Both the Forest Service and BLM have listed the black swift as a Sensitive Species/Special Status Species in Oregon. It is not listed for either agency in Washington.

The black swift has been documented at 10 sites in Oregon and 26 sites in Washington. It has been observed on National Forests in both states, including the Wallowa-Whitman NF, and has been documented on the Spokane BLM District in Washington.

ORNHIC (Oregon Natural Heritage Information Center) has ranked the black swift as S2B (imperiled breeding population) for the state of Oregon and has described the state status as SP (sensitive species, peripheral or naturally rare). The NatureServe conservation status is listed as S2 – imperiled – in Oregon (NatureServe 2007). The black swift has been designated as a priority species in bird conservation plans for Oregon and Washington, British Columbia, and Alaska (Altman, 2003).

Direct and Indirect Effects

Due to the specific habitat where black swift nest and forage, disturbance from invasive plant treatments will not affect the black swift. Invasive plant infestations are extremely limited, if they occur at all, in the vicinity of waterfalls, and these birds forage at great heights over large areas, so they would not be in close proximity to treatment activities.

Herbicide Effects

Exposure scenarios for insect-eating birds were used to evaluate risks of herbicide use to black swift. In addition, the extent to which black swift may overlap treatment areas and their use of habitats were also used to make conclusions about risks from herbicides in the proposed action.

Triclopyr at high (6 lbs/ac) and typical (1 lb/ac) application rates exceed the NOAEL in exposure estimates for insect-eating birds. There is no difference in toxicity to birds from triclopyr BEE or TEA. The HQ at high application rates was 11. At typical application rates, the HQ = 1.8. The dose at the typical rate does not reach the lowest dose at which effects were noted (LOAEL). However, the dose for the highest application rate exceeds the lethal dose for birds (SERA 2011 Triclopyr, Appendix 3, Table 1). In order to receive this dose, a small bird must consume nothing but contaminated insects for an entire day's diet. The following factors make it infeasible for black swift to be exposed to sufficient triclopyr to receive a dose of concern:

- A standard in the forest plan prohibits broadcast spray of triclopyr
- Spot spray of targeted invasive plants is unlikely to contaminate insect prey
- Black swifts forage over large areas and at great heights, reducing the likelihood that the specific insects they ingest would be ones contaminated by a spot spray of triclopyr
- Triclopyr is listed as an option for only six invasive plants on the forest and would most likely be used primarily on blackberry.
- Invasive plant infestations are rare in close proximity to nesting habitat

It should be noted that the herbicides proposed in this project do not bioaccumulate or cause reproductive effects in birds at the rates proposed.

Consuming insects contaminated with NPE surfactant applied at the highest rate permitted by project design feature F-4 (0.5 lbs/ac) results in an HQ=2 for small birds. The following factors make it unlikely for black swift to consume enough contaminated insects to receive this dose of concern:

- Other classes of surfactants are to be used preferentially over NPE (PDF F-4)
- Other classes of surfactants have been found to be more effective, reducing use of NPE
- Spot spray of targeted invasive plants is unlikely to contaminate insect prey
- Black swifts forage over large areas and at great heights, reducing the likelihood that the specific insects they ingest would be ones contaminated by a sprays containing NPE

The magnitude and duration of any disturbance or herbicide exposure is low level and short term, and sufficient herbicide or NPE exposure to cause adverse effects is infeasible . Therefore, treatments proposed will have no effect on black swift.

Cumulative Effects

Because there are no anticipated direct or indirect effects from the proposed treatments, there will be no cumulative effects when combined with other ongoing or reasonably foreseeable activities on the forest.

Herbicide Use – Black swift may be exposed to herbicides on other ownerships because they forage over large distances. Herbicide use outside of national forests is not reported and the amount of exposure is unknown. Within and near the forest, invasive plant treatments are likely the primary target for herbicide use on private, agricultural, utility corridors, County, State and other lands. Glyphosate is the only herbicide for which we have sufficient data to conclude that there may be a potential for cumulative (additive) doses to wildlife (see Basis for Cumulative Effects section). The potential for additive doses from other herbicides, or synergistic effects from combinations of herbicides or other pesticides, would be speculative because there is insufficient data to address these issues (see also Incomplete and Unavailable Information section, Chapter 3 in FEIS, and Appendix P of the R6 2005 FEIS).

For glyphosate, acute dietary exposures up to 5000 mg/kg did not result in toxic effects to birds. Estimated acute exposure from one day's worth of ingesting contaminated insects was 810 mg/kg at the highest application rate – well below the highest doses tested. Since this dose estimates an entire day's worth of food, there is no cumulative effect from foraging on other lands where glyphosate may have been used. That is, a black swift is unlikely to ingest substantially more food in one day, so regardless of where contaminated insects may be encountered; there is no indication of cumulative acute risk to birds.

There is no data available on long-term residues of herbicides on insects, so risk of chronic exposure to contaminated insects cannot be quantitatively evaluated.

However, it appears unlikely for their prey to be contaminated. This project would target only invasive plants for herbicide treatments and there is no indication that insect prey of black swift is found on invasive plants to any great degree.

BLACK SWIFT REFERENCES

Harlequin Duck *(Histrionicus histrionicus)*

Harlequin Ducks are an oceanic species that nest inland along swift flowing rivers and streams. They winter along rocky ocean coastlines. This species is relegated, during nesting season, to the creek and riverbanks and within the stream flow of mountain creeks and rivers (Robertson and Goudie 1999). The species is listed as sensitive. It is hunted in Washington and Oregon. Harlequin ducks forage heavily on caddisfly, and will also eat some mayflies and stoneflies (Marshall et al. 2003). They apparently eat fish only rarely.

Project Area Information

There are records of harlequin ducks on the Minam River in the Eagle Cap Wilderness prior to 1970. There are no known recent locations and no records of breeding on the Wallowa-Whitman.

Direct and Indirect Effects

Harlequin ducks nest along fast-flowing rivers and mountain streams. Invasive plant treatments along fast-flowing sections of river and mountain streams are likely to be rare for a variety of reasons. Infestations of invasive plants are less likely along swift sections and higher gradient streams than in slower river bottom habitat. It is more difficult for seeds and propagules of invasive plants to become established in swift water. If invasive plants become established along some swift water areas, they may not be treated because terrain and swift water limit access to the infestation. In addition, there are no records of harlequin ducks breeding on the forest.

Herbicide Effects

Risk from herbicide exposure was evaluated using consumption of contaminated fish. While harlequin ducks only rarely eat fish, there is not sufficient data to quantitatively estimate dose from consuming contaminated aquatic insects. Because harlequin ducks are found along swift water, any herbicide that inadvertently entered the water would be rapidly diluted and moved downstream. This would greatly reduce exposure of this duck and its prey to herbicide. The fish-eating bird scenario seems an appropriate "worst case scenario" to use as a surrogate for analysis. A quantitative estimate of dose was calculated for a bird eating contaminated fish for one day (acute) and for a lifetime (chronic). The fish in the scenario are from a pond (1000 m2 by 1 m deep) that has been contaminated by a spill of 200 gallons of herbicide. In this scenario, no herbicide or NPE-based surfactant exceeded a dose of concern for any exposure (acute or chronic) at any application rate (typical or highest).

Results from this scenario indicate that no herbicide or NPE-base surfactant poses a risk of adverse effects to harlequin ducks.

The magnitude and duration of any disturbance or herbicide exposure is low level and short term. For these reasons there would be no impact to harlequin ducks from the proposed treatments.

Cumulative Effects

Because there are no anticipated direct or indirect effects from the proposed treatments, there will be no cumulative effects when combined with other ongoing or reasonably foreseeable activities on the forest.

<u>*Herbicide Use*</u> – Harlequin ducks forage in swift flowing streams during the breeding season, and are not reported to move large distances away from the breeding site for foraging. Their exposure to herbicides used for other purposes in addition to the proposed project is unlikely. However, we did analyze the potential for a cumulative dose to fish-eating birds. Glyphosate is the only herbicide for which we have sufficient data to conclude that there may be a potential for cumulative (additive) doses to wildlife (see Basis for Cumulative Effects section). We do not have sufficient data to address how a harlequin duck might be affected if they already had a body burden of some chemicals and were then exposed to herbicides from this project. Therefore, the potential for additive doses from other herbicides, or synergistic effects from combinations of herbicides or other pesticides, would be speculative because there is insufficient data to address these issues (see also Incomplete and Unavailable Information section).

Since glyphosate is so widely used, it is used as an indication of potential cumulative effects of herbicide exposure. Glyphosate did not produce a toxic effect to birds at the highest doses tested for acute exposures. Estimated dose from one day's diet of contaminated fish was 0.000002 mg/kg, while the NOAEL for birds is 540 mg/kg. Even if harlequin ducks were exposed to fish contaminated from glyphosate use on other lands, or for other purposes, any toxic effects are highly unlikely. Harlequin ducks could not consume enough prey in one day to receive a toxic dose, regardless of how many different land ownerships on which they might have foraged.

Estimates of chronic doses to fish-eating birds resulted in extremely low values (e.g. 0.0000005 mg/kg for the glyphosate). The chronic NOAEL for birds from glyphosate is 43 mg/kg. It is not possible for the herbicide use in this project to add to potential other sources of herbicide exposure and cause a cumulative effect.

Black Rosy-finch

The black rosy finch is one of the least known passerine birds due to its remote high alpine habitat and inaccessible nests on cliffs. The males will defend loosely defined territories around the nest. Nests are placed in a crack or hole in cliff, on small cliff ledge under overhanging rocks, or under rocks in talus slides. Wintering birds will roost in communal colonies in caves, mine shafts, barn rafters and cliff swallow nests. This species is restricted to the mountainous west, with breeding range limited to areas around southern Montana, Wyoming, Idaho and northern Utah. In winter, their range spreads out somewhat to include northern Nevada and southeastern Oregon. Populations are apparently secure, although their range is very limited (NatureServe 2014). Black rosy finches forage on the ground for seeds, but will also eat, and feed their young, some insects in the spring.

Project Area Information

The black rosy finch may occasionally breed in the Wallowa Mountains.

Direct and Indirect Effects

Due to the specific habitat where they nest and forage, disturbance from invasive plant treatments will not affect the black rosy finch. Invasive plant treatments would not occur on high alpine cliff faces within the Wallowa Mountains.

Herbicide Effects

There is no quantitative exposure scenario for birds that eat primarily seeds, but the scenarios for birds that eat contaminated insects can be used as a reasonable surrogate, because the residue rate for insects is basically the herbicide residue on a small round object.

For small birds consuming contaminated insects, glyphosate at the highest application rate and upper residue rates slightly exceeds the NOAEL (HQ=1.5) in acute exposures, but only for formulations that contain POEA surfactants. This exposure is not expected to result in any adverse effects because no effects to birds were noted in the highest dietary concentrations (up to 5000 mg/kg) tested (SERA 2011 glyphosate, p. 117).

Triclopyr at high (6 lbs/ac) and typical (1 lb/ac) application rates exceed the NOAEL in exposure estimates for insect-eating birds. There is no difference in toxicity to birds from triclopyr BEE or TEA. The HQ at high application rates was 11. At typical application rates, the HQ = 1.8. The dose at the typical rate does not reach the lowest dose at which effects were noted (LOAEL).

However, the dose for the highest application rate exceeds the lethal dose for birds (SERA 2011 Triclopyr, Appendix 3, Table 1). Consuming insects contaminated with NPE surfactant applied at the highest rate permitted by project design feature F-4 (0.5 lbs/ac) results in an HQ=2 for small birds. In order to receive these doses, a small bird must consume nothing but contaminated insects for an entire day's diet. The following factors make it unlikely for black rosy finch to be exposed to sufficient triclopyr or NPE to receive a dose of concern:

- Triclopyr is not used on the invasive plants which produce seeds known to be consumed by birds (e.g. thistles, knapweeds) and cannot be broadcast sprayed per a forest plan standard
- Invasive plants are typically treated so that they are killed before seeds are formed
- Other surfactants are use preferentially over NPE per PDF F-4, reducing the likelihood of exposure
- Treatments will not occur along high alpine cliff faces within the Wallowa Mountains.

Therefore, treatments proposed will have no effect on black rosy finch.

Cumulative Effects

Because there are no anticipated direct or indirect effects from the proposed treatments, there will be no cumulative effects when combined with other ongoing or reasonably foreseeable activities on the forest.

Herbicide Use – Black rosy finch may be exposed to herbicides on other ownerships because they presumably could forage distances large enough to encompass other ownerships. Herbicide use outside of national forests is not reported and the amount of exposure is unknown. Within and near the forest, invasive plant treatments are likely the primary target for herbicide use on private, agricultural, utility corridors, County, State and other lands. Glyphosate is the only herbicide for which we have sufficient data to conclude that there may be a potential for cumulative (additive) doses to wildlife (see Basis for Cumulative Effects section). The potential for additive doses from other herbicides, or synergistic effects from combinations of herbicides or other pesticides, would be speculative because there is insufficient data to address these issues (see also Incomplete and Unavailable Information section, Chapter 3 in FEIS, and Appendix P of the R6 2005 FEIS).

For glyphosate, acute dietary exposures up to 5000 mg/kg did not result in toxic effects to birds. Estimated acute exposure from one day's worth of ingesting contaminated insects (used as a surrogate for contaminated seeds) was 810 mg/kg at the highest application rate – well below the highest doses tested. Since this dose estimates an entire day's worth of food, there is no cumulative effect from foraging on other lands where glyphosate may have been used. That is, a black rosy finch is unlikely to ingest substantially more food in one day, so regardless of where contaminated insects may be encountered; there is no indication of cumulative acute risk to birds.

There is no data available on long-term residues of herbicides on insects, so risk of chronic exposure to contaminated insects cannot be quantitatively evaluated.

However, black rosy finch typically occurs along high alpine cliff faces in the wilderness where herbicide use is not occurring. There is no indication that cumulative effects to black rosy finch from herbicide treatments could occur.

CITATIONS:

NatureServe. 2014. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: September 4, 2014).

Wallowa Rosy-finch

This sub-species subspecies of Gray-crowned Rosy-Finch has a restricted breeding range limited to the high alpine areas of the Wallowa Mountains. It is considered uncommon. Breeding habitat consists of barren rocky or grassy areas and talus slopes in the alpine zone. In winter, the birds move to lower elevations and the range extends slightly to include northern Nevada and north-eastern California. The remote breeding habitat appears to be relatively secure and populations relatively stable. The primary threat to the species may be climate change due to alterations in alpine habitats (NatureServe 2014). Introduced fish in alpine lakes may compete with rosy-finches for insects in the spring (Epanchin et al. 2010). Like other finches, this species is primarily a seed eater but will eat, and feed their young, insects in the spring.

Project Area Information

This Gray-crowned Rosy-Finch breeds in high alpine areas of the Wallowa Mountains.

Direct and Indirect Effects

Due to the specific habitat where they nest and forage, disturbance from invasive plant treatments will not affect the Gray-crowned Rosy-Finch. Invasive plant treatments would not occur on high alpine rocky, barren ground or talus slopes within the Wallowa Mountains.

Herbicide Effects

The herbicide exposure scenario of a small bird consuming contaminated insects was used to evaluate risk to Wallowa rosy finch, as discussed above for black rosy finch. Glyphosate, triclopyr and NPE estimated exposures resulted in HQ's above 1.0. However, no adverse effects to birds from dietary exposures to glyphosate were noted for the highest doses tested, which far exceed the estimated doses in this analysis, so no effects from glyphosate are likely. The following factors make it unlikely for Wallowa rosy finch to be exposed to sufficient triclopyr or NPE to receive a dose of concern:

- The high alpine areas that provide their spring and summer habitat have much less invasive plant infestations than lower elevation areas
- Triclopyr is not used on the invasive plants which produce seeds known to be consumed by birds (e.g. thistles, knapweeds), and cannot be broadcast sprayed per a forest plan standard
- Invasive plants are typically treated so that they are killed before seeds are formed

- Other surfactants are use preferentially over NPE per PDF F-4, reducing the likelihood of exposure

Cumulative Effects

Because there are no anticipated direct or indirect effects from the proposed treatments, there will be no cumulative effects when combined with other ongoing or reasonably foreseeable activities on the forest.

Herbicide Use – Wallowa rosy finch may be exposed to herbicides on other ownerships because they presumably could forage over distances large enough to encompass other ownerships. For reasons described above for black rosy finch, glyphosate is the only herbicide for which we have sufficient information to indicate potential multiple exposures, but glyphosate did not cause adverse effects in dietary exposures to birds even at doses greatly exceeding the highest estimate from proposed use for this project. In addition, exposure to glyphosate contaminated seeds would be rare because the goal of weed treatments is to kill the weeds before seed is produced. Therefore, there is no indication of adverse cumulative effects to Wallowa rosy finch from herbicide treatments of invasive plants.

CITATIONS

Epanchin, P.N., R.A. Knapp, and S.P. Lawler. 2010. Non-native trout impact an alpine-nesting bird by altering aquatic-insect subsidies. Ecology 91(8): 2406-2415.

Lewis' Woodpecker

Marshall et al 2003 indicates the Oregon distribution was formerly widespread, although it is currently only common in the white oak-ponderosa pine belt on the eastern slopes of the cascades east of Mt. Hood. It occurs in low numbers along the stream and river bottoms of eastern Oregon. It is a regular transient in small numbers west of the Cascades, uncommon east of the Cascades, and most common in open habitats and burns in and near the Cascades forests (Marshall et al. 2003).

Lewis' woodpecker prefers open riparian woodland habitats dominated by cottonwoods, open ponderosa pine, and burned or logged ponderosa pine. Marshall et al 2003 indicates from various studies the preferred nest trees are cottonwoods although nests are also found in ponderosa pine, juniper, fir, and willow. This species is a weak cavity excavator and typically uses cavities excavated by other species. They require large snags in an advanced state of decay that are easy to excavate, or they use old cavities created by other woodpeckers. Nest trees generally average 17 inches to 44 inches (Saab and Dudley 1998, Wisdom et al. 2000). Burned ponderosa pine forests created by stand-replacing fires provide highly productive habitats as compared to unburned pine (Wisdom et al. 2000). Brushy undergrowth that supports insects on which Lewis' woodpeckers feed is an important component of their preferred breeding habitat (Tobalske 1997). Lewis' woodpeckers are aerial insectivores during the breeding season relying on flying insects as forage.

Project Area Information

Lewis' woodpecker occurs throughout the forest along stream and river bottoms in open riparian woodland habitats dominated by cottonwoods, open ponderosa pine, and burned or logged ponderosa pine.

Direct and Indirect Effects

The Lewis' woodpecker is not susceptible to the low magnitude, extent, and duration of disturbance caused by treating patches of invasive plants, so no effects from disturbance will occur.

Invasive plant treatments will not cause negative effects to this species as a result of human or mechanical disturbance.

Herbicide Effects

Lewis' woodpeckers prefer open riparian woodland habitats dominated by cottonwoods, ponderosa pine, and burned or logged ponderosa pine. The Lewis's woodpecker is an aerial insectivore, relying on flying insects.

To analyze the effects of herbicides to the Lewis' woodpecker the scenario of birds consuming insects was used. As discussed above for other birds, only glyphosate, triclopyr and NPE exceeded the NOAEL for small birds consuming contaminated insects. However, no adverse effects from exposure glyphosate, triclopyr or NPE are expected for the following reasons:

- Glyphosate did not cause adverse effects to birds a the highest dietary doses tested, which far exceed exposure estimates from this project
- A standard in the forest plan prohibits broadcast spray of triclopyr
- Spot spray of targeted invasive plants is unlikely to contaminate insect prey
- Triclopyr is listed as an option for only six invasive plants on the forest and would most likely be used primarily on Scotch broom and blackberry.
- Other classes of surfactants are to be used preferentially over NPE (PDF F-4)
- Other classes of surfactants have been found to be more effective, reducing use of NPE
- The specific plant species targeted for treatment on the Wallowa-Whitman NF do not provide foraging or nesting habitat for the Lewis' woodpecker and therefore it is very unlikely that the Lewis' woodpecker would be exposed to herbicides or NPE from the project.

Cumulative Effects

Because there are no anticipated direct or indirect effects from the proposed treatments, there will be no cumulative effects when combined with other ongoing or reasonably foreseeable activities on the forest.

<u>Herbicide Use</u> **-** For reasons described above for other insectivorous birds, glyphosate is the only herbicide for which we have sufficient information to indicate potential multiple exposures, but glyphosate did not cause adverse effects in dietary exposures to birds even at doses greatly exceeding the highest estimate from proposed use for this project. A bird could not consume

enough contaminated insects in a day to reach a dose of glyphosate that would cause an adverse effect. Therefore, no cumulative effects from herbicide exposure are likely.

White-headed Woodpecker

The white-headed woodpecker is a species that prefers ponderosa pine habitat that has a more open stand conditions with large pine for foraging and large snags for nesting habitat. They prefer stands with live, old ponderosa pine, abundant snags and relatively open understory conditions. White-headed woodpeckers favor live ponderosa pine as foraging substrate, but have also been observed in lodgepole pine, sugar pine, Engelmann spruce and other species. They concentrate their foraging activities on live ponderosa pine, but they may also glean insects from other tree species. The white-headed woodpecker feeds primarily on live tree insects and utilizes pine seeds. They generally select large diameter ponderosa pine snags as nest sites, though they are not always in tall snags (Dixon, 1995; Marshall, 1997).

Project Area Information

The white-headed woodpecker is infrequently observed on the Wallowa-Whitman National Forest. Habitat occurs sparingly in the following plant associations –ponderosa pine, Douglas-fir, and white fir in open stands where average tree size is 20”dbh or greater.

Direct and Indirect Effects

The white headed-woodpecker prefers open stands of large diameter ponderosa pine. The white-headed woodpecker concentrates its foraging activities on live ponderosa pine and feeds primarily on live tree insects and utilizes pine seeds.

The white-headed woodpecker would not be susceptible to the low magnitude, extent, and duration of disturbance caused by treating patches of invasive plants. Invasive plant treatments will not cause negative effects to this species as a result of human or mechanical disturbance.

Herbicides

The white-headed woodpecker would not be exposed to herbicides from the proposed project because the trees upon which they forage will not be treated, and the insect prey they consume is largely under the surface or high in the canopy.

Cumulative Effects

Because there are no anticipated direct or indirect effects from the proposed treatments, there will be no cumulative effects when combined with other ongoing or reasonably foreseeable activities on the forest.

Herbicide Use – White-headed woodpeckers will not be exposed to herbicides from the proposed project because of their nesting and foraging habits, therefore this project will not add to other potential exposure and there are no cumulative effects to white-headed woodpeckers from herbicide use.

Rocky Mountain Tailed Frog

This species occurs in clear, cold swift-moving mountain streams with coarse substrate. It may occur primarily in older forest sites, but better information is needed; required microclimatic and microhabitat conditions are more common in older forests. Closely tied to riparian habitat, it may be found on upland areas, but only during wet weather and near water in humid forests. During dry weather, it stays on moist stream-banks. Rocky Mountain tailed frogs lay eggs under stones in water and the eggs hatch in late summer. This species has a very slow development; larvae may remain in nest site until the following summer. Larval period lasts a few years and the frogs require several additional years to attain sexual maturity.

The larva feed mostly on diatoms while adults eat a wide variety of insects and other invertebrates. This species hibernates in the winter, with adults being active mostly from April to October. Adults generally exhibit very limited movements, but some individuals may disperse longer distances (Daugherty and Sheldon 1982, Adams and Frissell 2001).

The species ranges from the southeastern corner of Washington and northeastern corner of Oregon through central Idaho and the panhandle of Idaho into northwestern Montana and the southeastern corner of British Columbia. It is ranked as “imperiled” in Oregon and Washington, “vulnerable” in Idaho, and "apparently secure” in Montana (NatureServe 2014). In Oregon, it occurs in four counties (Wallowa, Union, Umatilla, Baker) (Olson 2011). The Wallowa-Whitman NF has at least 26 sites for this species, primarily in the southern portion of the forest (Olson 2011).

This species is vulnerable to management practices that alter the riparian or aquatic zones of streams, especially those that change the moisture regime, increase stream temperature, increase sediment load, reduce woody debris input and change stream bank integrity. Protection of headwater streams is particularly important for this species (Hallock and McAllister 2005).

Project Area Information

Tailed frogs are found throughout the Wallowas in cold swift-moving mountain streams with coarse substrate.

Direct and Indirect Effects

The proposed action will not change habitat, microhabitat, and microclimate conditions for this frog due to the limited amount, if any, of invasive plants within its habitat. Treatment of certain invasive plants, like Japanese knotweed, could preserve important ecosystem functions in riparian habitats.

For suitable habitat and newly discovered infestations, pre-treatment assessment (PDF A-1) would confirm presence or absence of Rocky Mountain tailed frog. Trampling of these frogs is unlikely because they are primarily nocturnal and adults generally exhibit very limited movements. Because there will be no alteration of habitat, no disturbance to individual frogs, and preventative project design features, there will be no direct or indirect effects to tailed frogs.

Herbicides

Data on toxicity of herbicides to amphibians are limited. Several studies have found that amphibians are less sensitive, or about as sensitive, as fish to some herbicides (Berrill et al. 1994; Berrill et al. 1997; Johnson 1976; Mayer and Ellersieck 1986; Perkins et al. 2000). Forest Service risk assessments indicate that only glyphosate and triclopyr pose a risk to amphibians, depending upon the formulation used and application rates applied. The updated risk assessments for glyphosate and triclopyr (SERA 2011a, b) address risk to amphibians directly. Neither of the aquatic formulations of glyphosate or triclopyr exceeded a level of concern for amphibians (SERA 2011 a, b). Non-aquatic formulations of glyphosate and triclopyr have significant buffers (150 feet for triclopyr and 50 feet for glyphosate) on perennial streams, so no introduction to water is likely.

The 2010 FEIS, Table 46, p. 303 displayed predicted herbicide concentrations in small stream adjacent to treatment areas, using the GLEAMS-derived water contamination rates and some typical application rates. Peak water concentrations from the model (GLEAMS-Driver) ranged from 0.076-0.198 mg/L for glyphosate, several orders of magnitude below the NOEC for aquatic glyphosate (NOEC = 340 mg/L).

Additionally, potential adverse effects to amphibians from herbicide are greatly reduced by PDFs that restrict herbicide application rates, herbicide choice, and require buffers. More specifically, 1) herbicide use buffers (F-3, H-1, H-2, H-3, H-8, H-10 through H-12) virtually eliminate the potential for herbicide in concentrations of concern to be delivered to water (2010 FEIS, p.243). This is particularly true of the swift-moving streams in which these frogs occur, as any herbicide reaching the water would be quickly diluted and moved downstream.

Cumulative Effects

Because there are no anticipated direct or indirect effects from the proposed treatments, there will be no cumulative effects when combined with other ongoing or reasonably foreseeable activities on the forest.

<u>Herbicide Use -</u> Glyphosate is the only herbicide for which we have sufficient data to conclude that there may be a potential for cumulative (additive) doses to wildlife (see Basis for Cumulative Effects section). However, Rocky Mountain tailed frogs prefer cold, swift-moving streams which are typically found in the upper reaches of watersheds where multiple ownerships are less common than down in the lower portions. Cumulative exposure to these frogs appears unlikely. In the event that other foreseeable actions did introduce glyphosate into the water, the amount of glyphosate needed to reach just the NOEC for amphibians is 1,717 times the amount modeled for the proposed project (i.e. highest modeled concentration of 0.198 mg/L compared to the NOEC of 340 mg/L). It does not appear plausible that the minor amount of aquatic glyphosate potentially added to a stream from the proposed action could result in a toxic cumulative effect to Rocky Mountain tailed frogs.

Townsend's Big-eared bat

The Townsend’s big-eared bat is a non-migratory species dependent on caves, or cave-like structures including mines year-round. These caves occur in a wide variety of habitat types and elevations from sea level to 10,000 feet (NatureServe 2011, Siemers 2002). Townsend’s will also use rock crevices, rock faces/cliffs, buildings, tunnels, bridges, and trees as day or night roost sites (Dobkin et al. 1995, Ellison et al. 2003, Mazurek 2004).

In addition to cave or cavelike habitat, primary components include suitable foraging habitat that provides insect prey and water sources for both drinking and foraging. Considered a moth specialist, preferred prey items include small moths 0.23-0.47 inches (6 to 12 mm) from the families Noctuidae, Geometridae, Notodontidae, and Sphingidae, with opportunistic foraging on beetles and flies (Pierson et al. 1999). Townsend’s are considered moth specialists (primarily Lepidoterans); however, they can be considered habitat generalists in terms of foraging as they appear to forage successfully in a wide range of habitats, and particularly in edge habitat.

They forage in riparian areas, intermittent streams (Seidman and Zabel 2001), wetlands, and lakes, and along forest/shrub edges, ridges, or canopy, where insects concentrate (Burford and Lacki 1998, Clark et al. 1993). They also glean insects directly from foliage or other substrates. Although they appear to avoid large, open areas (Pierson et al. 1999), and areas of dense, regenerating forests, estimates of canopy coverage necessary to create suitable foraging conditions are unknown. Woodland edge habitat offer a less cluttered environment, some cover, and a high prey density.

Project Area Information

Townsend’s big-eared bats are likely to occur in caves in the semi-arid desert areas of the Wallowa-Whitman. There are also several mines that occur on the forest that may also provide habitat.

No proposed treatment areas are associated with the known locations of these bats, although bats could forage along rivers on the forest. Additional suitable habitat in the form of bridges is present at many locations in the project area.

Invasive plants are not adversely affecting habitat for Townsend’s big-eared bat

Direct and Indirect Effects

These bats are very intolerant of human disturbance at either winter hibernacula or summer roosts (Csuti et al. 2001). However, traffic along the roads and the bridges used for roosting was well-established when the bats colonized the bridges. This bat may have roosts on bridges within or near treatment areas. Roadside treatments typically consist of a boom or nozzle spray attached to an ATV, or a person with a backpack sprayer conducting spot sprays of plants. Both treatment methods only take a couple minutes to conduct, do not generate noise much beyond the background noise of the road and bridge use, and do not occur in close proximity to the bats themselves. Therefore, the likelihood of disturbing roosting bats during treatment of roadside invasive plants near bridges is remote.

Herbicide Effects

This bat feeds primarily on moths, but will also eat beetles, true bugs, and flies. It captures prey in flight or by gleaning from foliage (Csuti et al. 2001).

The effect of herbicides to the Townsend's big-eared bat was evaluated using the scenario of an insectivorous mammal. Occupied sites are not likely to occur near invasive plant treatment areas because they are typically found in mining shacks, caves, or rock crevices in canyon rims.

The bats forage over large areas catching insects (primarily moths) in flight or by gleaning from vegetation. If contaminated insects were ingested, only glyphosate (more toxic formulation, high rate, upper expsosure estimate), and triclopyr (high rate, upper exposure estimate) resulted in a dose that exceeds an HQ of 1.0. In order to receive this dose, the bat would have to consume nothing but contaminated insects for an entire nights feeding. The small amount of acreage proposed for herbicide treatment, scattered in small patches, makes it unlikely that the bats would forage within treatment areas and on insects that have been inadvertently sprayed by herbicides. Given the bats foraging habits, the prohibition on broadcast spray of triclopyr, and PDF F-4 which requires the use of the lowest effective application rate, it is unlikely that bats would be exposed to enough herbicides from the proposed project to exceed the toxicity level. In addition, because the bats roost in crevices well above ground level during the day, it is not plausible that they could be directly exposed to spray of herbicides.

Data is lacking on risk from chronic exposure to contaminated insects. It is highly unlikely that bats would be exposed chronically to contaminated insects given the small acreages treated and the relatively large areas in which bats forage. The bats are not likely to forage exclusively within treated areas over a 90-day period (the chronic exposure) so there does not appear to be a plausible risk from chronic exposure.

Invasive plant treatments will not cause adverse effects to Townsend's big-eared bat. Since there are not likely to be any adverse effects from disturbance or herbicide exposure, invasive plant treatments will have no effect on the Townsend's big-eared bat.

Cumulative Effects

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the Wallowa-Whitman over the next decade including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, Lower Joseph. Patrick Cr., Morgan Nesbitt, and Dry Creek. These projects will result in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested forest-wide. Prescribed fire and vegetation management, including both commercial and non-commercial thinning, has the potential to impact the habitat of the insects that bats prey on. However, it is unlikely there would be a measurable impact to bats from elimination of roosting habitat because they primarily roost in caves and mines, neither of which is impacted by vegetation and fuels treatments. There is a possibility that insect host plant species could be impacted by vegetation and fuels treatments and this effect could be cumulative for insects that depend on invasive plant species that would be eradicated by proposed treatments. However, Townsend's big-eared bats will prey on many different species of insects so even if one species of insect was completely eliminated from an area, there would still be sufficient alternate prey available so an effect to bats would be highly unlikely.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. Because Townsend's big-eared bats primarily roost in caves, mines, and rock crevices, there would be no cumulative effect to bats from firewood collection.

Livestock Grazing

Livestock grazing occurs across the forest and could occur within Townsend's big-eared bat habitat. Although grazing does not directly impact bats, it has the ability to influence the habitat of the insects they prey on. Because some insects prey will use invasive plant species, there could be a cumulative effect to insects if livestock graze on some of the plant species that the proposed treatments are targeting. However, this is highly unlikely because most invasive plant species are not that palatable to cattle. Additionally, even if one species of insect was completely eliminated from an area, there would be sufficient alternate prey available for bats so there would be no cumulative effect to bats from grazing when combined with the proposed treatments.

Mining

Mining occurs across the forest and could occur within Townsend's big-eared bat habitat. The activities associated with mining could cause disturbance to roosting bats, causing them to leave the immediate vicinity of an active mining claim in the short term while mining is actively occurring. However, there would be no disturbance to roosting bats from proposed invasive species treatments so there could be no cumulative effect to roosting spotted bats.

Motorized Access – Transportation System

Driving on roads has the potential to cause direct mortality to individual bats from vehicle collisions. However, this is expected to be an extremely rare occurrence because rates of traffic on forest roads are typically low at night when bats are active. The reasonably foreseeable future action of limiting motorized travel to existing roads, with some exceptions to accommodate camping or other permitted activities, would likely have no impact on bats because motorized travel is not currently believed to be impacting bat populations. Because there are no predicted impacts to bats from roads and any travel management other than the remote possibility of a vehicle collision with an individual bat, the proposed invasive species treatments will not have a cumulative effect or lead to a trend toward federal listing for the Townsend's big-eared bat.

Recreation

The projected increases in the human population in Oregon will likely increase recreation on the National Forests. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. None of these activities typically occur at night so impacts to foraging bats would be nonexistent. None of these activities have the potential to impact day roosts of bats or the host plant species of their prey. Because there would be no impact to bats from recreation, there would be no cumulative effect from proposed invasive species treatments and no resulting trend toward federal listing.

Boardman to Hemingway (B2H) Transmission Line

The Boardman to Hemingway (B2H) Transmission Line proposed route does not cross through any known Townsend's big-eared bat habitat so there would be no effect from the transmission line and no cumulative effect when combined with the proposed treatments.

Herbicide Use – Since bats forage over large areas, it is possible (although unlikely) that they could consume insects that were contaminated by other actions on other ownerships. Glyphosate is the only herbicide for which we have sufficient data to conclude that there may be a potential for cumulative (additive) doses to wildlife (see Basis for Cumulative Effects section). For this analysis, we will assume that formulations typically used in upland areas constitute the more toxic formulation with POEA surfactants included. The exposure scenario evaluated is for a small insect-eating mammal and highest application rate. If bats consumed an entire night's feeding of contaminated insects, they could ingest enough glyphosate with POEA to reach doses that caused mortality in maternal rabbits (the rabbit developmental study is the source of the toxicity values for mammals). How this translates to risk to bats specifically is unknown.

However, there are important factors to consider when interpreting these results:

1) The toxicity level is based on gavage exposures, which do not represent dietary exposures well (SERA 2011, p. 179). That is, a bollus dose delivered directly to the stomach (gavage) is extreme and always much more toxic than dietary doses.
2) It is highly unlikely that bats would consume only contaminated insects during a night's feeding.
3) The highest application rate is usually only used with injection applications, which would not contaminate insects.
4) There are minimal invasive plants in or near Townsend's big-eared bat habitat.
5) PDF A-1 requires confirmation of species' habitats and occurrences prior to treatment.

In conclusion, adverse cumulative effects from glyphosate exposure are possible, but highly unlikely, for the proposed action.

Fringed Myotis (Pacific Fringe-tailed bat (*Myotis thysanodes vespertinus*))

Pacific fringe-tailed bat (a.k.a. fringed myotis) is found throughout western North America. In Oregon it occurs along the coast range, Willamette Valley, southern Cascades, and Blue Mountains. Found in a variety of habitats, the fringe-tailed bat seems to prefer forested or riparian areas (Csuti et al. 1997). It is considered to have a patchy distribution and is rare in the Pacific Northwest. One young is born in late June to mid-July. Maternity colonies may number several hundred individuals. Roosts include caves, mines, rock crevices, tree cavities, conifer snags, bridges, and buildings (Cross and Waldien 1995). Fringe-tailed bats migrate between summer and winter roosts, but little is known about the type or locations of winter roosts

(O'Farrell and Studier 1980). They eat beetles, moths, crickets, and other insects captured in flight or by gleaning from a surface.

Project Area Information

Fringed myotis occurs throughout the Wallowa-Whitman in a variety of forested habitat.

Direct and Indirect Effects

Direct and indirects effects to fringed myotis would be the same as discussed for Townsend's big-eared bat. The fringed myotis is highly unlikely to forage on contaminated insects due to the patchy nature of invasive plants relative to the large foraging areas used by bats. In exposure scenarios for consuming contaminated insects, only glyphosate and triclopyr exceeded a dose of concern. It is highly unlikely that bats would consume solely contaminated insects for an entire nights feeding. Restrictions on broadcast spray of triclopyr, and direction to use the lowest effective application rates reduce the likelihood that bats could ingest enough herbicide from the proposed project to exceed the toxicity level.

Invasive plant treatments will not cause adverse effects to the fringed myotis. Since there are no likely adverse effects from disturbance or herbicide exposure, there is no appreciable difference in effects between alternatives.

Cumulative Effects

Cumulative effects would be the same as discussed for Townsend's big-eared bat above.

Herbicide Use - Potential cumulative effects are the same as discussed above for Townsend's big-eared bat. Cumulative doses of glyphosate-contaminated insects could pose a risk of adverse effects to bats, but likelihood of this occurring is low for reasons listed above.

Western Ridged Mussel - *Gonidea angulata* - Suspected

The western ridged mussel is widely distributed west of the Continental Divide, from California north to British Columbia and east to southern Idaho and northern Nevada (Burch, 1975; Taylor, 1981). In Oregon it historically occurred in rivers of the Coastal Range, and the main stem and tributaries of the Columbia River, including tributaries to the Snake and Malheur Rivers and John Day River mainstem (Brim Box et al., 2004). It is apparently extirpated from many sites in the Snake and Columbia watersheds (Nedeau et al., 2005). It remains in portions of the Snake River system, namely the Okanogan River in Washington, and Clearwater River, Hells Canyon and middle Snake River in Idaho, but is extirpated from many former locations (Frest and Johannes, 1995). It occurs more continuously from southwest Oregon south to southern California (COSEWIC, 2003).

The NatureServe Rounded National Status Rank is N3 – Vulnerable; and the Rounded Global Status Rank is G3 – Vulnerable (NatureServe 2013). This species is fairly widespread but is declining in terms of area occupied and number of sites and individuals; habitat continues to be threatened as some decline has occurred in area occupied and number of sites and individuals.

This mussel is found mainly in low to mid-elevation watersheds in streams of all sizes, and sometimes lakes (Nedeau et al., 2005). It can be found in habitats with fine sediments, including on sand and gravel bars and on soft substrates at depths up to 10 feet. This species is more pollution tolerant than some other western unionids, however it is absent from highly polluted areas (Frest and Johannes, 1995). It is also more tolerant of habitat disturbance such as sedimentation (Vannote and Minshall, 1982). This unusual species belongs to a monospecific genus with no living relatives, only fossil forms otherwise exist in the western U.S.

Currently, Zebra and Quagga (dreissenid) Mussels are the most serious potential threat to this native mussel (NatureServe 2013). Dreissenid mussels have had devastating effects on native unionid communities elsewhere, such as in the Great Lakes region. General threats to the species in the middle Snake River populations include agricultural runoff, fish farms, urbanization and dams (population in Little Granite Reservoir on the Snake thought to be extirpated by a water drawdown in 1993). Populations in the lower Columbia River system are threatened by impoundments, harbor and channel modifications and agricultural runoff (Frest and Johannes, 1995). In British Columbia and Idaho, they are threatened by loss or degredation of habitat (eutrophication, urbanization, impoundment, siltation) (COSEWIC, 2003).

Preferred Habitat

This species inhabits creeks and rivers of all sizes and can be found on substrates varying from firm mud to coarse particles; is rarely found in lakes or reservoirs (Frest and Johannes, 1995; Taylor, 1981). (It is generally associated with constant flow, shallow water (<3 m in depth), and well oxygenated substrates (COSEWIC 2003). This species is often present in areas with seasonally turbid streams, but absent from areas with continuously turbid water (i.e. glacial melt water streams) (Frest and Johannes 1992). Gonidea angulata generally occurs at low to mid elevations (Nedeau et al. 2009). Additionally, the presence of glochidial host fish is necessary for the reproduction of mussel species. Although the entire suite of host fishes for G. angulata is not known, three native fish have been documented as hosts for G. angulata in northern California: hardhead (Mylopharodon conocephalus), pit sculpin (Cottus pitensis), and tule perch (Hysterocarpus traski).

Project Area Information

Western ridged mussels have been documented on the Forest within Hells Canyon .

Direct and Indirect Effects

Due to limited surveys, this analysis assumes that aquatic mollusks could be present in suitable habitat types within Hells Canyon. No aquatic plant treatments are included in this EIS, so no direct disturbance or removal of habitat for these species would occur, nor is any direct application of herbicide to the water proposed.

Manual treatments create the largest potential for sedimentation due to the soil disturbance involved. For manual-only treatments, there are limited acres within RHCA’s (111 acres), the potential sedimentation caused by manual removal of invasive plants along river banks is negligible (FEIS, p. 301) and therefore should not cause an effect.

Herbicides

The few studies available on herbicide effects to aquatic mollusks are used as an indication of likely effects for western ridged mussel.

There are limited data on herbicide effects to aquatic snails. Relyea (2005a) found no effect to three species of aquatic snails from the glyphosate formulation Roundup®. Mona et al. (2013) reported gene damage in aquatic snails exposed to 5 mg/L (ppm), but not 0.5 mg/L, glyphosate, presumably from the formulations used in Egypt mentioned in the paper. However, the Mona et al. paper does not specific if they used technical glyphosate alone, or the formulations mentioned. Given the numerous papers that attribute adverse effect of glyphosate-based formulations to the surfactants present (e.g. Relyea 2005b, Relyea 2012, Diamond and Durkin 1997) we cannot determine if the effects noted in Mona et al. are from glyphosate itself, or the formulation mixture with surfactants. Tate et al. (1997) reared three generations of aquatic snails in different sub-lethal concentrations of technical grade glyphosate. Glyphosate had little effect on the first and second generations, but for the third generation, growth rates of snail embryos and egg-laying capacity increased in the presence of glyphosate, while hatching was inhibited and some abnormalities were observed at 0.1 mg/L and higher. Griselia et al. (2004) tested imazapyr and a Brazilian formulation of Arsenal (which contains imazapyr and the surfactant nonylphenol ethoxylate) to find the LC50 to the aquatic snail Biomphalaria tenagophila. The LC50 of imazapyr was 45.9 mg/L and for Arsenal it was 20.1 mg/L. Back et al. (2012) looked at aquatic snail and algal assemblages in eutrophic wetland plots treated with glyphosate (Aqua-Neat®) or imazapyr (Habitat®). Glyphosate plots were erroneously treated with concentrations 6-times higher than approved label rates (Back et al. 2013). Eight species of snails were recovered from the plots. Diversity of snail species was similar across treated and untreated plots, while snail densities were higher in herbicide-treated plots. The higher snail densities in herbicide-treated plots were attributed to increase light availability creating higher algal growth. No negative impacts to snail species were reported.

Along habitat in which western ridged mussel might occur, there are approximately 77 acres of Japanese knotweed (54 acres within RHCAs) and 2.5 acres of purple loosestrife (0.4 acres within RHCAs) found along the Snake River and tributaries to the river which could be treated with herbicides. The 2010 FEIS, Table 46, p. 303 displayed predicted herbicide concentrations in small stream adjacent to treatment areas, using the GLEAMS-derived water contamination rates and some typical application rates. Peak water concentrations from the model (GLEAMS-Driver) ranged from 0.0001-0.0004 mg/L for imazapyr, and 0.076-0.198 mg/L for glyphosate. The maximum predicted concentrations of glyphosate in Gumboot Creek (0.112 mg/L) and a hypothetical creek with sandy soil (0.198 mg/L) slightly exceed the concentrations in Tate et al. (1997) (0.1 mg/L) which showed reproductive effects after 3 generations of exposure. All other modeled concentrations of glyphosate at all other locations were well below that which caused effects to the snails. Predicted concentrations of imazapyr are thousands of times below the LC50 reported in Griselia (2004). Triclopyr cannot be broadcast at all, and no broadcast application of other herbicides can occur within 100 feet of streams. Broadcast treatments proposed outside aquatic buffers under these alternatives would not result in adverse effects from herbicide exposure due to the effectiveness of buffers (see FEIS p. 296-298) and project PDFs

H-1 and H-2. Therefore, there is no likelihood of concentrations of concern for triclopyr or other herbicides reaching suitable habitat.

There are no occupied sites proposed for treatment and the pre-field assessment (PDF A-1) would identify if a treatment site was occupied and adjust proposed treatments if necessary to reduce impacts.

Therefore, no adverse effects to aquatic mollusks from herbicide treatments are expected to occur.

Future treatments to new infestations could occur adjacent to suitable habitat for aquatic mollusks under these alternatives; although treatment method would vary. If this occurs, additional herbicide exposure (Alternatives B, C and D only) could occur. Manual treatments of new infestations under Alternative A are unlikely to produce sufficient sedimentation to affect aquatic mollusks (FEIS, p. 281-282). Future herbicide treatments would use the same herbicides and comply with the same PDFs and management restrictions as currently proposed treatments, or if necessary in a new NEPA document. Consequently, effects from future treatment under EDRR are the same as described for current infestations and the potential for adverse effects is low under all alternatives.

Indirect Effects

The effects on aquatic mollusks from invasive plants growing adjacent to their habitat are unknown, but giant knotweed has been shown to change nitrogen ratios in leaf litter, potentially influencing aquatic food webs (Urgenson 2009). Control of knotweed near suitable habitat could serve to preserve important ecosystem functions and food webs. Control of other invasive plants could also protect riparian functions.

Available studies that looked at herbicide effects to periphyton, the food that aquatic mollusks eat, indicate that herbicides do not negatively affect periphyton and sometimes can actually increase its abundance (Kish 2006, Relyea 2005a). Therefore, no indirect adverse effects to aquatic mollusk habitat are indicated.

Direct and Indirect Effects Conclusion

Effects to western ridged mussel are not expected because:

- No herbicides would be directly sprayed in water; the only potential effects come from upslope treatments of invasive plants, with the herbicide potentially leaching into adjacent waterways through subsurface flow.
- No effects of exposure to other aquatic mollusks have been noted in short-term exposures at concentrations predicted from the proposed project.
- If herbicide were to get into the water , contact time in flowing streams would be a matter of minutes, not hours or days, and certainly not for multiple generations of aquatic mollusks.
- No effects to aquatic snails (also a surrogate for herbicide effects to the mussel) were noted in generations 1 and 2 from studies of herbicides that would be used….

- Glyphosate and imazapyr treatments in wetlands can increase aquatic snail populations and do no adversely affect food availability.
- Glyphosate is inactivated rather quickly by adsorption to soil and microbial breakdown in soil and water.
- The size and distribution of the invasive plant populations (relatively small and scattered), frequency of occurrence (patchy), environmental fate of glyphosate (not persistent), and size of the rivers in Hells Canyon (much larger than the modeled stream) make it impossible to achieve the predicted concentration of herbicide over a period of 3 snail generations.
- There are very limited acres of invasive plants, relative to the uninfested land, adjacent to mussel and snail habitats, so only a small portion of the habitat would be treated.

Aquatic mollusks could be indirectly exposed to insignificant amounts of sediment or herbicide from invasive plant treatments, but there is no indication that the amount of herbicide or sediment would cause an adverse effect. Invasive plant treatments could create additional food for aquatic mollusks, through additional sunlight or indirect effects from herbicide in the water. Therefore, the proposed project may affect but is not likely to lead to a trend toward federal listing for western ridged mussel.

Cumulative Effects

Because there are no anticipated direct or indirect effects from the proposed treatments, there will be no cumulative effects when combined with other ongoing or reasonably foreseeable activities on the forest.

Herbicides

There are no available studies on background levels of herbicides or pesticides within Hells Canyon. Very low amounts of herbicide could be introduced into suitable habitat from the proposed project, and add to any contaminants already present in the river, but there is no data available to analyze this potential. Long-term exposure to herbicides could affect aquatic snails (Tate et al. 1997). This project will not create long-term exposures, as any herbicide inadvertently introduced into the water would move quickly downstream. Available toxicity studies are conducted with much longer exposures than could occur from the proposed project, so there is no indication that cumulative effects from herbicides are likely.

Summary of Effects and Determination for western ridged mussel

Invasive plant treatments may impact individuals but is not likely to lead to a trend toward federal listing for western ridged mussel. Impacts are likely insignificant in scale and scope.

Shortface Lanx (Fisherola nuttalli) - Documented

This freshwater limpet is found in the Columbia River drainage system of the Pacific Northwest, including Idaho, Washington, Oregon, and Montana. Its presence in the Columbia River drainage in British Columbia is assumed from the discovery of a shell (Clarke 1981). It may also occur in the Okanagan River drainage in British Columbia. Populations have been lost from most tributaries and almost all the Columbia River itself. It has been confirmed in the Deschutes

River of Oregon (Neitzel and Frest 1990). In Idaho, it occurs in the Middle and Upper Snake River reaches from Elmore Co., upstream to at least Bingham Co. Populations also occur in the Salmon River and Hell's Canyon of the Snake River including parts of Nez Perce and Idaho Counties. Populations within Idaho persist in parts of the Salmon and Snake Rivers.

The NatureServe ranks for shortface lanx are G2, N2, and S1S2 in Oregon – Imperiled to Critically Imperiled (NatureServe 2013).

Shortface lanx feeds by scraping algae and diatoms (periphyton) from rock surfaces in the streams. It is likely food for fish and amphibians.

Specific threats to populations of shortface lanx have been identified as loss of habitat through impoundments, degraded water quality and siltation of cobbles, loss of rocky substrate, as well as nutrient enrichment. Effluence from agriculture, industry, and urban and residential developments has reduced water quality in much of the known range (Stagliano et al., 2007).

Preferred Habitat

Specific habitat appears to be streams and rivers at least 30 meters wide and up to 100 meters wide. Waters are unpolluted, cold, well-oxygenated, with a permanent flow and cobble-boulder substrate (Neitzel and Frest 1990). It occurs on diatom covered rocks in the main channels, or fast-flowing water (rapids), of the streams (Neitzel and Frest 1989). Aquatic plants and algae are generally rare to absent where it is located.

Project Area Information

Shortface lanx have been documented on the Forest in the Snake and Imnaha Rivers.

Direct and Indirect Effects

Direct and indirect effects are similar to those discussed above for the western ridged mussel, but with somewhat less likely impacts. These snails occur in more rapid flowing and cold streams, which occur higher in the watersheds and there are generally fewer invasive plant infestations in those locations. No adverse direct or indirect effects are expected.

Cumulative Effects

The potential for cumulative effects from the proposed action to this aquatic snail would be very similar at those discussed for western ridged mussel. No cumulative effects from the proposed project are expected.

Summary of Effects and Determination for shortfaced lanx

Invasive plant treatments may impact individuals but is not likely to lead to a trend toward federal listing for shortfaced lanx. Impacts are likely insignificant in scale and scope.

Columbia Pebblesnail (Fluminicola fuscus) – Documented

Also known as the ashy pebblesnail, this aquatic mollusk formerly occurred in the Lower Snake and Columbia River drainages in Washington, Oregon, Idaho, British Columbia, and possibly Montana (Frest and Johannes, 1995; Hershler and Frest, 1996). There currently are sites documented from the Columbia River within the Columbia River Gorge National Scenic Area, the Snake River in Hells Canyon, and the Deschutes River.

NatureServe ranks are G2, N2 and S1 in Oregon – imperiled to critically imperiled.

This snail feeds by scraping bacteria, diatoms and other organisms from rock surfaces.

Threats include impoundments created by dams, and agricultural or waste-water runoff with high nutrient levels.

Preferred Habitat

It is found in larger tributaries and rivers, on upper surfaces of stable rocks in fast current. Columbia pebblesnail requires cold water with high oxygen content.

Project Area Information

There are documented records of Columbia pebblesnail on the forest, likely in Hells Canyon and Grande Ronde River areas.

Direct and Indirect Effects

Direct and indirect effects are similar to those discussed above for the western ridged mussel, but with somewhat less likely impacts. These snails occur in more rapid flowing and cold streams and there are generally fewer invasive plant infestations in those locations. No adverse direct or indirect effects are expected.

Cumulative Effects

The potential for cumulative effects from the proposed action to this aquatic snail would be very similar at those discussed for western ridged mussel. No cumulative effects from the proposed project are expected.

Summary of Effects and Determination for Columbia pebblesnail

Invasive plant treatments may impact individuals but is not likely to lead to a trend toward federal listing for Columbia pebblesnail. Impacts are likely insignificant in scale and scope.

Hells Canyon Land Snail (Cryptomastix (Bupiogona) populi) - Suspected

Also known as the Poplar Oregonian , this terrestrial snail is found only around the junction of Oregon, Washington, and Idaho, where it is considered critically imperiled (NatureServe State Rank S1; NatureServe 2013. The Poplar Oregonian has been found along a limited portion of the northern Hells Canyon (Snake River) drainage, the Lewiston and Clarkston area, and the lowermost few miles of the lower Salmon River canyon (Frest and Johannes 1995a). Most known colonies occur at slope bases along major river corridors, including the Snake River and

Salmon River. The range includes Wallowa County in Oregon and may extend down the Snake River to Clarkston, Washington (Frest and Johannes 1995a).

Preferred Habitat

This snail is unusual in that it is adapted to drier habitats than most terrestrial snails. It is found mostly in moderately xeric, rather open and dry, large-scale basalt taluses. It is usually found at lower elevations on steep, cool (generally north or east-facing) lower slopes in major river basins. Talus vegetation may include Celtus, Artemisia, Prunus, Balsamorrhiza, grasses, Seligeria, and some bryophytes. The surrounding vegetation is generally sage scrub (Frest and Johannes 1995a).

Threats include grazing, road work, and disturbance of talus habitat. Grazing is extensive in much of the area of original habitat, and the species appears to be absent from heavily grazed areas. One colony in Washington appears to have been extirpated solely from grazing.

Road construction along river corridors through talus deposits may also affect populations, resulting in direct mortality as well as potential hydrologic changes that may threaten local populations. Roadside spraying poses another threat to some colonies (Frest and Johannes 1995a).

The use of talus for road realignment and maintenance also has negative effects. Roadwork on U.S. Highway 12 west of Clarkston, near White Bird and Lewiston, has resulted in extirpation of large colonies (Frest and Johannes 1995a).

Project Area Information

The Hells Canyon land snail is not known to occur on the forest.

Direct and Indirect Effects

Manual, mechanical, and herbicide activities can cause surface disturbance or trampling, potentially killing terrestrial snails. However, manual and mechanical methods are unlikely considering this snail's preferred habitat of talus slopes.

Herbicides

There is limited data regarding herbicide toxicity to land snails – the few studies available are from studies conducted on brown garden snails (*Helix aspersa*) exposed to picloram and glyphosate. In Schuytema et al. (1994), snails were fed food contaminated with the herbicides at concentration up to 5000 mg/kg for 14 days. Neither glyphosate nor picloram appeared to pose a risk to the snail. The effect on hatching success and embryo development of H. aspersa snail eggs was tested for glyphosate, a European formulations of Roundup®, and a commercial nonylphenol polyethoxylate (NPE) surfactant (Agral®) (Druart, et al. 2010). After 14 days of exposure, hatching success for glyphosate alone was equivalent to controls, indicating that glyphosate itself had no effect. The formulation Roundup® completely inhibited hatching at 225 mg/l. Hatching response to NPE was quite variable, with EC50 (50% reduction in hatching success) ranging from 26 – 85 mg/l. Druart, et al. (2010) observed the embryo development of non-hatched eggs from the hatching success studies. They report that "embryos exposed to glyphosate were blocked late in their development…" This result is presumably from Roundup® since glyphosate itself did not alter hatching success. They report that "all non-hatched embryos exposed to Agral® (NPE) stopped developing at early stages of embryogenesis…"

Based on the limited data available, glyphosate and picloram do not appear to pose a risk to terrestrial snails. It appears unlikely that herbicides are likely to pose serious toxic risk to terrestrial snails, but this conclusion of risk is made with the reservation that data is extremely limited.

Cumulative Effects

Since this snail is not known to occur on the Wallowa-Whitman NF, cumulative effects cannot be evaluated. However , due to the restricted and specific nature of the snail's habitat, it is highly unlikely that any populations would be exposed to herbicides from multiple sources. Based on limited data available, the proposed action is unlikely to create effects that could be added to other effects to the snail or its habitat.

Summary of Effects and Determination for Hells Canyon Land Snail

The proposed project will not affect Hells Canyon land snail.

Fir Pinwheel (Radiodiscus abietum) - Documented

This terrestrial snail occurs only in Oregon, Washington, Idaho and Montana (NatureServe 2013). It occurs in the Hells Canyon river valley. It feeds on organic detritus and microorganisms on leaf surfaces, such as molds and bacteria.

Preferred Habitat

Most often found in moist and rocky Douglas-fir (*Pseudotsuga menziesii*) forest at mid-elevations in valleys and ravines (Frest and Johannes 1995a). At some Montana locations, Western red cedar (*Thuja plicata*) formed the canopy. Often this species is found in or near talus of a variety of rock types or under fallen logs (Pilsbry 1948, Brunson and Russell 1967, Frest and Johannes 1995b). Moist sites are preferred, low on slope or near persistent water sources, but outside of floodplains.

Logging and grazing over most of the known range are probably the greatest threats, through alteration of appropriate habitat. However, alteration of habitat from fire, highway and road construction, rural home development and land clearing could represent threats. Due to a lack of data on susceptibility to chemicals, fire suppression retardants, pesticides, and other chemicals might also impact the snails. Drying of sites is considered a major concern. This snail, like most others, feeds on organic detritus and microorganisms on leaf surfaces, such as molds and bacteria.

NatureServe ranks are G4 (apparently secure) and S1 in Oregon (critically imperiled).

Threats include logging of relatively intact moderate-elevation Douglas fir forest; grazing of much of the logged terrain; highway construction and other right-of-way impacts; severe forest fires (Frest and Johannes 1995).

Project Area Information

Fir pinwheel have been documented on the Forest in the past, but there are no current known sites recorded. The only currently known site in Oregon appears to be outside the forest above the city of Weston (Duncan and Huff 2009).

Direct, Indirect and Cumulative Effects

Effects to fir pinwheel would be the same as discussed above for Hells Canyon land snail, as their habitat associations are similar.

Western Bumble Bee – Documented

The western bumble bee was among the two most abundant bumblebees in most of western North America until fairly recently. While there were perhaps millions of populations in 1998, and the range and area of occupancy were huge, there is no basis for assessing how many populations still exist, how many of them are potentially viable, or what the current range is. In less than 15 years this has gone from the second most common bumblebee in the western US to undetectable in substantial areas and rare elsewhere except in the far north and perhaps highest elevations. The decline of this subgenus is on-going and continent-wide. Rao and Stephen (2010) indicate that this once common species no longer occurs in coastal and valley regions of Oregon. The Oregon Natural Heritage Program has records from several places in 2006-2008, mostly single bees, but 49 were found in a prairie in northeastern Oregon during 2007-2008 (NatureServe 2013). The Xerces Society has 2012 records only for one place each in Oregon, Washington, and Wyoming, and from one place each in Colorado and Montana in 2011, and a different place in Montana in 2010. The Xerces Society considers this species in steep decline and COSEWIC (Committee on the Status of Endangered Wildlife in Canada) considers it of conservation concern in Canada. The decline appears to have spread considerably from 2005-2010. Although there is not enough data yet to confirm a population rebound, western bumble bees were found in 2014 in areas that they had not been seen in for many years (Doughton 2014).

The NatureServe State rank for Oregon is S1S2 – imperiled to critically imperiled. A Global Rank is difficult to define since this species is such rapid and steep decline.

The major threats to bumble bees include: spread of pests and diseases by the commercial bumble bee industry, other pests and diseases, habitat destruction or alteration, pesticides, invasive species, natural pest or predator population cycles, and climate change (Xerces Society 2013). Like other severely declining bumblebees, the main cause of decline of western bumble bees is thought to be pathogen spillover of a particularly virulent, probably imported, strain of the microsporidian (*Nosema bombi*) and an imported protozoan parasite (Crithidia bombi) from domesticated bumblebees (this species and *Bombus impatiens*) that were reared in Europe and returned to the U.S. for greenhouse pollination (e.g. Committee on Status of Pollinators, 2007, Colla and Packer, 2008, Evans et al., 2008; Federman, 2009 and references reviewed in all). The major decline of the subgenus Bombus was first documented in this species, specifically as Nosema nearly wiped out commercial hives, leading to the cessation of commercial production of this species. Wild populations crashed simultaneously. The timing, speed, and severity of the population crashes strongly supports the idea that an introduced disease caused the decline of these bees.

Some pesticides can pose a risk to bumble bees. Neonicotinoids are new systemic and persistent insecticides that are very toxic to bees. In 2013, use of this type of insecticide on street and parking lot trees in Wilsonville and Hillsboro, Oregon resulted in the death of an estimated 50,000 bumble bees (OregonLive.com 2013a,b). The bumble bees killed were yellow-faced bumblebees (*Bombus vosnesenskii*) (Hilburn 2013).

Bumble bees are also threatened by invasive plants and insects (Xerces Society 2013). The invasion and dominance of native grasslands by exotic plants may threaten bumble bees by directly competing with the native nectar and pollen plants that they rely upon.

Preferred Habitat

Bumble bees are generalist foragers and do not depend on any one flower type (Xerces Society 2013). Food plants for the western bumble bee include plants in the genera *Melilotus, Cirsium, Trifolium, Centaurea, Chrysothamnus,* and *Eriogonum.* The *Cirsium* and *Centaurea* genera include invasive plants targeted in the proposed project.

Project Area Information

Western bumble bees have been documented on the forest. There are 58 observations or sites (not necessarily discrete sites) recorded for the Wallowa-Whitman NF. Due to the abundance of known food plants, western bumble bees are not habitat-limited.

Direct and Indirect Effects

Manual and mechanical treatments are not expected to directly affect western bumblebees as they are very mobile and can leave the area when treatments occur. Also, they rely on a wide range of nectar plants, so the removal of invasive plants would not limit their food availability.

Herbicides

The honey bee is a standard test subject for required toxicity testing of pesticides, so there is data on risk to bees in the risk assessments for all herbicides included in this project. Considering the herbicides proposed for use in this project, only glyphosate and triclopyr pose a potential risk to bees.

For glyphosate, a relatively large number of acute toxicity studies have been conducted on bees and other species of terrestrial insects using both technical grade glyphosate as well as various glyphosate formulations, for both contact spray and dietary exposures (Appendix 4 in SERA 2011). Contact spray of glyphosate does not pose a risk of mortality to bees. Consumption of contaminated food can pose a risk to terrestrial invertebrates at the highest application rate (at typical rate no HQs are greater than 1). For glyphosate without the POEA surfactant, only the upper bound estimates at the highest application rate exceeded the NOAEL (HQ= 2-4). For formulations with POEA surfactant, at the highest application rate, HQ's range from 1.8 in the central estimate to 9 for the upper exposure assumptions.

Imazapyr poses no risk to bees even at the highest application rate proposed in this project. EPA classifies imazapyr as practically non-toxic to bees and the results of the Forest Service risk assessment state that this conclusion is clearly justified. Neither contact nor estimated oral doses exceeded the NOAEL (HQ <1), even at the highest application rate and upper exposure estimates.

Similarly, picloram at the highest application rate and upper exposure estimates did not exceed the NOAEL (HQ<1) for bees in direct contact or estimated dietary exposures.

Triclopyr TEA and BEE at the highest application rates and upper exposure estimates exceed the NOAEL for dietary exposures (HQ = 2-5). Central estimates of exposure, even at the highest application rates are equivalent to the NOAEL. Direct spray scenarios do not pose a risk to bees (SERA 2011).

None of the other herbicides indicated a risk to bees in the risk assessments.

It should be noted that all estimates of dietary exposure are based on consumption of fruit, grass or other vegetation by terrestrial insects, rather than nectar or pollen. If invasive plants are sprayed when flowers are not present, risk to western bumblebees would be greatly reduced.

Treating infestation of invasive plant populations while they are still small would reduce risk to western bumblebees because it would limit potential exposure to glyphosate or triclopyr.

Direct and Indirect Effects Conclusion

Manual and mechanical treatments will not affect western bumble bees. Glyphosate and triclopyr could adversely affect western bumble bees if they fed on contaminated flowers. This potential adverse effect is unlikely to occur for the following reasons:

- Invasive plants are often treated before they flower to reduce the potential for seed set.
- PDF A-1 requires that occurrence of sensitive species and their habitat is confirmed prior to treatments. Treatment methods and timing can be adjusted to avoid impacts if bumble bees are found.
- Target invasive plants provide only a small number of the wide variety of food plants utilized by western bumble bees.

Cumulative Effects

<u>Vegetation Management and Prescribed Fire</u>

Several vegetation and fuels management projects are ongoing or proposed on the Wallowa-Whitman over the next decade including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West

Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, Lower Joseph. Patrick Cr., Morgan Nesbitt, and Dry Creek. These projects will result in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested forest-wide. Prescribed fire and vegetation management, including both commercial and non-commercial thinning, has the potential to impact the habitat of western bumblebee. There is a possibility that host plant species could be impacted by vegetation and fuels treatments and this effect could be cumulative for invasive plant species that would be eradicated by proposed treatments. However, bumblebees will feed on many different species of plants so even if one species was completely eliminated from an area, there would still be sufficient alternate floral resources available so an effect to bumblebees would be highly unlikely.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. There would be no impact to bumblebees from firewood collection because it does not impact bumblebee habitat so there would be no cumulative effect when combined with proposed treatments.

Livestock Grazing

Livestock grazing occurs across the forest and does occur within bumblebee habitat. Grazing has the ability to impact habitat of western bumblebees by alteration of the plant community as well as trampling of burrows used for nesting and hibernation. Herbicide treatments combined with grazing could have a cumulative effect on plants used by bumblebees. However, herbicide treatments would target invasive plant species which are typically not preferred by cattle and PDF A-1 requires that occurrence of sensitive species and their habitat is confirmed prior to treatments. Treatment methods and timing can be adjusted to avoid impacts if bumble bees are found and target invasive plants provide only a small number of the wide variety of food plants utilized by western bumble bees. Because potential direct/indirect effects are unlikely to occur then cumulative effects are also unlikely to occur.

Mining

Mining occurs across the forest and could occur within bumblebee habitat. The ground disturbance associated with mining could cause disturbance to bumblebee habitat, causing them to leave the immediate vicinity of an active mining claim in the short term while mining is actively occurring. However, the alteration of habitat would be very localized and small scale and suitable habitat is available across the forest so there would be no effect to bumblebees from mining. Because there is no effect to bumblebees from mining there would be no cumulative effects when combined with proposed invasive species treatments.

Motorized Access – Transportation System

Driving on roads has the potential to cause direct mortality to bumblebees from vehicle collisions. The reasonably foreseeable future action of limiting motorized travel to existing roads, with some exceptions to accommodate camping or other permitted activities, would likely have no impact on bumblebees because motorized travel is not currently believed to be impacting bumblebee populations. Because there are no predicted impacts to bumblebees from roads and any travel management, the proposed invasive species treatments will not have a cumulative effect or lead to a trend toward federal listing for the western bumblebee.

Recreation

The projected increases in the human population in Oregon will likely increase recreation on the National Forests. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. None of these activities typically impact bumblebees. Because there would be no impact to bees from recreation, there would be no cumulative effect from proposed invasive species treatments and no resulting trend toward federal listing.

Boardman to Hemingway (B2H) Transmission Line

The Boardman to Hemingway (B2H) Transmission Line proposed route has the potential to impact bumblebee habitat. However, bumblebees are highly mobile and would likely find suitable habitat elsewhere on the forest. In addition the right-of-way that will be created and maintained for the transmission line could actually create habitat for bumblebees by maintaining open foraging habitat with floral resources. In addition, it is unlikely that direct/indirect effects from herbicide treatments would occur so it is unlikely there would be a cumulative effect when combined with the effects of the transmission line.

Herbicides – Because western bumblebees can fly a long distance, and invasive plants that could be utilized by them are present on other ownerships, the bees could be exposed to herbicides in addition to the herbicides used in this project. There is no data on potential synergistic effects from a combination of sublethal doses of herbicides to bees. The herbicides proposed for use in the project are generally low toxicity to bees and synergism is not usually a concern with low toxicity chemicals (ATSDR 2004, USEPA 2000). Glyphosate and triclopyr could pose a risk to bees at high application rates, and these are common herbicides. Western bumblebees that are exposed to a lower dose of glyphosate or triclopyr from the proposed project could receive additional doses from other sites while foraging, resulting in toxic doses to the bees. This is not anticipated to occur for the following reasons:

- Triclopyr is not the herbicide used on the invasive plants utilized by bumble bees.
- Glyphosate is not the primary herbicide utilized on invasive plants utilized by bumble bees.
- Picloram and clopyralid are the primary herbicides used on thistles and knapweeds visited by bumble bees. Bumble bees would need to ingest double the modeled exposure at the highest application rate to exceed the NOEL. This is possible under a cumulative effects scenario, but is unlikely because exposure from the proposed project is not expected to occur.
- PDF A-1 would eliminate exposure from the proposed project.

Silver-bordered fritillary – Boloria selene - Documented

This butterfly is Holarctic in distribution. In North America, it is found from Alaska east to Newfoundland and south to Oregon, New Mexico, northern Illinois, and Virginia. Populations are demonstrably secure globally, but are rare in parts of its range, particularly on peripheries (Butterflies and Moths of North America 2014). East of the Cascades in Oregon and Washington represent the western edge of this butterfly's range in the lower 48 states of the United States. Between early June to mid-August populations in the vicinity of Big Summit Prairie, Crook County and in central Grant County fly in a single annual brood (Warren 2005). Two annual broods are likely to occur in Baker Co. from mid- and late May.

NatureServe ranks are G5 – secure, and in Oregon, S2 – imperiled.

Preferred Habitat

Boloria selene can be found in bogs, open riparian areas, and in marshes containing a large amount of willow (*Salix* spp.) and larval food plants (Warren 2005). Adults lay eggs on or near violets, usually marsh violet (*Viola palustris*) and bog violet (*V. nephrophylla*) (Andrews 2010a). Butterfly adults feed on nectar of various composites, as well as mints and Verbena (Pyle 2002).

The primary threat to this butterfly is loss of habitat through succession and drying of meadows.

Project Area Information

Silver-bordered fritillary has been documented on the forest in the Southern Wallowa Range north of Halfway, and Baker Co. (Andrews, Huff, and Vora 2010).

Direct and Indirect Effects

Mechanical treatments are not proposed in the meadow and riparian habitat for this butterfly. Manual treatments in meadows near violet species could trample caterpillars if not timed properly. Willows and violets and other native food plants are not the target for treatment activities, nor would they be removed by treatment efforts. However, PDF A-1 would confirm habitat and species presence prior to treatments so adverse effects would be avoided.

Herbicides

Herbicides could affect butterflies directly, or through affects to adult nectar plants or caterpillar host plants. Specific data on herbicide effects to butterflies are limited. Russell and Schultz (2009) tested the toxicity of sethoxydim (in the formulation Poast®) to the larvae of Puget blue butterfly (*Icaricia icarioides blackmorei*), a Washington species of concern, and the non-native small white or cabbage white butterfly (*Pieris rapae*). Larvae were directly sprayed and also fed on sprayed food plants, mimicking a spring application. It should be noted that Poast® contains a petroleum solvent, which could be an important factor in the toxicity results. Due to issues with the exposure methodology for the cabbage white butterfly, and because it is a non-native species, results discussed here will focus on results for the native Puget blue. Poast® did not alter percent survival of larvae, biomass of pupae, adult biomass, or morphological characteristics, but did cause earlier emergence from the pupae, and adults had smaller wing sizes. The effects of the sethoxydim formulation to the Puget blue butterfly were all sublethal effects (Russell and Schutlz 2009). The authors suggest that applications made in late summer and fall would reduce effects to species like the Puget blue which stop feeding in summer and when larvae retreat to ground litter.

Stark, Chen and Johnson (2012) tested the toxicity of triclopyr BEE (in the formulation Garlon 4 Ultra®), sethoxydim (in the formulation Poast®) and imazapyr (in the formulation Stalker®) to Behr's metalmark butterfly (*Apodemia virgulti*). Larvae were directly sprayed and fed on sprayed food plants. All three herbicide formulations reduced the number of individuals reaching the pupae stage. If larvae did reach the pupae stage, there was 100% emergence to the adult stage. For Garlon 4 Ultra®, pupae weight was significantly larger and adult abdomen length significantly longer than controls. Poast® and Stalker® did not affect other parameters measured. The authors suggest that the effects were likely caused by the inert ingredients or combinations of inert ingredients, or effects of the formulations on food plant quality because the herbicide active ingredients tested all have different modes of action (Stark, Chen, and Johnson 2012).

Effects on populations in field applications may be different than individual toxicity tests. Bramble et al. (1997) conducted a series of studies on the effects of using commercial formulations of herbicides (including glyphosate, picloram, triclopyr, and metsulfuron methyl with various surfactants) in rights-of-way maintenance, compared with mechanical maintenance and observed no significant or substantial differences in butterfly populations.

Avoiding spraying of native food plants would avoid herbicide impacts to butterflies. No larval food plants for silver bordered fritillary would be targeted by applications for invasive plant control, although they could be contaminated by drift if treatments were in close proximity. The adults of this butterfly can feed on plants in the Composite family, which includes several species of target invasive plants. Neither species is reported to heavily use or rely upon invasive plant species for nectar, so visits to invasive plant species would likely be incidental and infrequent.

Due to limited data, risks to butterfly species from herbicide exposure cannot be ruled out, but substantial effects to silver-bordered fritillary are not expected for the following reasons:

- PDF A-1 would confirm habitat and species presence prior to treatments so adverse effects would be avoided.
- Available data indicate primarily sub-lethal effects to butterfly larvae.
- Larval plant species are not the target for treatments.
- Invasive plant species that may be visited by adults are typically treated before flowering to reduce likelihood of seed set.

Cumulative Effects

<u>Vegetation Management and Prescribed Fire</u>

Several vegetation and fuels management projects are ongoing or proposed on the Wallowa-Whitman over the next decade including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West

Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, Lower Joseph. Patrick Cr., Morgan Nesbitt, and Dry Creek. These projects will result in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested forest-wide. Prescribed fire and vegetation management projects have project design features that protect the riparian and meadow habitat that the silver-bordered fritillary uses so there would be no effect from vegetation and fire projects and thus no cumulative effects when combined with the proposed invasive species treatments.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. There would be no impact to silver-bordered fritillary from firewood collection because it does not occur within suitable habitat so there would be no cumulative effect when combined with proposed treatments.

Livestock Grazing

Livestock grazing occurs across the forest and does occur within fritillary habitat. Grazing has the ability to impact habitat of the silver-bordered fritillary by alteration of the plant community. Herbicide treatments combined with grazing could have a cumulative effect on plants used by fritillaries. However, herbicide treatments would target invasive plant species which are typically not preferred by cattle and PDF A-1 requires that occurrence of sensitive species and their habitat is confirmed prior to treatments. Treatment methods and timing can be adjusted to avoid impacts if fritillaries are found. Because potential direct/indirect effects are unlikely to occur then cumulative effects are also unlikely to occur.

Mining

Mining occurs across the forest but project design features protect the riparian and meadow habitat that fritillaries use so there would be no effect from mining. Because there is no effect to fritillaries from mining there would be no cumulative effects when combined with proposed invasive species treatments.

Motorized Access – Transportation System

Driving on roads has the potential to cause direct mortality to fritillaries from vehicle collisions. The reasonably foreseeable future action of limiting motorized travel to existing roads, with some exceptions to accommodate camping or other permitted activities, would likely have no impact on fritillaries because motorized travel is not currently believed to be impacting fritillary populations. Because there are no predicted impacts to fritillaries from roads and any travel management, the proposed invasive species treatments will not have a cumulative effect or lead to a trend toward federal listing for the silver-bordered fritillary.

Recreation

The projected increases in the human population in Oregon will likely increase recreation on the National Forests. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. None of these activities result in any measurable effect to fritillaries because they are so small in scale. Because there would be no impact to fritillaries from recreation, there would be no cumulative effect from proposed invasive species treatments and no resulting trend toward federal listing.

Boardman to Hemingway (B2H) Transmission Line

The Boardman to Hemingway (B2H) Transmission Line proposed route has the potential to impact fritillary habitat. However, fritillaries are highly mobile and would likely find suitable habitat elsewhere on the forest. In addition the right-of-way that will be created and maintained for the transmission line could actually create habitat for fritillaries by maintaining open foraging habitat with floral resources. Also, it is unlikely that direct/indirect effects from herbicide treatments would occur so it is unlikely there would be a cumulative effect when combined with the effects of the transmission line.

Herbicides

There are no cumulative effects to butterfly larvae because they are restricted to a specific site and herbicide treatments elsewhere would not add to those from the proposed action. The movement of adult butterlies between populations or locations is not reported, but we will assume they can forage over long distances. If so, adults could be exposed to herbicides from other projects in addition to the proposed project and presumably adult butterflies could receive a dose that would be toxic to them. However, data on risk to adult butterflies from herbicide-treated flowers is extremely limited, so definitive conclusions are not possible. Based on the proposed project, design criteria, and typical invasive plant treatments which are not done during flowering, substantial cumulative effects appear unlikely.

Johnson's Hairstreak - Callophrys johnsoni -Documented

The current range of this butterfly is uncertain. The species is considered to be very localized and scarce with few "big" years (Xerces Society 2013). It apparently occurs in Southwest British Columbia, south in Coast Ranges to San Francisco Bay in California; south in Cascades and Sierra Nevada to Yosemite, and in the Blue Mountains of eastern Oregon (NatureServe 2013). It has been found on multiple sites on the: Willamette NF; Deschutes NF; Umpqua NF; Rouge River/Siskiyou NF; Fremont-Winema National Forests; Umatilla NF; and Wallowa-Whitman NF (Xerces Society 2013).

NatureServe ranks list this species as vulnerable globally and in the U.S. (G3 and N3, respectively), and imperiled (S2) in Oregon.

Logging and fire are primary threats to existing populations (Xerces Society 2013Mistletoe control and BTK (*Bacillus thuringiensis* var. *kurstaki*) applications (Lepidoptera are susceptible to BTK) to control defoliating insects threaten local areas. Hybridization with thicket hairstreak (*C. spinetorum*) may be affecting some populations (Andrews 2010b). Herbicide applications to adult nectar plants would also be a concern.

Preferred Habitat

Johnson's hairstreak is found in forests which contain dwarf mistletoe . It is thought that old growth and late successional forests provide the best habitat for the mistletoe, but it is also present in younger stands which have not experience recent disturbance (Andrews 2010b). It occurs mostly in older coniferous forests infected by dwarf mistletoe, particularly western hemlocks infected by *Arceuthobium tsugense*, and ponderosa pine infected by *Arceuthobium campylopodum* (Davis 2010). Conifer forests with dwarf mistletoe are common and widespread, so the butterfly does not appear to be habitat limited (Andrews 2010). Caterpillars feed on all exposed plant parts and secrete a sugary solution which is used by ants that in turn protect the caterpillar from predators. Adults obtain nectar on low plants in numerous genera, such as Mount Hood pussypaws (*Calyptridium umbellatum*), mountain whitethorn (*Ceanothus cordulatus*), Oregon grape (*Mahonia aquafolium*), Pacific dogwood (*Cornus nuttallii*), and other species in the genera *Rubus, Actostophylos, Ceanothus, Cornus, Fragaria, Rorippa* and *Spraguea* species (Andrews 2010b, Pyle 2002; Pyle 1981, Xerces Society 2013). The only invasive plant noted as an adult food plant is dandelion (Andrews 2010b).

Project Area Information

Johnson's hairstreaks were documented on the forest prior to 1980 and a survey protocol test in 2010 confirmed two sites on the forest (Davis 2010).

Direct and Indirect Effects

No effects to Johnson's hairstreak will occur from manual, mechanical or herbicide control of invasive plants because the larval food plant occurs high in the canopy of conifer trees and no reported adult food plants would be treated.

Cumulative Effects

The proposed project will have no effect on Johnston's hairstreak butterfly, so effects will not cumulate with other potential effects from other actions.

Intermountain Sulphur - *Colias occidentalis pseudochristina = Colias Christina* - Documented

This subspecies, Intermountain or Western Suphur is found from the eastern Blue Mountains in Washington, through the Blue and Ochoco Mountains in Oregon, along the Snake River in Idaho, and south into western Utah. There are numerous locations in Oregon within the Ochoco, Aldrich, Blue and Wallowa Mountains.

NatureServe ranks list this species as vulnerable globally, and critically imperiled in Washington, but it has not been ranked in Oregon, Idaho or Utah (NatureServe 2014).

Loss of habitat due to agricultural conversion and development are the primary threats to this species. Aerial spraying of Btk (*Bacillus thuringiensis* var. *kurstaki*) for forest defoliating moths has weakened and eliminated several populations of this subspecies in eastern Oregon (Hammond 2009, pers. comm., as cited in USFS/BLM 2009). Additionally, the widespread spraying of Dimilin, pyrethroids, and organophosphates for grasshopper control occurs yearly in the range of this species (ODA 2008, Walenta 2008), and may pose further threats.

Preferred Habitat

This species inhabits open woodland from 1036 to 1524 m (3400 to 5000 ft.), including meadows, roadsides, and open forest. Hammond (2009, pers. comm., as cited in USFS/BLM 2009) describes the subspecies habitat as sagebrush with scattered Ponderosa Pine, including both south- and east-facing slopes. The larvae of this subspecies feed on pea plants (*Lathyrus* species), including Bonneville pea (*L. brachycalix*), Lanzwert's pea (*L. lanzwertii*), fewflower pea (*L. pauciflorus*), and Sierra pea (*L. nevadensis*) (Hammond 2009, pers. comm. ., as cited in USFS/BLM 2009). The adult butterflies use a variety of plants as nectar sources, and males may occasionally be seen frequenting mud puddles (Warren 2005).

Project Area Information

This species has been documented to occur on the Wallowa-Whitman NF.

Direct and Indirect Effects

Invasive plants may occur within the general habitat for this butterfly. None of the reported larval food plants are a target for treatment. The larval food plants are not known to be in the vicinity of invasive plant treatment areas, so are not likely to be damaged or disturbed by treatments. Adults feed on a wide variety of plants, but invasive plant species are not reported to be those which they utilize. Adult butterflies could leave areas with treatment disturbance, are not limited by the amount of food plant habitat, and are widespread in Oregon, so no effect to either larvae or adults is anticipated from invasive plant treatments for non-herbicide methods.

Herbicides

Adults are not reported to utilize invasive plants. Assuming they could visit thistles or knapweeds as do other pollinators, visits to invasive plant species would likely be incidental and infrequent. Risk from herbicide exposure would be the same as that discussed for silver-bordered fritillary.

Due to limited data, risks to butterfly species from herbicide exposure cannot be ruled out, but substantial effects to intermountain sulphur are not expected for the following reasons:

- PDF A-1 would confirm habitat and species presence prior to treatments so adverse effects would be avoided.
- Available data indicate primarily sub-lethal effects to butterfly larvae.
- Larval plant species are not the target for treatments.
- Invasive plant species that may be visited by adults are typically treated before flowering to reduce likelihood of seed set.

Therefore, invasive plant treatments may affect individual adult butterflies, but are not likely to lead to a trend toward federal listing.

Cumulative effects

<u>*Vegetation Management and Prescribed Fire*</u>

Several vegetation and fuels management projects are ongoing or proposed on the Wallowa-Whitman over the next decade including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, Lower Joseph. Patrick Cr., Morgan Nesbitt, and Dry Creek. These projects will result in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested forest-wide. Vegetation management and particularly prescribed fire have the potential to impact the open woodland habitat that the intermountain sulphur prefers through alteration of habitat and or mortality of larvae. Sulphurs could be displaced to alternate habitat elsewhere on the forest. Predicted herbicide effects, if any, are not likely to cause mortality so there should be no cumulative mortality occurring when combined with vegetation management and prescribed fire. PDF A-1 would confirm habitat and species presence prior to treatment, larval plant species are not the target for treatments, and invasive plant species that may be visited by adults are typically treated before flowering to reduce likelihood of seed set. Because adverse effects from herbicide are unlikely, cumulative effects are also unlikely.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. There would be no impact to the intermountain sulphur from firewood collection because it occurs at such a small scale so there would be no cumulative effect when combined with proposed treatments.

Livestock Grazing

Livestock grazing occurs across the forest and does occur within intermountain sulphur habitat. Grazing has the ability to impact habitat of the intermountain sulphur by alteration of the plant community. Herbicide treatments combined with grazing could have a cumulative effect on plants used by the intermountain sulphur. However, herbicide treatments would target invasive plant species which are typically not preferred by cattle and PDF A-1 requires that occurrence of sensitive species and their habitat is confirmed prior to treatments. Treatment methods and timing can be adjusted to avoid impacts if intermountain sulphurs are found. Because potential direct/indirect effects are unlikely to occur then cumulative effects are also unlikely to occur.

Mining

Mining occurs across the forest and could occur within intermountain sulphur habitat. The ground disturbance associated with mining could cause sulphurs to leave the immediate vicinity of an active mining claim in the short term while mining is actively occurring. However, the alteration of habitat would be very localized and small scale and suitable habitat is available across the forest so there would be no effect to intermountain sulphurs from mining. Because there is no effect to intermountain sulphurs from mining there would be no cumulative effects when combined with proposed invasive species treatments.

Motorized Access – Transportation System

Driving on roads has the potential to cause direct mortality to intermountain sulphurs from vehicle collisions. The reasonably foreseeable future action of limiting motorized travel to existing roads, with some exceptions to accommodate camping or other permitted activities, would likely have no impact on the intermountain sulphur because motorized travel is not currently believed to be impacting intermountain sulphur populations. Because there are no predicted impacts to intermountain sulphurs from roads and any travel management, the proposed invasive species treatments will not have a cumulative effect or lead to a trend toward federal listing for the intermountain sulphur.

Recreation

The projected increases in the human population in Oregon will likely increase recreation on the National Forests. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. None of these activities result in any measurable effect to intermountain sulphurs because they are so small in scale. Because there would be no impact to intermountain sulphurs from recreation, there would be no cumulative effect from proposed invasive species treatments and no resulting trend toward federal listing.

Boardman to Hemingway (B2H) Transmission Line

The Boardman to Hemingway (B2H) Transmission Line proposed route has the potential to impact intermountain sulphur habitat. However, intermountain sulphurs are highly mobile and would likely find suitable habitat elsewhere on the forest. In addition the right-of-way that will be created and maintained for the transmission line could actually create habitat for intermountain sulphurs by maintaining open foraging habitat with floral resources. Also, it is unlikely that direct/indirect effects from herbicide treatments would occur so it is unlikely there would be a cumulative effect when combined with the effects of the transmission line.

Herbicides

There are no cumulative effects to butterfly larvae because their food plants are not likely in the vicinity of invasive plant treatment sites nor are they the target of treatments, and their specific restricted locations make it infeasible for them to be impacted by herbicide treatments elsewhere. Intermountain sulphur butterflies are known from several locations in the Blue Mountains, so it is possible that adults could be exposed to herbicides from other projects in addition to the proposed project. If so, presumably adult butterflies could receive a dose that would be toxic to them. However, they are not reported to utilize invasive plant species , so visiting enough flowers that have been treated with herbicides to receive a dose of concern seems unlikely. However, data on risk to adult butterflies from herbicide-treated flowers is extremely limited, so definitive conclusions are not possible. Based on the proposed project, design criteria, the lack of information on utilization of invasive plant species, and the widespread nature of their locations in the Blue Mountains, substantial cumulative effects to adult butterflies appears unlikely.

Yuma Skipper - Ochlodes Yuma - Documented

The Yuma skipper butterfly occurs primarily in the intermountain west of the U.S. – northern New Mexico north to Washington and east to Colorado. Populations in Oregon and Washington are widely scattered and among those considered "outliers", but are tentatively included within the subspecies that occurs in Nevada (i.e. *O.y. lutea*) (Cary, DeLay and Pfeil 2011). This butterfly is restricted to areas which contain its single obligate plant, common reed (*Phragmites australis*); namely marshes, riparian zones, pond edges, seeps, sloughs, springs and irrigation canals. However, Pyle (2002) noted adults in a small population in Klickitat County, Washington were associated with an ornamental grass (*Miscanthus spp.*). Common reed is thought to be one of the most widespread plants on earth and is ubiquitous throughout North America. Recent research using genetic markers indicate 3 strains of common reed occur in the U.S.; the native strain, an introduced invasive strain from Europe, and a Gulf Coast strain in the southern U.S. (Swearingen and Saltonstall 2010).

Males often perch on common reed awaiting females. Females deposit their eggs on or near the host plant. Caterpillars feed on common reed and also roll up leaves of their host plants to use as shelters (Allen, et al. 2005; Pyle, 2002; Opler, et al. 2006). Adults nectar on a variety of flowers including thistles and yellow composites (Pyle, 2002).

As a species, the Yuma skipper is widely distributed and relatively secure (Opler, et al. 2006). However, in Oregon and Washington it is known from only a few populations in three widely separated areas. NatureServe (2014) ranks this species as globally secure. It is not ranked in most states, but Oregon and Washington are ranked as critically imperiled (S1).

Site specific threats are unknown but general threats include loss of wetland habitats to urban or agricultural uses, pesticide spraying (especially the use of organophosphates and pyrethroids for mosquito control), and grazing damage to wetland habitat. There is a question about the ability of *O. yuma* to use the non-native strain of *P. australis*; if *O. yuma* are unable to utilize the non-native strain of *P. australis*, then the colonization of this butterfly's habitat by non-native strains of *P. australis* would likely be a threat to this skipper. However, *O. y. sacramentorum* is known to use the non-native strain of *P. australis* (Pelham personal communication, as cited in USFS/BLM 2007).

In Oregon and Washington the Yuma skipper has one flight period from early July to early September, peaking in August (Pyle, 2002).

Preferred Habitat

The Yuma skipper is found around common reed patches in and around freshwater marshes, streams, oases, ponds, seeps, sloughs, springs, and canals (Pyle, 2002 and Opler, et al. 2006).

Project Area Information

This butterfly is commonly found along the Imnaha River in Wallowa County. Common reed (*P. australis*) is not a target weed for treatment on the Wallowa-Whitman NF because it is so ubiquitous.

Direct and Indirect Effects

Effects to the Yuma skipper larvae are not anticipated because their food plant is not targeted for treatment. Adults feed on a wide variety of plants, including some invasive plants such as thistles. Adult butterflies could leave areas with treatment disturbance, are not limited by the amount of food plant habitat, so no effect to either larvae or adults is anticipated from invasive plant treatments for non-herbicide methods.

Herbicides

Risk to butterflies from herbicides is discussed above for silver-bordered fritillary. The larval food plants are not targeted for treatments, and risks to larvae appear to be primarily sub-lethal, so no effects to larvae Yuma skippers is expected. Data on risk of herbicides to adult butterflies is lacking. Yuma skipper are reported to visit thistles, so they could presumably be exposed to herbicides from the proposed project. However, invasive plants are typically treated prior to flowering to reduce the chance of seed set, which would reduce the likelihood of exposure.

Due to limited data, risks to butterfly species from herbicide exposure cannot be ruled out, but substantial effects to Yuma skipper are not expected for the following reasons:

- PDF A-1 would confirm habitat and species presence prior to treatments so adverse effects would be avoided.
- Available data indicate primarily sub-lethal effects to butterfly larvae.
- Larval plant species are not the target for treatments.
- Invasive plant species that may be visited by adults are typically treated before flowering to reduce likelihood of seed set.

Cumulative Effects

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the Wallowa-Whitman over the next decade including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, Lower Joseph. Patrick Cr., Morgan Nesbitt, and Dry Creek. These projects will result in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested forest-wide. Prescribed fire and vegetation management projects have project design features that protect the marshy habitat that the Yuma skipper uses so there would be no effect from vegetation and fire projects and thus no cumulative effects when combined with the proposed invasive species treatments.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. There would be no impact to the Yuma skipper from firewood collection because it does not occur within suitable habitat so there would be no cumulative effect when combined with proposed treatments.

Livestock Grazing

Livestock grazing occurs across the forest and could occur adjacent to Yuma skipper habitat. Grazing has the ability to impact habitat of the Yuma skipper because cattle congregate at ponds, potentially impacting the reed community. However, herbicide treatments would not impact those same reed communities and PDF A-1 requires that occurrence of sensitive species and their habitat is confirmed prior to treatments. Treatment methods and timing can be adjusted to avoid impacts if Yuma skippers are found. Because potential direct/indirect effects are unlikely to occur then cumulative effects are also unlikely to occur.

Mining

Mining occurs across the forest but project design features protect the marshy habitat that Yuma skippers use so there would be no effect from mining. Because there is no effect to Yuma skippers from mining there would be no cumulative effects when combined with proposed invasive species treatments.

Motorized Access – Transportation System

Driving on roads has the potential to cause direct mortality to Yuma skippers from vehicle collisions. The reasonably foreseeable future action of limiting motorized travel to existing roads, with some exceptions to accommodate camping or other permitted activities, would likely have no impact on Yuma skippers because motorized travel is not currently believed to be impacting Yuma skipper populations. Because there are no predicted impacts to Yuma skippers from roads and any travel management, the proposed invasive species treatments will not have a cumulative effect or lead to a trend toward federal listing for the Yuma skipper.

Recreation

The projected increases in the human population in Oregon will likely increase recreation on the National Forests. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. None of these activities result in any measurable effect to Yuma skippers because they are so small in scale. Because there would be no impact to Yuma skippers from recreation, there would be no cumulative effect from proposed invasive species treatments and no resulting trend toward federal listing.

Boardman to Hemingway (B2H) Transmission Line

The Boardman to Hemingway (B2H) Transmission Line proposed route has the potential to impact Yuma skipper habitat. However, Yuma skipper are highly mobile and would likely find suitable habitat elsewhere on the forest. Also, it is unlikely that direct/indirect effects from herbicide treatments would occur so it is unlikely there would be a cumulative effect when combined with the effects of the transmission line.

Herbicides

There are no cumulative effects to butterfly larvae because their food plants are not likely in the vicinity of invasive plant treatment sites nor are they the target of treatments, and their specific restricted locations make it infeasible for them to be impacted by herbicide treatments from other projects elsewhere. Yuma skipper butterflies are known only from a few locations Oregon. The movement of adult butterlies between populations or locations is not reported, but we will assume they can forage over long distances. If so, adults could be exposed to herbicides from other projects in addition to the proposed project and presumably adult butterflies could receive a dose that would be toxic to them. However, data on risk to adult butterflies from herbicide-treated flowers is extremely limited, so definitive conclusions are not possible. Based on the proposed project, design criteria, and typical invasive plant treatments which are not done during flowering, substantial cumulative effects appear unlikely.

3.3.7 Effects to Management Indicator Species

The paragraphs below replace the Cumulative Effects discussion for the following Management Indicator Species found on the corresponding pages of the 2010 FEIS indicated below:

Elk, pages 252 – 253

Northern goshawk, page 255

Pileated woodpecker and cavity excavators, page 256

American marten, pages 258 – 259

The remainder of this section is unchanged.

Rocky Mountain Elk

Cumulative Effects

Many other ongoing Forest Service activities and reasonably foreseeable actions (described in Table 2) , as well as activities conducted by other entities within and outside of NFS land, cause ground disturbance which can create conditions favorable to invasive plants. Potentially, this disturbance could create a continual or increasing need to treat invasive plants. These activities are potential sources of disturbance to elk and could create a cumulative effect when combined with the disturbance created by invasive plant treatments, although elk are not particularly sensitive to short-term disturbance associated with most invasive plant treatments. Treatment caps limit the amount of treatment that would be approved annually regardless of invasive species spread.

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph. These projects, and other similar projects to be implemented in the next 10-15 years, are expected to result in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually forest-wide. Prescribed fire and vegetation management, including both commercial and non-commercial thinning, has the potential to impact elk and elk habitat. While there would be some removal of big game hiding cover that could leave deer and elk more vulnerable to predation, each project would comply with Forest Plan standards that require leaving a sufficient amount of hiding cover within each analysis area. In general, vegetation and fuels treatments create more nutritious forage for deer and elk and are considered beneficial. Increasing the amount of available forage would not likely result in a measurable increase in elk populations on the forest. However, it may influence the distribution of elk across the landscape over the next decade. Proposed invasive species treatments may improve habitat for elk and potentially compliment beneficial changes in habitat from vegetation management or prescribed fire projects.

Firewood Collection

The collection of firewood occurs across the forest, primarily adjacent to roads. Any impact to elk from firewood collection would result from the short-term disturbance that occurs while woodcutters are actively cutting wood. Disturbance from firewood collection, when combined with the short-term disturbance associated with invasive species treatments, could cause additional displacement of elk while these activities are occurring. However, elk tend to avoid roads where firewood collection typically occurs and the possibility that elk would be in invasive species treatment areas is low so the risk of a cumulative effect is relatively low.

Livestock Grazing

Grazing occurs across the forest within suitable elk habitat. Cattle have been known to displace deer and elk, causing them to use the landscape differently. Big game may use steeper slopes in the presence of livestock than they would otherwise. In addition, cattle can directly compete with elk for forage. However, grazing allotment management plans take elk habitat into consideration and grazing is implemented so as to prevent a decline in elk populations on the forest. Disturbance associated with the proposed invasive species treatments, when combined with potential impacts from grazing, may further influence distribution of elk on the landscape in the short-term while invasive species treatments are actively occurring but would not impact elk populations.

Mining

Mining occurs across the forest within suitable elk habitat. The activities associated with mining may cause disturbance to elk, causing them to leave the immediate vicinity of an active mining claim in the short term while mining is actively occurring. Proposed invasive species treatments could cause additional disturbance in the short term, causing elk to avoid those areas.

Motorized Access /Transportation System

Elk are known to avoid roads and high road densities are associated with poor elk habitat quality. The reasonably foreseeable future action of regulating motorized travel to designated roads, trails, and areas, with some exceptions to accommodate camping or other permitted activities, would increase elk habitat quality and improve elk distribution across the forest. An improvement in elk habitat quality resulting from invasive species treatments could further improve elk distribution on the landscape.

Recreation

The projected increases in the human population in Oregon will likely increase recreation on the National Forests. This could increase human-related disturbance to elk. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. Game hunting is highly regulated but other recreational activities have the potential to increase and cause additional disturbance to elk. Disturbance associated with invasive species treatments could further influence elk distribution on the landscape.

Boardman to Hemingway (B2H) Transmission Line

Effects on elk could include temporary displacement of animals resulting from construction noise and activity and the conversion of cover into forage resulting from vegetation maintenance within the right-of-way.

Herbicide Use

Elk occur within areas that have invasive plant infestations and could be exposed to some herbicides. However, invasive plants are not a preferred forage item, so exposure from ingesting treated invasive plants is expected to be low and there is no indication that elk would be exposed to harmful levels of herbicide from the proposed project (FEIS 2010, p.248-253). Elk may be exposed to herbicides on other ownerships because they travel large distances. Herbicide use outside of National Forests is not reported and the amount of exposure is unknown. Within and near the forest, invasive plant treatments are likely the primary target for herbicide use on private, agricultural, utility corridors, County, State and other lands. Glyphosate is the only herbicide for which we have sufficient data to conclude that there may be a potential for cumulative (additive) doses to wildlife (see Basis for Cumulative Effects section). The potential for additive doses from other herbicides, or synergistic effects from combinations of herbicides or other pesticides, would be speculative because there is insufficient data to address these issues (see also Incomplete and Unavailable Information section).This project would use a maximum of 16,000 lbs of glyphosate per year, on 8,000 acres across the entire forest. The most sensitive effect from glyphosate ingestion on experimental mammals is diarrhea, which occurs at 350 mg/kg. Males weigh about 700 pounds (315 kg); females weigh about 500 pounds (225 kg). Assuming a conservative 400 lb. (181 kg) elk (smaller animals eat more food/day), the animal would need to consume over 63,350 mg to experience this affect. In the exposure scenario where a large mammal consumes an entire day's diet of directly sprayed grass (glyphosate at 2 lbs/acre), the dose received was 37 mg/kg, or 6,697 mg for a 400 lb elk. An individual elk would need to receive a dose almost 10 times the estimated dose from the exposure scenario to experience a toxic effect from glyphosate. In an acute exposure scenario, the elk would have to eat 10 times more than they normally do in one day to receive a toxic dose. Given the very small percentage of elk habitat infested by invasive plants (less than 1 percent), the scattered natured of the infestations, the very high amount of sprayed forage that an elk would need to eat to receive a toxic effect, and because elk do not graze substantially on invasive plants, there is no cumulative effect to elk from herbicide use.

Spread of weeds

Current and future activities, as well as natural disturbances such a fire, floods, and actions by wildlife, create bare ground which can be colonized by invasive plants. These disturbances would create the need for future weed treatments, under the Early Detection/Rapid Response protocol in the EIS, and these treatments would likely overlap the ranges of elk herds. As discussed above, there is no indication that these additional treatments, even if done with herbicides, would pose a risk to elk. Invasive plant infestations would likely decrease habitat quality for elk. Future invasive plant infestations could modify the distribution of elk as they seek out more palatable forage. EDRR treatments of new infestations would help prevent invasive plants from adversely influencing elk distribution.

Aggregate Cumulative Effects to Elk

In summary, the past, present and future activities on the landscape, when added to the activities in the proposed project, could create additional stressors such as disturbance and potential herbicide exposure. The potential for these stressors to cumulatively affect elk has been discussed above and although some adverse impacts are possible, based on the above analysis and the following rationale, there are no effects that would alter local populations or adversely affect distribution and use of the forest by elk because there is no indication of contribution to elk mortality, reduced reproduction, or a reduction in available and suitable habitat for elk caused by the past, present and future activities that would be made worse by the proposed action. Less than 1 percent of the total suitable elk habitat on the forest is proposed for treatment. The possibility that elk would be in treatment areas is low because habitats that become dominated by invasive plants are often not used by elk and many of the proposed treatment sites occur along open roads which are typically avoided by elk. Long-term improvement in elk foraging habitat outweighs anticipated adverse effects. Any disturbance and displacement would be short term (a few days). The herbicides proposed for use do not bioaccumulate and treatment caps limit the total acres treated in any one year, whether it is an existing or new infestation. There is no indication that elk could consume enough contaminated vegetation to experience an adverse effect. Prevention measures in the WWNF LRMP reduce the introduction, establishment and spread of invasive plants from management activities. Invasive plant treatments, particularly EDRR on new infestations, would help alleviate impacts to forage for elk.

Northern Goshawk

Contributions to potential cumulative effects

Many other ongoing Forest Service activities and reasonably foreseeable actions (both described in Table 2) , as well as activities conducted by other entities within and outside of NFS land, cause ground disturbance which can create conditions favorable to invasive plants. Potentially, this disturbance could create a continual or increasing need to treat invasive plants. However, prevention standards that apply to NFS lands would minimize invasive plant spread. Treatment caps limit the amount of treatment that would be approved regardless of invasive plant spread. This project could add to the amount of habitat or individual birds that may be disturbed by human activities as described categorically by type of work below.

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph. These projects, and other similar projects to be implemented in the next 10-15 years, are expected toresult in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually forest-wide. Prescribed fire and vegetation management, including both commercial and non-commercial thinning have the potential to reduce goshawk nesting habitat. However, Forest Plan standards protect active goshawk nests from timber harvest and prescribed fire. When more forest openings are created there may be an increase in goshawk foraging habitat and hunting success. In addition, bird and mammal species that goshawks prey on may respond positively to vegetation treatments. The proposed project may improve habitat for prey of goshawks and potentially compliment beneficial changes in hunting habitat from vegetation management or prescribed fire projects.

Firewood Collection

Firewood collection does not affect northern goshawks because it occurs on such a small scale that it does not impact nesting or foraging habitat. Because there are no effects to goshawks from firewood cutting, there would be no cumulative effects when combined with this project.

Livestock Grazing

Livestock grazing occurs across the forest within suitable goshawk foraging habitat. Grazing does not directly impact goshawks and grazing management plans consider habitat needs of their prey, so impacts to goshawk populations are unlikely. Because there would be no impacts to goshawksfrom grazing, there would be no cumulative effects when combined with this project.

Mining

Mining occurs across the forest within suitable goshawk foraging habitat. The activities associated with mining may cause temporary disturbance to goshawks, causing them to avoid hunting in the immediate vicinity of an active mining claim in the short term while mining is actively occurring. The cumulative impact could result in additive temporary disturbance to foraging goshawks. However, the contribution of invasive plant treatments would be minor, especially considering the PDF J-3 and because disturbance from invasive plant treatments is short-term, limited in spatial scale, and of low intensity. Mining has no effect on nesting goshawks because forest plan standards protect all raptor nests sites in use.

Motorized Access /Transportation System

Driving on roads could cause direct mortality to individual goshawks if a vehicle collision were to occur. Most goshawks would avoid roads so collisions are expected to be a rare occurrence. The proposed project does not create a risk of mortality to goshawks, so there would be no cumulative effect from motorized access or the transportations system.

Recreation

The projected increases in the human population in Oregon will likely increase recreation on the National Forests. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. This could increase human presence in habitat used by northern goshawks. The proposed project would contribute very low levels of human activity in addition to other general activities and human presence in goshawk habitat, but is not expected to result in a substantial change in goshawk hunting or reproductive success because disturbance is short-term, very limited in spatial scale, and avoids impacts to nesting due to PDF J-3.

Boardman to Hemingway (B2H) Transmission Line

Goshawk habitat is known to occur within the proposed powerline right-of-way. The project would remove vegetation along the right-of-way, potentially causing a shift in goshawk distribution. Vegetation removal and other activities associated with the transmission line would not impact goshawk or their prey species at the population level because the scale of activities is small relative to the amount of suitable goshawk habitat on the forest. Construction of the transmission line could cause disturbance, causing goshawks to forage elsewhere during construction. Invasive plant treatments could add to this, but are very minor in comparison. Invasive plant treatments are not expected to contribute to a significant cumulative effect because the treatments are short in duration (days) compared to the relatively long construction timeframe, limited in extent, and low intensity. Because the transmission line would not adversely impact goshawk, there would be no cumulative effect when combined with this project.

Herbicide Use

Results disclosed in the FEIS remain the same – no estimated dose from predatory birds consuming contaminated prey exceeded the NOAEL, even at highest application rates.

Using glyphosate as an indicator for potential multiple exposures from other uses outside of the WWNF, glyphosate did not produce a toxic effect to birds at the highest doses tested for acute exposures. Estimated dose from one day's diet of contaminated prey was 0.01 mg/kg at typical application rates (0.04 mg/kg at highest application rates), while the NOAEL for birds (for the most toxic formulation containing POEA surfactant) is 540 mg/kg (SERA 2011). Thus, even if exposure to contaminated prey as a result of glyphosate use on other lands occurred, toxic effects would be highly unlikely because northern goshawks could not consume enough prey in one day to receive an acute toxic dose – they would need to consume over 13,000 times more prey in one day than they normally eat in order to just reach the no-effect level.

Chronic or cumulative doses to a predatory bird cannot be quantified but doses exceeding a level of concern are also unlikely because the proposed herbicides do not bioaccumulate and are rapidly excreted.

Northern goshawks could be exposed to herbicides, via their prey, from other uses outside of the WWNF, but using glyphosate as an indicator, additive or cumulative doses are unlikely to cause an effect. Also, the proposed invasive plant treatments are of short duration (a few days), limited in spatial scale, and low intensity, minimizing the likelihood that their prey could be contaminated from the project.

Cumulative Effects – Spread of invasive plants

Current and future activities, as well as natural disturbances such a fire, floods, and actions by wildlife, create bare ground which can be colonized by invasive plants. These disturbances would create the need for future weed treatments, under the Early Detection/Rapid Response protocol in the EIS, and these treatments would likely overlap the ranges of northern goshawk. As discussed above, there is no indication that these additional treatments, even if done with herbicides, would pose a risk to goshawks. Invasive plant infestations would likely alter some foraging habitat for goshawks. Future invasive plant infestations could modify the distribution of goshawks as their prey seeks out more palatable forage. Given the wide range of goshawks, there is no indication that this would limit food availability. EDRR treatments of new infestations would prevent invasive plants from influencing prey distribution.

Aggregate Cumulative Effects to the northern goshawk

In summary, the past, present and future activities on the landscape, when added to the activities in the proposed project, could create stressors such as disturbance to foraging goshawk, a shift in prey distribution from vegetation changes, and potential herbicide exposure. The potential for these stressors to affect goshawk has been discussed above and there is no indication that this would result in a cumulative effect for goshawk for several reasons. Other projects and activities within the WWNF follow the same guidelines with respect to seasonal and spatial restrictions within nest sites, so the proposed project is not expected to add to disturbance to nesting goshawks from vegetation management, prescribed fire projects, the B2H Transmission line or other projects. The low intensity of activity associated with the project, the widely dispersed treatment sites, and adherence to PDF J-3 and J-5 would ensure that project activity does not add appreciably to general human activity and potential disturbance as a result of dispersed recreation. Potential vegetation changes from vegetation management, prescribed fire, grazing, and the B2H Transmission when added to control of invasive plants from the proposed project could be beneficial to prey species, and open up additional hunting habitat. Prevention measures required of all projects on the WWNF reduce the introduction, establishment and spread of invasive plants from other management activities, also limiting the percentage of goshawk habitat that would be treated. There is no indication that doses of herbicides from multiple sources could add up to a harmful dose, even assuming highest application rates. Herbicide exposure is unlikely given the preferred habitat of northern goshawks and because their prey do not typically nest in or forage exclusively on invasive plants.

Pileated Woodpecker and Other Cavity Excavators

Cumulative Effects

Many other ongoing Forest Service activities and reasonably foreseeable actions (described in Table 2) , as well as activities conducted by other entities within and outside of NFS land, cause ground disturbance which can create conditions favorable to invasive plants. Potentially, this disturbance could create a continual or increasing need to treat invasive plants. These activities are potential sources of disturbance to cavity excavators and could create a cumulative effect in combination with the disturbance created by invasive plant treatments. Treatment caps limit the amount of treatment that would be approved annually regardless of invasive species spread.

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph. These projects, and other similar projects to be implemented in the next 10-15 years, are expected to result in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually forest-wide. These treatments have the potential to impact cavity excavators through direct mortality, loss of habitat, and disturbance. However, these vegetation and fuels treatments are designed to maintain habitat and viable populations for these species. There is potential for a cumulative effect to occur if the proposed invasive species treatments were to overlap with vegetation treatments in time and space. This could result in additional short-term disturbance to cavity excavators. However, the disturbance would be limited to the time that treatments are actively occurring and birds would be expected to resume their normal behavior shortly after activity ceases. Aside from short-term disturbance, no other cumulative effects are expected because invasive species treatments would not impact habitat or cause mortality to primary cavity excavators.

Firewood Collection

Firewood collection occurs across the forest, primarily adjacent to roads. Firewood collection has the potential to impact habitat and cause mortality and disturbance to primary cavity excavators. The disturbance associated with firewood cutting could create a cumulative effect when combined with the disturbance associated with invasive species treatments. However, the disturbance would be very small-scale and limited to the time that treatments are actively occurring and birds would be expected to resume their normal behavior shortly after activity ceases. Aside from short-term disturbance, no other cumulative effects are expected because invasive species treatments would not impact habitat or cause mortality to primary cavity excavators.

Livestock Grazing

Livestock grazing occurs across the forest and does occur within cavity excavator habitat. However, grazing does not cause disturbance to cavity excavators so there would be no cumulative impact from grazing combined with the proposed invasive species treatments.

Mining

Mining occurs across the forest and does occur within cavity excavator habitat. The activities associated with mining could cause disturbance to cavity excavators, causing them to leave the immediate vicinity of an active mining claim in the short term while mining is actively occurring. The disturbance associated with mining could create a cumulative effect when combined with the disturbance associated with invasive species treatments. However, the disturbance would be very small-scale and limited to the time that treatments are actively occurring and birds would be expected to resume their normal behavior shortly after activity ceases. Aside from short-term disturbance, no other cumulative effects are expected because invasive species treatments would not impact habitat or cause mortality to primary cavity excavators.

Motorized Access /Transportation System

Driving on roads has the potential to cause direct mortality to individual birds from vehicle collisions. The reasonably foreseeable future action of regulating motorized travel to designated roads, trails, and areas, with some exceptions to accommodate camping or other permitted activities, would likely have no impact on cavity excavators because motorized travel is not currently believed to be impacting cavity excavator populations.

Recreation

The projected increases in the human population in Oregon will likely increase recreation on the National Forests. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. None of these activities have the potential to impact habitat of cavity excavators but could cause temporary disturbance to individuals. This disturbance could create a cumulative effect when combined with the disturbance associated with invasive species treatments. However, the disturbance is limited to the time that treatments are actively occurring and birds would be expected to resume their normal behavior shortly after activity ceases.

Boardman to Hemingway (B2H) Transmission Line

Primary cavity excavators could experience modification of foraging and nesting habitat due to construction of access roads, tower structures, and maintenance. Mortality of birds could occur due to collisions with the transmission line or towers. Birds may abandon nests during breeding season as a result of increased stress from human presence and construction activities. Construction of tall structures that could be used by raptors for perching or nesting in habitats where perches are otherwise limited could increase raptor hunting success and predation on cavity excavators. The proposed invasive species treatments would not impact the habitat or mortality of cavity excavators but the disturbance associated with the treatments could overlap with the disturbance created by the construction and maintenance of the transmission line, possibly resulting in altered behavior of primary cavity excavators during the time at which the disturbance is taking place. However, the birds would likely resume their normal behavior shortly after the disturbance ceases.

Herbicide Use

Pileated woodpeckers would not be exposed to herbicides from the proposed project because of their nesting and foraging habits, therefore this project would not add to other potential exposure and there are no cumulative effects to pileated woodpeckers from herbicide use.

Other cavity excavators may be exposed to herbicides on other ownerships because they travel large distances. Herbicide use outside of National Forests is not reported and the amount of exposure is unknown. Within and near the forest, invasive plant treatments are likely the primary target for herbicide use on private, agricultural, utility corridors, County, State and other lands. Glyphosate is the only herbicide for which we have sufficient data to conclude that there may be a potential for cumulative (additive) doses to wildlife (see Basis for Cumulative Effects section). The potential for additive doses from other herbicides, or synergistic effects from combinations of herbicides or other pesticides, would be speculative because there is insufficient data to address these issues (see also Incomplete and Unavailable Information section, Chapter 3 in 2010 FEIS, and Appendix P of the R6 2005 FEIS).

For glyphosate, acute dietary exposures up to 5000 mg/kg did not result in toxic effects to birds. Estimated acute exposure from one day’s worth of ingesting contaminated insects was 810 mg/kg at the highest application rate – well below the highest doses tested. Since this dose estimates an entire day’s worth of food, there is no cumulative effect from foraging on other lands where glyphosate may have been used. That is, primary cavity excavators are unlikely to ingest substantially more food in one day, so regardless of where contaminated insects may be encountered; there is no indication of cumulative acute risk to birds.

There is no data available on long-term residues of herbicides on insects, so risk of chronic exposure to contaminated insects cannot be quantitatively evaluated. However, it appears unlikely for their prey to be contaminated. This project would target only invasive plants for herbicide treatments and there is no indication that insect prey of cavity excavators is found on invasive plants.

Spread of Weeds

Current and future activities, as well as natural disturbances such as fire, floods, and actions by wildlife, create bare ground which can be colonized by invasive plants. These disturbances would create the need for future weed treatments, under the Early Detection/Rapid Response protocol in the EIS, and these treatments would likely overlap the ranges of Cavity excavators. As discussed above, there is no indication that these additional treatments, even if done with herbicides, would pose a risk to cavity excavators.

Aggregate Cumulative Effects to Primary Cavity Excavators

In summary, the past, present and future activities on the landscape, when added to the activities in the proposed project, could create stressors such as disturbance and potential herbicide exposure. The potential for these stressors to affect cavity excavators has been discussed above and there is no indication that this would result in a cumulative effect other than short-term disturbance because there is no indication that the proposed invasive species treatments contribute to primary cavity excavator mortality, reduced reproduction, altered availability of insect prey, or reduction in available and suitable habitat for primary cavity excavators. The only potential cumulative impact from the proposed invasive species treatments combined with other activities on the forest would be the increased disturbance resulting from the additional human presence associated with the proposed and ongoing activities. This disturbance would be small in scale and short-term and would not impact primary cavity excavators beyond the time and area at which treatments or activities are actively occurring. Primary cavity excavators do not ingest invasive plants directly and most insects utilized by these species occur within dead wood, under bark, or other areas that would not be exposed to herbicides. Use of herbicide is not expected to reach a level of concern because even additive exposures are all below an HQ = 1 (i.e. less than the NOAEL). Aerial broadcast application of herbicides would occur largely in areas with larger invasive plant infestations, which are less likely to be selected for nesting or foraging habitat. The herbicides proposed for use do not bioaccumulate and treatment caps limit the total acres treated in any one year, whether it is an existing or new infestation. Prevention measures in the WWNF LRMP reduce the introduction, establishment and spread of invasive plants from management activities. Invasive plant treatments, particularly EDRR on new infestations, would help alleviate impacts to vegetation, reducing risks to primary cavity excavators and their insect prey.

American Marten

Cumulative Effects

Many other ongoing Forest Service activities and reasonably foreseeable actions (Table 2) , as well as activities conducted by other entities within and outside of NFS land, cause ground disturbance which can create conditions favorable to invasive plants. Potentially, this disturbance could create a continual or increasing need to treat invasive plants. These activities are potential sources of disturbance to marten and could create a cumulative effect when combined with the disturbance created by invasive plant treatments. Treatment caps limit the amount of treatment that would be approved annually regardless of invasive species spread.

Vegetation Management and Prescribed Fire

Several vegetation and fuels management projects are ongoing or proposed on the WWNF including Snow Basin, Bird Track, Sandbox, Trail, Cold Canal, Puderbaugh, Anthony Lakes White Bark Pine, Pinus Creek Aspen, Limber Jim, Eastface, West Sumpter, Ladd Canyon TSI, Chesnimnus Elk Burn, Cove II WUI, and Lower Joseph. These projects, and other similar projects to be implemented in the next 10-15 years, are expected toresult in approximately 1,000 acres of fuels treatments, 10,000 acres of prescribed burning, 3,000 acres of non-commercial thinning, and an average of 25-35 million board feet harvested annually forest-wide. Prescribed fire and vegetation management, including both commercial and non-commercial thinning, has the potential to impact marten habitat. While there would be some removal or simplification of marten habitat that could displace marten or leave them more vulnerable to predation, each project would comply with Forest Plan standards that require leaving a sufficient amount and quality of marten habitat to support viable populations on the forest. However, vegetation treatments and prescribed burning has the potential to influence the distribution of marten across the landscape over the next decade. Disturbance associated with the proposed invasive species treatments could result in additional displacement of marten while treatments are actively occurring but this effect would be short-term and localized.

Firewood Collection

The collection of firewood occurs across the forest, primarily adjacent to roads. Any impact to marten from firewood collection would result from the short-term disturbance that occurs while woodcutters are actively cutting wood. Disturbance from firewood collection, when combined with the short-term disturbance associated with invasive species treatments, could cause additional displacement of marten while these activities are occurring. However, marten tend to avoid roads where firewood collection typically occurs and the possibility that marten would be in invasive species treatment areas is low so the risk of a cumulative effect is relatively low.

Livestock Grazing

Livestock tend to avoid marten habitat due to the difficulty of walking through areas with large amounts of downed wood and the relative lack of suitable forage within these areas. There would be no cumulative effect to marten from livestock grazing when combined with invasive species treatments.

Mining

There are no active mining claims within suitable marten habitat on the forest so there would be no cumulative effect when combined with invasive species treatments.

Motorized Access /Transportation System

Marten are known to avoid roads. The reasonably foreseeable future action of regulating motorized travel designated roads, trails, and areas, with some exceptions to accommodate camping or other permitted activities, could improve marten distribution across the forest. However, because there are no invasive species treatments proposed within marten habitat, there is unlikely to be any cumulative effect from travel management when combined with the proposed invasive species treatments.

Recreation

The projected increases in the human population in Oregon will likely increase recreation on the National Forests. This could increase human-related disturbance to marten. Recreational activities in the analysis area include game hunting, mushroom and berry gathering, hiking/packing and both developed and dispersed camping. Game hunting is highly regulated but other recreational activities have the potential to increase and cause additional disturbance to marten. Disturbance associated with invasive species treatments could further displace marten into adjacent habitat in the short-term while disturbance was taking place.

Boardman to Hemingway (B2H) Transmission Line

The transmission line does not pass through suitable marten habitat so there would be no cumulative effect when combined with proposed invasive species treatments.

Herbicide Use

Martens may be exposed to herbicides on other ownerships because they travel large distances. However, due to their preference for remote areas and forested habitat with less herbicide use than open areas, the likelihood of this occurring is very low. Herbicide use outside of National Forests is not reported and the amount of exposure is unknown. Within and near the forest, invasive plant treatments are likely the primary target for herbicide use on private, agricultural, utility corridors, County, State and other lands. Glyphosate is the only herbicide for which we have sufficient data to conclude that there may be a potential for cumulative (additive) doses to wildlife (see Basis for Cumulative Effects section). The potential for additive doses from other herbicides, or synergistic effects from combinations of herbicides or other pesticides, would be speculative because there is insufficient data to address these issues (see also Incomplete and Unavailable Information section).

This project would use a maximum of 16,000 lbs of glyphosate per year, on 8,000 acres across the entire forest. The most sensitive effect from glyphosate ingestion on experimental mammals is diarrhea, which occurs at 350 mg/kg. A marten weighs about 1-3 lbs (0.5-1.5 kg). A 3 lb. (1.5 kg) marten would need to consume over 525 mg to experience this affect. In the exposure scenario where a canid/carnivore consumes an entire days diet of directly sprayed prey (glyphosate at 2 lbs/acre), the dose received was 4.2 mg/kg, or 6.3 mg for a 3 lb. marten. An individual marten would need to receive a dose 83 times the estimated dose from the exposure scenario to experience a toxic effect from glyphosate. Put another way, a marten would have to eat 83 times their normal daily intake of food, and all of it would need to be contaminated, in order to receive a dose that matched the lowest known effect level. Given the wide distribution of invasive plant treatments, the low amount of glyphosate in each treatment, and the extremely low likelihood that a marten prey items would be contaminated by glyphosate, there is no indication that a cumulative dose of glyphosate is likely, and therefore no cumulative effect to martens from herbicide use.

Effects of repeated herbicide use on the same acreage would be based on the rate of the herbicide used and its persistence in the environment. Project Design Features do not allow repeated use within a year (sulfometuron methyl - PDF H7) or two years (picloram - PDF H6), two of the most persistent herbicides among those proposed for use on the WWNF. In addition, herbicide use on treated acres would decline as target populations became smaller. Thus, there is no indication that repeated treatments on the same acreage would have cumulative effects on the marten.

Spread of Weeds

Current and future activities, as well as natural disturbances such a fire, floods, and actions by wildlife, create bare ground which can be colonized by invasive plants. These disturbances will create the need for future weed treatments, under the Early Detection/Rapid Response protocol in the EIS, and these treatments could overlap marten habitat. As discussed above, there is no indication that these additional treatments, even if done with herbicides, would pose a risk to marten. EDRR treatments of new infestations would help prevent invasive plants from adversely influencing marten habitat.

Aggregate Cumulative Effects to Marten

In summary, the past, present and future activities on the landscape, when added to the activities in the proposed project, could create additional stressors such as disturbance and potential herbicide exposure. The potential for these stressors to cumulatively affect marten has been discussed above and although adverse impacts are possible, based on the above analysis and the following rationale, there are no effects that would alter local populations or adversely affect distribution and use of the forest by marten because approximately 99% of the forest-wide marten habitat would be unaffected under all alternatives and it is unlikely that an animal would occur within a treatment site. Distribution and use of the Forest by marten would remain unchanged. There are no adverse effects related to reproduction or recruitment of local marten populations, so no population level effects would occur. Any disturbance and displacement would be short term (a few days). Prevention measures in the WWNF LRMP reduce the introduction, establishment and spread of invasive plants from management activities. The herbicides proposed for use do not bioaccumulate and treatment caps limit the total acres treated in any one year, whether it is an existing or new infestation. No herbicide exposures for carnivores exceeded the NOAEL, and cumulative doses that would pose a risk of exceeding the NOAEL are implausible.

3.4.3 Soil and Water- Environmental Consequences

> The paragraph below is provided as an addition to the discussion of "Clean Water Act Compliance" found on pages 310-311 of the 2010 FEIS. It provides information on National Pollutant Discharge Elimination System (NPDES) permitting requirements, new since publication of the 2010 FEIS.

The Environmental Protection Agency has expanded the National Pollutant Discharge Elimination System (NPDES) permitting program to include pesticide applications on, near or over waters of the United States. Pesticide applications to control weed and algae pests in, over or at water's edge from point sources require a Pesticide General Permit (PGP). Forest Service units in Oregon obtain the PGP from Oregon Department of Environmental Quality; in Idaho, the PGP is obtained from the EPA. The Oregon permit (File #121983) was obtained May 5, 2012; the Idaho permit (#IDG87A709) was obtained as of May 2, 2012. Both permits are on file.

> The paragraphs below replace the Cumulative Effects discussions for soil and water resources found on the following pages of the 2010 FEIS:
>
> Page 290
>
> Pages 292 - 293
>
> Page 293
>
> Page 300
>
> Pages 311 - 313
>
> The remainder of this section is unchanged.

Soil

Introduction and Indices of Measure

This section discusses the potential for positive and negative cumulative effects from invasive plant treatment in light of past, ongoing and potential future activities in the project area. The cumulative effects analysis area for soils is the activity area assigned to a project (FSM 2521.05, Region 6 Supplement). For this project, an activity area is an individual area or polygon planned for treatment of invasive plants. Thus, cumulative effects to soils would only be possible if any past, ongoing or future foreseeable activity directly overlaps a treatment site.

Invasive plant treatment would result in positive impacts to native plant communities and restoration of soil biota in areas where invasive plants have had adverse effects on soils. Soil communities change in response to disturbance and subsequent invasive plant establishment and restoration of native plant communities over time can help restore beneficial soil conditions. This takes time; at least 30 years or more from the time of treatment. Thus, this project would contribute to meeting Soil Quality Standards (SQS) to maintain or enhance soil productivity (LRMP page 4-21) by helping restore native plant communities. Environmental stressors such as climate change and wildland fire could interfere with such restoration could slow the benefits of invasive plant removal on plant communities and soils.

The primary index of measure for soils is the presence or absence of Detrimental Soil Conditions (DSC). DSC are expressed in terms of compaction, puddling, displacement, burned soil (burn severity), erosion and mass wasting (FSM 2521.03.1., Region 6 Supplement). Of these, erosion would be the most likely impact of invasive plant treatments, however the risk for measurable adverse impact is very low, and would be more likely to result from manual treatment than other invasive plant treatment methods. Small areas may be subject to increased erosion from removal of invasive plants; this impact would not last more than one year because vegetation recovery in these small areas would be rapid.

About 4,000 acres of known sites are within areas at higher risk of erosion, however, the potential for lingering detrimental soil conditions from treatment in these areas is low because there are few large monocultures of invasive plants where treatment would result in large areas of bare soils and vegetation recovery would be rapid. No foreseeable future actions are planned in these higher risk areas that would result in a cumulative effect on soils when added to this project.

Proposed herbicide use would not have lingering negative effects on soils, and there is no chance that a treatment site would be affected by any chemical use from any other overlapping activity. Multiple herbicide applications over a series of years in this project would not pose a risk to soil microbes or soil productivity. The suppression of sensitive suites of soil microbes is avoided by allowing sufficient time between applications, given the half-life of the various herbicides. Residues remaining in the soil when subsequent applications occur are expected to be minimal. Also, each application would reduce the extent of re-treatment needed and would limit the amount of herbicide build up that could occur.

The cumulative effects analysis considers the interaction between vegetation impacts from past, ongoing and foreseeable future activities and events, soils, and invasive plant treatments.

Cumulative Effects Analysis

Chapter 3.1.2 discusses the relationship between human activities, the spread of invasive plants, and the cyclical use of herbicides where vectors are persistent, such as roads. Forest Service controlled activities are planned to reduce potential for detrimental soil conditions and invasive plant introduction, establishment and spread.

Invasive plants are common in areas of soil disturbance including areas affected by past wildland or prescribed fire; grazing; homesteads and mining areas, utility corridors, trailheads and developed recreation sites, and roads. Detrimental soil conditions are also associated with these events and activities. While invasive plants (and treatment proposed under this project) may occur in areas affected by past vegetation management projects, these are conducted in a manner that minimizes potential for adverse soil conditions, thus cumulative effects are unlikely.

Wildfires are not considered “management actions” per se, yet they can have substantial effect on soil condition and can offer invasive plants a competitive advantage for spread. Grassland community sites represent the areas most susceptible to invasive plants. However, burn severity on these sites is characteristically rated low due to low fire residence time and light fuel loading. When invasive plant species invade a burned area, then long-term increases in soil erosion can occur due to reduced root density and canopy cover associated with invasive species.

Treating invasive plants within burned areas can promote more rapid improvement of soil condition by promoting native revegetation, leading to reduced long-term erosion potential. Since the invasive plants tend to grow in patches, and in limited spatial extent, the contribution of short-term cumulative effects to erosion from invasive plant treatments in burned areas is too small to be measurable compared to erosion from the burned area itself.

Areas subjected to excessive past grazing activities may also experience long-term increases in soil erosion where bunchgrass communities become replaced with annual grasses and forbs. Where invasive plant species establish on sites with altered communities, a risk of increased soil erosion exists. Areas that experience both repeated wildfire events and past grazing effects are subject to higher erosion potential.

Invasive plant treatment is likely to help restore native plant communities (see Chapter 3.2) and help restore soils in and grazed areas. Treatments of invasive plants within grazed areas would contribute a minor amount of short-term increased erosion potential by removing or killing the invasive plants. But, similar to burned areas, since the invasive plants tend to grow in patches, and in limited spatial extent, the contribution of short-term cumulative effects to erosion from invasive plant treatments in grazed areas is too small to be measurable compared to erosion from the grazed area itself.

Invasive plant treatment would not likely contribute significantly to detrimental soil conditions in areas affected by past wildland fire or grazing, and over time, restoration would improve soil conditions. For about a year after treatment, increased erosion is possible if areas of bare soil exist. All treatment methods could result in erosion from loss of target or associated vegetation.

Timber sales and other vegetation management are designed to protect soil productivity and limit DSC. Thus, if invasive plant treatment overlaps with vegetation management projects, cumulative adverse effects on soils are unlikely. Any negative impacts would be minor due to the limited spatial extent of the invasive plants within these areas, the short-term nature of the invasive plant removal, and are outweighed by the positive effects of promoting native re-vegetation.

Road corridors (including cut and fill slopes); trailheads; developed recreation sites (campgrounds, picnic sites, and similar areas); mining sites; utility corridors and other similar areas of intense management also are likely areas where invasive plant treatment will occur. These areas already exist as 100% DSC due to compaction, surface treatments, and severe displacement of topsoil. They are removed from the productive land base for resources such as timber and forage (FSM 2521.03.3) and soil protection standards do not apply. Invasive plants and invasive plant treatment would not influence the soil productivity in these areas.

Ongoing activities that do not disturb the ground (such as road use) would not contribute to cumulative effects on soils.

Alternative Comparison

Alternative A would not result in increased restoration of native plant communities. The presence of invasive plants in some areas would hinder the recovery of plant communities and subsequent beneficial result on soil biota.

The three action alternatives would contribute to meeting Soil Quality Standards (SQS) to maintain or enhance soil productivity (LRMP page 4-21) by helping restore native plant communities.

Alternative B is most likely of the action alternatives to result in beneficial soil conditions because recovery of native plant communities would be more likely under this alternative (see 3.2). Alternatives C and D would have similar results, however limitations associated with these alternatives could delay or defer restoration actions where invasive plant treatments are less effective.

None of the alternatives would contribute to detrimental adverse effects on soils from the invasive plant treatments themselves. All alternatives include potential risk of removal of invasive plants from manual and chemical methods to result in bare soils and accelerated erosion, however the affected area would be small and the time between removal of invasives and vegetation recovery short-lived. Thus, none of the alternatives are likely to contribute to measurable erosion at a meaningful scale. No other potential for detrimental soil conditions exist.

A Site Specific Example – Temperance Creek

Temperance Creek subwatershed has the highest level of infestation for uplands and riparian areas, and represents the highest potential for cumulative effects on the WWNF. 1,905 acres of chemical treatment, 34.4 acres of biological control and 1.3 acres of manual treatments have been prescribed within the watershed. Homesteads, grazing, and wildfire are past activities and events that have had lingering impacts on soils, and that are likely to contain invasive plants proposed for treatment.

Historic homesteads were limited to the Temperance Creek Ranch (at mouth) and the Wisner Place. Soils within homestead sites within the HCNRA typically still reflect detrimental conditions due to compaction and changes in plant communities. Proposed invasive plant treatments in these sites will not add to compaction and will improve plant community conditions, so no adverse cumulative effects will occur on homestead sites.

Temperance Creek subwatershed was an allotment permitted for sheep use until 2003, when it closed under signature of the Hells Canyon National Recreation Area Comprehensive Management Plan (2003). Terracettes (contour trails on steep slopes) exist in many areas with past grazing activities. These terracettes typically reflect DSCs due to compaction of tread surface. Proposed invasive plant treatments in these sites will not add to compaction and will improve plant community conditions, so no adverse cumulative effects will occur on allotment sites.

Past wildfire events with significant acres burned that may have lingering detrimental soil conditions within the Temperance Creek watershed include a 2007 fire (8797 acres Invasive plant treatments in Temperance Creek watershed overlap partially with the burned area, but comprise a minor portion of the total area. Proposed treatments would remove existing invasive plants, and promote restoration of more desirable plant communities. Treatments could add a slightly increased potential for erosion, but the amount would be negligible due to limited spatial overlap and short-term nature of the impacts.

Even for one of the most heavily infested area on the Forest, the likelihood of adverse cumulative effects from invasive plant treatment is low. Effective invasive plant treatments would contribute to recovery of desirable plant communities and DSC from these past activities and events. The action alternatives, especially Alternative B, could have a significant cumulative effect with other restoration activities that occur in previously disturbed areas within the Temperance Creek subwatershed.

Water Resources

Introduction

This cumulative effects analysis considers effects to water quality from all past, present and reasonably foreseeable future actions in addition to any effects from invasive plant treatments. Potential direct and indirect effects shared by invasive plant invasive plant treatments and other management activities include changes in sediment and temperature regimes. Herbicide use also creates the potential to introduce herbicides into streams, lakes and wetlands. Because no other forest management activities have the potential to introduce herbicides into waterbodies, the cumulative effect of herbicide use with the potential to contaminate water is the same as the direct/indirect effects discussed in the FEIS.

The effects analysis states no adverse effects to water quality from FS herbicide treatment are predicted at the site-scale (FEIS page 310-311). While herbicide use may occur downstream of the FS administrative boundary, any potential herbicide concentrations originating on FS lands are expected to diminish due to dilution (FEIS page 307), which have no predicted adverse impacts in the first place.

Two watersheds have significant amounts of private land upstream of FS lands: Joseph Creek and the Upper Grande Ronde River. While it's possible that contamination of water quality from herbicides may occur from these private lands, the cumulative impact is not likely to be significant. The proposed use of herbicides would not result in substantial risk of water contamination (see direct and indirect effects discussion in the 2010 FEIS 3.4.3). These streams are not 303d listed for chemical contamination, and there is no evidence of adverse impact from herbicide use. No water samples have been taken to determine chemical presence.

Indices of Measure for potential cumulative effects

The indices of measure for potential cumulative effects to water quality are any change in sediment delivery and stream shading. Effects of invasive plants on sediment delivery and stream shade (stream temperature) is discussed on pages 271-272, and 279 of the FEIS. The timeframe for considering cumulative effects is 15 years beyond the initial implementation date. The scales of analysis are candidate 6th field Hydrologic Unit Code (HUC) subwatersheds containing streams supporting beneficial uses stated below. Beneficial uses on most streams within the Forest relate to support of aquatic life, but may also include municipal water supplies.

Similar to the soils cumulative effects analysis, 6th field HUC (subwatersheds) across the forest were stratified to identify subwatersheds with the highest risk of direct/indirect effects from invasive plant treatments. These subwatersheds also represent the highest risk of cumulative effects with respect to invasive plant management. Invasive plant sites within Riparian Habitat Conservation Areas (RHCAs) exhibit the greatest potential to adversely affect sediment delivery and stream shade. Four subwatersheds will be analyzed for cumulative effects: Freezeout Creek; Upper South Fork Burnt River; Middle South Fork Burnt River; and Temperance Creek. These four watersheds had the highest amount of proposed treatments within RHCAs across the forest. Analysis of remaining subwatersheds across the forest will be described relative to those effects given to Freezeout Creek, Upper South Fork Burnt River, Middle South Fork Burnt Rive, and Temperance Creek.

Methodology

Determining quantifiable cumulative effects on water quality (sediment and temperature) at the subwatershed scale is typically very difficult, given all the variables encountered across the forest. A more realistic approach is estimating trends using best professional judgment. Past, present and reasonably foreseeable management actions within each of the high risk subwatersheds listed above will be discussed qualitatively. These high-risk subwatersheds represent the highest potential for cumulative effects. Since absolute differences between alternatives are difficult to measure, a relative ranking of cumulative effects on sediment and temperature will be given between all alternatives.

Actions Considered in Cumulative Effects Analysis

Table 39 of the 2010 FEIS displays streams currently 303(d) listed and with proposed invasive plant treatments within 100 feet of the waterbody. Table 39 also includes the parameter (s) not meeting water quality criteria. Due to moderate-high stream gradients, most streams within the WWNF tend to transport fine sediment rather than accumulate them (page 271 FEIS). Stream temperature is controlled by many factors, including low summer flows (page 269 FEIS). Effects from invasive plants on sediment delivery and stream temperature are difficult to measure, especially when masked by other past, present and reasonably foreseeable future actions listed below.

The following past, present and reasonably foreseeable management actions may overlap in space and time with invasive plant treatments at the subwatershed scale, potentially affecting sediment and temperature:

Travel Management Plan

It is anticipated that future implementation of Subpart B of the Travel Management Rule would result in regulating of motorized travel to designated routes, with exceptions for camping and other permitted uses. Regulation of cross-country travel and the designation of routes would be expected to ultimately result in a reduction of sediment delivery.

Road and trail management

Roads have a widely recognized impact to water quality through delivery of fine sediment. Lack of adequate maintenance of roads often leads to greater sediment delivery. Analysis and prioritization of roads and trails, and then applying Best Management Practices (BMPs) would ultimately reduce sediment delivery on roads and trails lacking BMPs. Targeted appropriations (CMLG funds) help to address the backlog of road maintenance needs.

Livestock Grazing

Revisions to Allotment Management Plans consider and incorporate any needed actions to address water quality parameters, including sediment and temperature. Continued improvement in management actions would result in long-term reduction in sediment delivery and stream temperatures due to increased riparian vegetation condition.

Timber and fuels management

Vegetation treatments within existing and planned NEPA analysis incorporate needed BMPs to minimize or prevent any adverse effects to sediment and temperature. Often, projects include restoration measures within the analysis area designed to reduce sediment delivery from existing condition.

Mineral Plans of Operations (POO)

Each POO goes through a site review to address necessary mitigations (BMPs) for addressing sediment concerns such as location and design of catch basins, road use, stream crossings and restoration. Only minimal, localized sediment delivery from existing and future mineral development activities is expected.

Wildfire events

These events are not planned "management actions" per se, but can affect sediment delivery and shading of streams. Within the past century, four large fires have burned appreciable acres within the Temperance Creek subwatershed. Himalayan blackberry infestations in RHCAs within the Hells Canyon National Recreation Area exhibit potential adverse effects to stream shade and sediment. These infestations occur on both burned and unburned sites (Gene Yates, personal communication, 1-9-2014).

Cumulative Effects for Alternative A

This alternative represents no change from the existing invasive plant treatment program, and ranks 4th (last) in terms of treatment effectiveness of invasive plants due to the most limited treatment options (ROD page 6).

Freezeout Creek: 68 acres (12%) of the 531 acres of mapped weeds within the subwatershed exist within Riparian Habitat Conservation Areas (RHCAs). These areas have the highest potential for adversely affecting sediment and temperature, and represent about 3% of the total RHCAs within the subwatershed. This subwatershed has limited management actions on FS lands, including an active allotment and some roads along the lower reaches of the stream.

This alternative treats invasive plants less than other alternatives, meaning any existing adverse effects from invasive plants in terms of increased sediment delivery and loss of shade would be relatively highest under this alternative. Because only 3% of RHCAs are affected by invasive plants, existing direct/indirect effects from invasive plants are relatively minimal. When combined with all other actions listed above, the expected trend for sediment and stream temperature is flat or slightly downward as watershed restoration treatments targeting sediment and riparian function are implemented.

Upper South Fork Burnt River: 73 acres (24%) of the 305 acres of mapped weeds within the subwatershed exist within RHCAs. These areas have the highest potential for adversely affecting sediment and temperature, and represent about 3% of the total RHCAs within the subwatershed. A portion of the subwatershed lies within the Monument Wilderness, while the remainder has been managed via timber harvest, roads and has an active allotment. Recent watershed restoration efforts include fencing, water developments and vegetation treatments.

While this subwatershed has higher levels of past, present and reasonably foreseeable future actions than Freezeout Creek, cumulative effects would be similar to Freezout Creek subwatershed. Trends in sediment delivery and stream temperature would not be measurably different from Freezeout Creek, as improvements in sediment delivery and stream temperature due to BMPs and restoration actions are estimated to occur at roughly the same pace and scale as Freezeout Creek.

Middle South Fork Burnt River: 75 acres (7%) of the 981 acres of mapped weeds within subwatershed exist within RHCAs. These mapped areas have the highest potential for adversely affecting sediment and temperature, representing about 4% of all RHCAs. This subwatershed has similar management actions (timber harvest, roads and livestock grazing) as the Upper South Fork Burnt River, but to a greater extent.

While this subwatershed has higher levels of past, present and reasonably foreseeable future actions than Freezeout Creek, cumulative effects would be similar to Freezeout Creek subwatershed. Trends in sediment delivery and stream temperature would not be measurably different from Freezeout Creek, as improvements in sediment delivery and stream temperature due to BMPs and restoration actions are estimated to occur at roughly the same pace and scale as Freezeout Creek.

Temperance Creek: 679 acres (39%) of the 1,740 acres of mapped weeds within the subwatershed exist within RHCAs. These mapped areas have the highest potential for adversely affecting sediment and temperature, representing about 21% of all RHCAs. This subwatershed exists entirely within wilderness. While grazed in the past, the area is now closed to grazing. No roads are present. Four large wildfire events burned an appreciable amount of this subwatershed since 1910. Effects from these fires to sediment delivery and stream shade are unknown.

Wildfire events and invasive plants represent the potential causes for increased sediment delivery and loss of stream shade; however, specific effects are unknown due to remoteness of the subwatershed. Because 21% of RHCAs have invasive plant infestations, the potential for measureable existing effects to sediment delivery and/or stream shade is the highest of any subwatershed on the forest. This statement merely follows the logic that as causes for sediment delivery and loss of shade increases spatially, a corresponding increase in effects would follow. The four large fire events may have contributed to increased sediment delivery and/or loss of stream shade, in addition to aiding in the spread of invasive plants. This subwatershed exhibits the highest potential cumulative effects for both increased sediment delivery and loss of stream shade of all subwatersheds where invasive plant treatments are planned.

Remaining Subwatersheds on the Forest: Because invasive plant sites within RHCAs are far fewer on the remaining subwatersheds, the potential for measureable cumulative effects is practically non-existent. While direct/indirect effects might be detectable at the site scale in a few instances, the potential for measureable cumulative effects at the subwatershed scale is extremely low.

Considering cumulative effects of climate change: The FEIS disclosed how climate change would likely interact with both invasive plants and native plant species (FEIS, pages 111-113). Most conclusions point to more favorable conditions for invasive plants, and increased stressors on native plant populations. Determining how these “more favorable conditions for noxious plants” affect cumulative effect indices of sediment and temperature become problematic when considering how they overlap in time. The temporal scale for measureable climate change effects is considered long-term (tens of years or more), whereas the temporal scale for effects of invasive plant control is considered short-term at 15 years. While climate change may provide more favorable conditions for invasive plants over the long-term, determining a quantifiable effect on how this would change the effects that invasive plants exude on sediment and temperature is immeasurable.

Cumulative Effects for Alternative A (No Action)

Treatments would occur on an extremely small percentage of any watersheds in the project area. Direct and indirect effects are so small (not able to measure) and temporary that treatment under No Action does not contribute to significant cumulative effects. (2010 FEIS page 300)

Cumulative Effects for Alternative B, Alternative C, and Alternative D

Cumulative effects for the alternatives B, C, and D would be relatively similar to those described for Alternative A for each of the four subwatersheds. Alternative B would provide the most treatment options and result in the most effective treatment of invasive plants (ROD page 6), followed by Alternative C and then D. However, while the alternative offers different management option and treatment effectiveness at the site scale, differences in cumulative effects between these three alternatives and alternative A do not exist at the subwatershed scale.

Remaining Subwatersheds on the Forest: cumulative effects are relatively similar to those stated in Alternative A.

Summary and Conclusion

At the subwatershed scale no relative differences in cumulative effects exist between the alternatives. No streams within the forest are currently on the 2010 Oregon 303(d) list as impaired due to pesticides. There are no cumulative effects with respect to pesticides. Many streams on the forest are 303(d) listed for sedimentation and temperature. Where the presence of invasive plants exists within RHCAs in those listed watersheds, their contribution to sedimentation and temperature listings is likely very minor. This means implementation of any alternative would not likely change the status of the 303(d) list.

Table 1 in the ROD displays shows that about 10% of treatment acres do not include use of herbicides. Non-herbicide treatments are expected to have similar cumulative effects as herbicide treatments for two reasons. First, effectiveness of non-herbicide treatments on invasive plant reduction is considered roughly the same as herbicide treatments for those areas targeted for non-herbicide treatments. Second, the FEIS did not predict measureable contamination of waters through use of herbicides. The use of non-herbicide treatments would also result in no measureable contamination of waters due to non-use of herbicides.

3.5.3 Aquatic Organisms and Habitat

The paragraphs below replace the Cumulative Effects discussion for fish and other aquatic organisms, including threatened, endangered and sensitive species found on pages 348 and 365 – 366 of the 2010 FEIS. A heading is added (“Consistency with PACFISH/INFISH”) that includes discussion clarifying how the project is consistent with Forest Plan guidance for managing anadromous and inland native fish and their habitat. PACFISH/INFISH guidance amended the WWNF Land and Resource Management Plan in 1995.

Cumulative Effects

Section 3.1.2 described the basis for cumulative effects analysis, and detailed resource sections above further discuss the reasons that there is unlikely to be a contribution to significant cumulative impacts on fish or aquatic organisms from any of the alternatives under this project. Modeling with GLEAMS-Driver indicates the use of picloram at the maximum concentration may reach a hazard quotient (HQ) greater than 1. For the Snake River/Temperance Creek Watershed the treatment acres include hand treatment along the Snake River as well as aerial treatment in the uplands. PDFs were developed to minimize risk of herbicide application to water at treatment sites. No broadcast treatments would occur directly adjacent to streams when water is present. Otherwise, herbicide use under all the action alternatives has little potential to contribute to cumulative effects regardless of what else is happening.

Aerial treatments proposed within Hells Canyon may include picloram. Assuming picloram was aerially sprayed next to a stream, an upper bound HQ value greater than 1 is possible. However, the project is more than 300 feet from a stream and thus, the potential for picloram use in this project to cause any effects on fish is extremely low. So while adverse effects on aquatic resources from aerial spray of picloram cannot be ruled out, they are unlikely to actually occur. This small amount of risk is unlikely to contribute to adverse cumulative effects on aquatic resources.

If the whole acreage at the common bugloss site was treated in one year, over 12 percent of the watershed would be treated. However it is estimated by Forest personnel that less than 1500 acres scattered across the larger treatment area would be treated at the bugloss site on Forest land. If the 1500 acres was doubled to take private land into account 3.4 percent of the watershed would be treated. Private landowners would use metsulfuron methyl aerially as their first choice to treat acres infested with bugloss. The Forest would use metsulfuron methyl with ground based methods as the first choice of treatment. This is a highly effective herbicide with low application rates and a low toxicity to fish. Given the low application rates of all proposed chemicals (typical rate of 0.03 lbs/acre), low toxicity value and scattered nature of the treatments, it is unlikely to have cumulative effects to the watershed. This would be the case, even when assuming that all invasive plant sites become up to the 100 percent level

Given the PDFs as well as the scattered distribution of the treatments and the low rainfall available to transport herbicide off site, it is unlikely that treatments would have a cumulative effect for this watershed. Changes to fish habitat from loss of target and/or non-target vegetation, erosion and sediment, and loss of shade are predicted to be undetectable.

While the potential for picloram to reach streams and impact fish cannot be ruled out, there is little potential for a cumulative impact from herbicide use on this project. Most of the private lands where herbicide may be used are downstream of the National Forest. By the time the water enters or leaves National Forest, the small amount of herbicide that might reach the stream would be highly diluted. The potential for accumulation downstream would be based on the potential for herbicide from agricultural use to reach the water in a measurable amount to where the Forest Service proposes treatment and then for there to be a measurable amount from Forest Service treatments, so the two sources could combine. This is unlikely, because mixing and dilution of any trace amount of herbicide that may result from invasive plant treatment would occur quickly, making it highly unlikely that herbicide concentrations would be additive or synergistic with downstream herbicide use. Given the scattered nature of treatments, and dilution over time and space by mixing and addition of inflow downstream, the amount of herbicide that may be delivered to a common point downstream is very small to non-existent.

The PDFs, herbicide use buffers, and riparian treatment caps minimize the potential for any herbicide to reach streams and contribute to adverse cumulative impacts on fish (see PDFs F-1 - 8; G, and H1-13 in 2010 FEIS section 2.2.3). Table 46 in the 2010 FEIS showed the potential for herbicide to reach streams, based on site-specific GLEAMS modeling. Hazard Quotient (HQ) values were well below 1; therefore, no levels of concern for water resources would be exceeded from this project.

Ongoing and reasonably foreseeable future (Forest Service) actions, described in Table 2, would be subject to Forest Plan standards and guidelines. Currently these standards direct that project impacts be evaluated and described during environmental analysis. Furthermore, Forest Service policy is not to approve projects where the effects to sensitive species would create a trend to federal listing (under the ESA) or cause a loss of population viability for significant populations. This finding is made in consideration of the other projects planned in each watershed and is evaluated at multiple scales. Contributions to sediment and loss of riparian vegetation that could result in warming water temperature are two of the main concerns for fisheries and the aquatic environment. This project would not result in measurable sediment input as shown in direct/indirect effects, nor would shade-producing vegetation be affected. Some examples of management action are discussed below with reasoning about why these actions would not cumulatively affect sediment or water temperature.

The effect of higher than historic water temperature on sensitivity of fish to proposed herbicides is inconclusive. Mayer and Ellersieck (1986) studied the effect of temperature on 48 chemicals and found that toxicity was positively correlated for 34% of the chemicals, although only two, diuron and triflurin, were herbicides, and are not proposed for use with this project. Three chemicals (6%) showed decreasing toxicity with increasing water temperature and the remaining 60% of chemicals showed no difference in toxicity in relation to water temperature. Furthermore, this study tested the effect of temperature on lethal doses (LD50's), where this EIS uses a more conservative no-observable-effect-level (NOEC) for which some evidence suggests may not have much effect on chronic "no effect" thresholds of pollutants (EPA 2001). The EPA adds: "No single pattern explains the effects of temperature on the toxicity of pollutants to aquatic organisms. … Chemically, temperature can change the concentration of substances in water and reduce a fish's ability to withstand chemical exposure" but that "for many of the chemical variables that can be influenced by temperature, information is scant or shows no pattern to consistently explain temperature effects."

Vegetation Management

Vegetation management, including, both commercial and non-commercial thinning and occasional regeneration harvest, has the potential to impact aquatic resources. Actions associated with vegetation management, such as thinning trees, hauling logs, scattering and burning slash and creating landings can impact ground vegetation, soils, and erosion potentials. All vegetation projects are subject to interdisciplinary team input as well as ESA Section 7 consultation wherein project design criteria is intended to alleviate adverse impacts to aquatic resources. Potential impacts to aquatic resources from vegetation management can be reduced to very low, non-detectible levels. Infrequent or unpredictable instances where impacts might occur would be incidental and limited.

Firewood collection is a common practice on the WWNF. Felling, bucking and loading of wood could potentially impact aquatic resources in permitted areas. Rules and regulations are an integral piece of every firewood permit. Specifically stream zone buffers and tree size restrictions are always in effect. Areas within 300 feet of fish bearing streams or 150 feet of other waterways, wilderness areas, wild and scenic rivers, or along scenic byways would not be impacted because firewood collection is not permitted in these areas. Because firewood cutting is limited to forested areas outside riparian zones and is a widely dispersed activity across the National Forest, anticipated impacts to aquatic resources are not measurable.

Livestock Grazing

Livestock grazing has the potential to contribute cumulative effects and adversely impact aquatic resources. Presently 85% of the WWNF is include in active and vacant grazing range allotments (primarily cattle). As shown in the FEIS (p. 403) a large percentage of the infested acres inventoried are located within an active, vacant or closed allotment. Livestock grazing is expected to continue within active allotments during the life of this project. Grazing may or may not continue in vacant allotments and would not likely be reestablished in closed allotments. Present and reasonably foreseeable livestock grazing is assumed, for this analysis, to occur on active and vacant allotments which comprise 74% of the National Forest.

Livestock grazing directly impacts aquatic resources by way of herbivory (removal and continued consumption of native riparian vegetation) and trampling (destabilization of stream banks). Indirect effects include soil compaction, which would hinder germination of native plant seeds. Along with herbivory and trampling, these factors play a role in changing aquatic habitats in terms of proper channel morphology and hydrologic function. Livestock grazing and browsing can function as a chronic disturbance, exerting continuous influence over long periods (Parks et al., 2003) so their effects are not temporary and would continue from year to year.

In regard to cumulative effects, treating invasive plants in conjunction with livestock grazing is not expected to impact aquatic resources at measurable levels. This is due to project design features and grazing management techniques intended to mitigate adverse effects.

Allotment management plan grazing standards derived from adaptive management techniques and ESA Consultation that are expected to maintain riparian vegetation characteristics.

Wildfire/Fire Suppression/Rx Fire

Wildfires impact aquatic resources depending on burn severity and intensity. Wildfires that exhibit low to moderate burn severity/intensity can often have a beneficial effect to riparian zones. Conversely moderate to high burn severity/intensities usually leads to adverse effects. Models can somewhat predict fire behavior on various landscapes given certain conditions. However it is impossible to predict when, where, and to what extent wildfire will occur. Wildfire disturbances can also create niches for invasive plants to flourish.

Fire suppression techniques and actions can also have impacts on aquatic resources. Construction of fire lines and application of fire retardant for example can degrade overall watershed function and pollute surface waters.

Prescribed fire is much less impactful to aquatic resources. Design criteria such as prescription guidelines as well as implementation practices such as not initiating fire within riparian zones are intended to benefit to the environment.

In general eliminating invasive plants should benefit aquatic resources with respect to wildfire, fire suppression, and prescribed fire. Specifically native plant species root systems have a higher degree of soil holding capacity than do non-native plant species.

Motorized Access – Transportation System

Road networks within watersheds can have adverse effects to aquatic resources by degrading hydrologic function and increasing sediment delivery to water courses. There is a reasonably foreseeable future action relative to travel management across much of the forest. However, the details of future travel management would be speculative, beyond the requirement to designate areas, roads, and trails for motorized use. The road system on the WWNF encompasses a spectrum of road densities and conditions.

With respect to cumulative effects, invasive plants treatments and associated actions within those watersheds that do not contain roads would have a negligible effect. Weed treatments would not influence the current road system or their associated impacts to aquatic resources.

Mining

Mining actions have a large potential to impact aquatic resources. Mineral mining is largely confined to areas of historical gold mining on the Whitman Ranger District. Historical impacts to watersheds occurred mostly during the euro-settlement period. Most mining occurs as placer and suction dredging operations along and within perennial and intermittent stream courses. The vast majority of mining operations requires access by roads, some level of ground disturbance, and management of water. Ongoing and future minerals operations are subject to environmental analysis, compliance with Forest Plan standards, compliance with requirements under the Clean Water Act, and scrutiny under the ESA Section 7 consultation process.

Given the relatively limited amount of minerals operations currently on the La Grande, Wallowa Valley, and Hells Canyon NRA, mining is not expected to contribute cumulative effects.

Conversely there are relatively large amounts of legacy, ongoing, and expected future mining activities on the Whitman Ranger District. Aquatic resources at risk are broad in scope and are not confined to stream side activities. Effects to aquatic resources associated with these sites can for example alter watershed drainage function, contribute sediment to surface waters, and expose geologies to the atmosphere which can then turn into acid rock drainage. Mining can also act as an invasive plants vector because many operations utilize equipment for ground disturbing activities. Invasive plants treatments within these sites could have adverse effects to water quality. Disturbed sites may more readily deliver runoff to surface and/or ground waters. However it would likely be very difficult to measure at a Forest-wide scale.

Aggregate Cumulative Effects – All activities

National Forests lands occupy large percentages of headwater watersheds in northeast Oregon. Most, but not all, are upstream of other sources of herbicides. Water flowing off of NFS lands on the WWNF often flow into larger stream networks with mixed ownership.

The herbicides considered in this EIS are eliminated rapidly from the bodies of aquatic animals and do not bio-accumulate up the food chain. Therefore, cumulative effects are unlikely to be different from the direct and indirect effects of each application. Forest Service use of herbicides is typically a small percent of the herbicides used in a large watershed of mixed ownership (Chapter 4.1.1) and such use is unlikely to contribute substantially to downstream effects because the concentrations would be very low.

Monitoring in other watersheds in the West have shown that concentrations of herbicides were ten to one thousand times less than the estimated glyphosate in surface water following aerial application (Rashin & Graber 1993). Environmental concentrations of these herbicides were four to ten times less than the estimated NOEC for aquatic species.

Several other stressors on fish exist, including hydropower development, direct harvest of fish, predation from non-native fish species, and competition from hatchery fish (USDA Forest Service 2008b). These are part of the existing condition for aquatic organisms and this project would not influence these conditions.

Sediment production from manual treatments would have a low probability to add to sources already derived from other actions on NFS lands, tribal lands, state and county lands, private forestry lands, rangelands, utility corridors, road rights-of-way, and private property. Potential project effects would represent a very small percentage of the total (cumulative) from all actions combined. Natural background seasonal fluctuation along with sediment/turbidity effects from other actions (e.g., roads, timber harvest, grazing) exceeds any potential production from invasive plant treatment by orders of magnitude.

Project Consistency with PACFISH/INFISH

The following is a summary of how the action alternatives of this project comply with the PACFISH/INFISH Strategies for managing anadromous and inland fisheries. Because the project design features are common to each action alternative, the effects of alternatives B, C and D have been summarized together. For additional analysis of the direct and indirect effects of each alternative, refer to the 2010 FEIS, section 3.5 Aquatic Organisms and Habitat.

PACFISH/INFISH Goals

Goal 1: Maintain or restore water quality, to a degree that provides for stable and productive riparian and aquatic ecosystems.

Water quality would be maintained. The 2010 FEIS page 295 stated that Project Design Features minimize the possibility that herbicides would enter water and impact water quality. Pages 310-311 stated that concentrations of herbicides reaching streams are expected to be well below concentrations of concern to beneficial uses and risks have been minimized or eliminated by buffers and PDFs.

Water quality is unlikely to be degraded by sediment produced from removal of invasive plants. The invasive plant populations on the WWNF are not extensive enough to result in significant sediment/turbidity and emergent vegetation would not be treated. Exposed stream banks are expected to re-vegetate during the spring/summer following treatment. In addition, site restoration and re-vegetation methods preclude erosion as a result of herbicide treatment. It is expected that most patches would be relatively small and any erosion negligible.

Treating invasive plants would improve riparian stability where invasive plants have colonized along stream channels and out-competed native species. For instance knotweed has poor bank holding capacity, which leads to more bank erosion and sedimentation of streams in high winter flows (R6 2005 FEIS).

Diffuse and spotted knapweed is found along many streams in the Forest. Lacey et al. (1989) reported higher runoff and sediment yield on sites dominated by knapweed versus sites dominated by native grasses. Thus, restoration of native vegetation in areas currently dominated by knapweed could restore water quality over time.

All invasive plant treatments carry some risk that removing invasive plants could exacerbate stream instability; however, PDFs account for these areas and mulching, seeding and planting would be prescribed as needed to re-vegetated riparian and other treated areas to minimize impacts from treatments (2010 FEIS page 295).

Goal 2: Maintain or restore stream channel integrity, channel processes, and the sediment regime (including the elements of timing, volume, and character of sediment input and transport) under which the riparian and aquatic ecosystems developed.

Treating invasive plants would improve riparian stability where invasive plants have colonized along stream channels and out-competed native species (2010 FEIS page 295). Invasive plant treatment may create some sediment, but the amount is low compared to background levels and would not result in adverse effects to fish habitat. Invasive plant treatment projects are not expected to create sediment that may adversely affect embeddedness and availability of suitable substrate in localized areas (2010 FEIS page 354). Modification of surface ground cover can change the timing of run-off but given the small areas of treatment, any changes would be transitory and too small to measure (2010 FEIS page 294).

Goal 3: Maintain or restore instream flows to support healthy riparian and aquatic habitats, the stability and effective function of stream channels, and the ability to route flood discharges.

Invasive plant treatments are unlikely to influence stream flow (2010 FEIS page 294, 361). There is no potential for increased peak flows or alteration of the timing, magnitude, duration and spatial distribution of flows as a result of treating or not treating invasive plants. This is because of the relatively small size of invasive plant infestations (especially adjacent to water), the spatial distribution, staggered timing of treatments, and low water use of invasive plants . None of the treatments are extensive enough under any alternative to effect peak flows, low flows or water yield (2010 FEIS page 361).

Goal 4: Maintain or restore natural timing and variability of the water table elevation in meadows and wetlands.

Invasive plant treatment is unlikely to influence water table elevation because it would not affect stream flows (see discussion under goal 3 above). Water table elevation is a factor in determining the best treatment approach (2010 FEIS page 362).

Goal 5: Maintain or restore diversity and productivity of native and desired non-native plant communities in riparian zones.

This purpose and need for this project revolves around maintaining and restoring native plant communities, and riparian zones are among the highest priority treatment site types. Fish habitat quality is being degraded by invasive plants in over 5,000 acres of riparian areas and invasive plant control is needed to maintain or improve the diversity, function, and sustainability of desired native plant communities (2010 FEIS page 9). Treatment of invasive plants near streams would allow for re-establishment of native riparian plants that typically have better root structure (and bank holding capacity) than non-native invasive plants (USDC/NOAA National Marine Fisheries Service 2009 page 58, USDI Fish and Wildlife Service 2009 page 79)

Goal 6: Maintain or restore riparian vegetation, to:

(a) provide an amount and distribution of large woody debris characteristic of natural aquatic and riparian ecosystems;

(b) provide adequate summer and winter thermal regulation within the riparian and aquatic zones; and

(c) help achieve rates of surface erosion, bank erosion, and channel migration characteristic of those under which the communities developed.

Invasive plants do not provide large woody debris to streams. They can adversely influence thermal regulation by outcompeting shade-producing vegetation. Some invasive plants have limited soil holding capacity and result in accelerated erosion. A good example is knotweed. This invasive plant chokes waterways, displaces native plants, and erodes riverbanks (USDA 2015). Knotweed creates its own monoculture, leaving stream banks susceptible to increased erosion as it loses its leaves during the rainy season. Removal of knotweed can help promote establishment of more desirable plants, especially if active restoration methods are employed.

Some minor bank erosion may occur from removing invasive plants in locations where invasive plants have taken over a stream bank, especially in smaller streams. For example, killing knapweed with an herbicide would de-vegetate a portion of the stream bank and result in a loss of roots that help to hold soil particles together. This may expose stream banks at higher flows and result in some erosion. The total spatial extent of heavy infestations along stream banks within the action area is low and impacts are unlikely to influence bank erosion rates at a meaningful scale (2010 FEIS page 354).

Goal 7: Maintain or restore riparian and aquatic habitats necessary to foster the unique genetic fish stocks that evolved within the specific geo-climatic region.

There is no indication that this project would influence fishery genetics or the long term viability of fisheries on the WWNF.

Goal 8: Maintain or restore habitat to support populations of well-distributed native and desired non-native plant, vertebrate, and invertebrate populations that contribute to the viability of riparian-dependent communities.

Invasive plant treatment would help maintain or restore riparian vegetation threatened by invasive plants. Native riparian vegetation plays a key role in forming aquatic habitat for fish and other aquatic species. Roots help stabilize stream banks, preventing accelerated bank erosion and providing for the formation of undercut banks, important cover for juvenile and adult fish. Native riparian vegetation also provides large and small wood to streams, adding to habitat complexity and providing cover and food sources for aquatic organisms. These services are not provided by invasive plants. Treatment of invasive plants in riparian areas would help maintain or restore native plant communities that contribute to a healthy riparian condition (2010 FEIS page 272).

Invasive plant treatment may have short term impacts on some elements of the riparian ecosystem (there is a potential for some common native plants to be killed); however, the impacts would be very small scale (limited to the area directly adjacent to treatment) and short term (vegetation would rebound within one season). This is based on the characteristics of the herbicides proposed for use, the PDFs that limit the application method, Long term benefits to the development of native plants and riparian dependent ecosystems are possible from removal of invasive plants. No broadcast herbicide application would occur within 100 feet of wet streams. This provides protection to the recruitment of conifer seedlings within riparian areas which would sustain channel and habitat features in the future.

PACFISH/INFISH Standard RA-3 and RMOs

PACFISH-INFISH Riparian Management Objective (RMOs) were considered to determine whether there is any potential effect that could result from invasive plant treatments, especially herbicide use, since standard RA-3 requires that herbicide applications not retard or prevent habitat from meeting RMOs. Standard RA-3 also requires that adverse effects on inland and anadromous fish be avoided. Progress toward maintaining and restoring good fish habitat is evaluated at the 3rd to 6th order watersheds, based on measurable indicators of good fish habitat.

General Riparian Area Management

RA-3 Apply herbicides, pesticides, and other toxicants, and other chemicals in a manner that does not retard or prevent attainment of Riparian Management Objectives and avoids adverse effects on inland native fish.

Table 5 - INFISH/PACFISH interim riparian management objectives

Habitat Feature	Interim Objectives
Pool Frequency (kf[1]) (all systems)	Varies by channel width (see Table 8)
Water Temperature (sf[2])	No measurable increase in maximum water temperature (7-day moving average of daily maximum temperature measured as the average of the maximum daily temperature of the warmest consecutive 7-day period). INFISH: Maximum water temperatures below 59°F within adult holding habitat and below 48°F within spawning and rearing habitats. PACFISH: Maximum water temperatures below 64°F within migration and rearing habitats and below 60°F within spawning habitats.
Large Woody Debris (sf) (forested systems)	Coastal California, Oregon and Washington: >80 pieces per mile; >24 inch diameter; >50foot length. East of Cascade Crest in Oregon, Washington, Idaho: >20 pieces per mile; >12 inch diameter, > 35 foot length
Bank Stability (sf) (non-forested systems)	>80 percent stable.
Lower Bank Angle (sf) (non-forested systems)	>75 percent of banks with <90 degree angle (i.e., undercut).
Width/Depth Ratio (sf) (all systems)	<10, mean wetted width divided by mean depth.

[1] Key feature
[2] Supporting feature

Table 6 - Interim objectives for pool frequency

Wetted Width (feet)	10	20	25	50	75	100	125	150	200
Pools per mile	96	56	47	26	23	18	14	12	9

Pool Frequency

There is no possibility that treatment of invasive plants would impact pool area, quality and frequency (2010 FEIS page 361).

Water Temperature

Removal of some streamside invasive plant species (such as knotweed) may decrease riparian vegetative shading in some areas, thereby increasing the amount of solar radiation striking the water. Since most invasive plants provide little shade, removal of these plants is unlikely to have any measurable effect to stream temperature. Removal of invasive plants from the banks of small, intermittent streams would not affect temperature because they are dry during the hottest time of the year, relative size of the infestation is small within context of the watershed, and overstory canopy is present in most treatment sites (2010 FEIS page 358). Where taller native shrubs replace the shorter invasive plants, shading of streams would contribute to reduced temperatures on some streams (2010 FEIS page 300).

Invasive plant treatments could temporarily reduce some streamside vegetation however no overstory shade would be removed.

Large Woody Debris

Treatment of invasive plants in RHCAs would not impact woody debris in streams. No broadcast application would occur within 100 feet of wet streams. This measure provides protection to the recruitment of conifer seedlings within riparian areas which would sustain channel and habitat features in the future. Controlling invasive plants would allow for reestablishment of native vegetation, allowing riparian stands over time to develop larger recruitment trees, increasing the size and quantity of in-channel debris (2010 FEIS page 361).

Bank Stability

Invasive plant treatments have low potential to adversely affect bank stability, especially at a meaningful scale. The total spatial extent of heavy infestations along stream banks within the project area is low. The amount of sediment released into any particular stream reach would depend on how extensive a particular invasive plant patch is and how close the invasive plant is to the actual wetted perimeter of the channel (2010 FEIS page 354).

The presence of people or crews with hand-held tools along stream banks could lead to localized, sediment/turbidity to fish habitat because of trampling, soil sloughing due to stepping on banks and removal of invasive plant roots. However, amounts of potential localized sediment/turbidity would be negligible because the invasive plant populations on the WWNF are not extensive enough to result in significant sediment/turbidity and emergent vegetation would not be treated. Exposed stream banks are expected to re-vegetate during the spring/summer following treatment. In addition, site restoration and re-vegetation methods preclude erosion as a result of herbicide treatment. It is expected that most patches would be relatively small and any erosion negligible (2010 FEIS page 354).

Impacts to stream bank stability are expected to be localized, of low intensity and duration, and would not significantly affect fish habitat. Reduction of invasive plants along stream banks and riparian areas would benefit native plant species and result in improved stream bank stability and riparian condition in the long-term (2010 FEIS page 362).

Lower Bank Angle

There is no risk of adversely impacting channel condition and dynamics as a result of treating invasive plants (2010 FEIS page 360). Thus, there are no possible adverse effects on lower bank angle.

Width/Depth Ratio

There is no risk of adversely impacting channel condition and dynamics as a result of treating invasive plants. Thus, there are no possible adverse effects on channel condition and dynamics (2010 FEIS page 360).

Summary

Invasive plant treatment complies with PACFISH and INFISH, and specifically standard RA-3. None of the alternatives would retard the attainment or maintenance of PACFISH/INFISH RMOs or goals. None of the herbicide or non-herbicide treatments, including aerial herbicide application, would disturb soils or channel features to the point of degrading bank stability, water temperature, lower bank angle of the creek, amount of large woody debris, or width to depth ratio.

While treatment (especially manual) may result in some ground disturbance and possible sedimentation, the amount would be low. There could be small localized areas of erosion and subsequent sediment input to the stream. These effects would be transitory and too small to measure. Pulling weeds along stream banks could also destabilize the banks in highly localized areas. These small treated areas are expected to revegetate within a season. As most of the treatments areas are previously disturbed roadways and trails, it is unlikely that the small additional ground disturbance would be a significant change from the existing condition (2010 FEIS page 294).

Over time, removal of invasive plants could improve habitat indicators as native vegetation recovers on the treated sites. Without treatment, all of these species are expected to continue to spread. Where they spread, banks could become less stable, leading to changes in suspended sediment and substrate character and embeddedness (2010 FEIS page 272).

The low levels of herbicide used in riparian areas are not expected to concentrate in fish. The Project Design Features would limit activities along stream banks when fish are spawning. Areas of high quality riparian habitat are distant from roads and contain very few sites. These areas would not have any measurable impacts from herbicide use and would continue to function as strongholds for recovery efforts (2010 FEIS page 430).

While treatment (especially manual) may result in some ground disturbance and possible sedimentation, the amount would be very low. Over time, removal of invasive plants could improve habitat indicators as native vegetation recovers on the treated sites.

3.6.3 Recreation Resources – Environmental Consequences

> The paragraphs below replace the Cumulative Effects discussion for recreation resources found on page 393 of the 2010 FEIS; the remainder of this section is unchanged.

This cumulative effects analysis considers effects to recreation resources from all past, present and reasonably foreseeable future actions as shown in the "On-going and Reasonably Foreseeable Projects & Activities" in addition to any effects from invasive plant treatments. For purposes of the effects analysis, the recreation resources have been evaluated in these defined areas – Hells Canyon National Recreation Area (HCNRA), wilderness areas, wild and scenic rivers (WS rivers), developed recreation sites (Devrec sites) and general forest areas (GFA). The analysis is limited to the WWNF land and immediately adjacent lands.

Indices of Measure for potential cumulative effects

The indices of measure for cumulative effects to recreation resources are any change in:

- Quality of Visitor Experience (e.g. visual changes in vegetation, residual odors, presence of invasive species)
- Displacement of Use (e.g. worker activity, use of chemicals) and
- Wilderness Character (e.g. untrammeled, natural, undeveloped, and outstanding opportunities for solitude or a primitive and unconfined type of recreation) for wilderness areas only.

The timeframes for considering these effects are short term (approximately one year) and long term (10-15 years beyond the initial implementation date). As discussed above in the direct and indirect effects section, the quality of visitor experience, and displacement of use may occur in varying degrees in all Alternatives, and in all five defined recreation resource areas (HCNRA, Wilderness, WS Rivers, Devrec Sites, GFA). In addition wilderness character would also be affected in varying degrees for the Wilderness areas.

Methodology

The determination of cumulative effects on recreation resources for quality of visitor experience and displacement of use is subjective as most forest recreation use is dependent upon an individual's expectations and adaptations to changing conditions. These include such factors as:

- Pre-travel expectations
- Flexibility in timing of visit or vacation
- Past experiences and number of visits at the site
- Tolerance to change in landscape and site accommodations
- Non-site related factors like; attitude, proper equipment, weather, party composition

The factors influencing wilderness character are also subjective and based on visitors expectations and adaptations to changing conditions for; the untrammeled, natural and/or undeveloped appearance of the site, and outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Actions considered in Cumulative Effects Analysis

The following past, present and reasonably foreseeable management actions may overlap in space and time with invasive plant treatments and potentially affecting quality of visitor experience, displacement of use, and wilderness character. These management actions categories are a consolidation of the specific projects and activities found in the found the "On-going and Reasonably Foreseeable Projects & Activities" list.

Travel Management Plan and Road Operations and Management

These activities involve the operation and maintenance of the designated road system, and the planning of a future designated motor-vehicle use maps with designated roads, trails and areas. Common activities for road management include: debris clearing and blading of the road surface; cleaning ditches; installing culverts; installing advisory signs; applying rock, gravel and other road surface materials; and monitoring authorized use on open routes and areas. Because vehicle access is the primary method of accessing the HCNRA, Devrec and GFS sites, and the main exterior portals to the Wilderness and WS Rivers, this is an important element to the quality of visitor's experience and displacement of use. Factors that significantly influence a recreationists experience for this activity include; restriction of traditional access, changes in type of allowed motor-vehicle allowed, changes in the permitted season of use, and level of use. Because of this influence, any effects to a visitor's experience or displacement of use is more likely an independent factor yet could be an immeasurable cumulative effect for any of the action alternatives.

Mining Plans and Operations

Mining plans and operations includes activities such as; survey and exploratory work, mining excavation and transport with heavy equipment, construction and presence of buildings and specialty mining equipment. Most activities and individual operations are located on the southwestern side of the National Forest and usually less than 40 acres, although larger mining districts can be subwatershed scale. As with many of the following activities, the presence of active or inactive mining operations, or activities would have a stronger influence upon the recreation resource (deter any extended use in the same area) than invasive plant treatments. However if there are any cumulative effects they would be minor and immeasurable.

Vegetation Management and Timber Harvest Projects

Vegetation management and timber harvest projects are generally located in the GFA areas yet can occur in the HCNRA, Devrec and WS Rivers. These commercial activities are not permitted in wilderness area. Associated activities include construction of temporary roads and skid trails, harvest activity with chainsaws and heavy equipment, and decking of logs. The activities typically are found at the subwatershed scale. The presence of heavy equipment, logging activity, removal of tree canopy and disturbance of understory vegetation is a greater influence upon the recreation resource and visitor use than invasive plant treatment.

Prescribed fire and fuels treatment

Prescribed fire and fuel treatments can occur in any of the five designated recreation areas. Fuels treatments are generally associated with the reduction of slash and vegetative material following a timber harvest, and prescribed fire can occur to meet several management objectives ranging from protection of adjacent private property to the reduction of timber tree densities. Common activities include; vehicle and engine access to the area, site preparation, temporary area closures for public safety, varying amounts of heat and smoke (short term), and long-term altered landscapes (black trees, increased sunlight/loss of shade, loss of ground vegetation). Similar to Vegetation Management projects, these fire and fuels activities may deter or influence visitor recreation use and wilderness character yet are primarily independent of the effects of invasive plant treatment for any action alternative so the cumulative effects would be immeasurable.

Special Use Permits

These include activities such as authorizations of new transmission power lines, communication facilities, and reauthorization of permits for stream gauges and outfitter and guides use. Both the non-recreational (e.g. powerlines, ditches) and recreational (e.g. outfitter and guides, summer cabins) special use permits (SUP) can be found in all five defined recreation resource areas. Most of the non-recreational SUPs are limited in size (average 2-5 acres) and location with associated activities like vehicle access to the site, construction of new structures, maintenance of existing structures and buildings. The recreation SUPs typically have larger subwatershed scale areas with associated activities like horseback and jetboat access, and overnight camping. The presence of the SUP structures and the associated activities tend to significantly influence the recreation resource and visitor use. For example visitors tend not to disperse camp or picnic under a transmission powerline, but may pass under it if the hiking trail intersects it. Any cumulative effects from invasive plant treatment would be immeasurable to the quality of visitor experience, displacement of use or wilderness character.

Livestock Grazing

Livestock grazing on the WWNF occurs on designated grazing allotments over most of the National Forest lands with the size of the allotments at the multi-subwatershed scale. Some of the main activities associated with grazing include; vehicle access to the allotments, grazing of cattle for 3-5 months each season, salting to improve distribution, and moving of livestock to internal pastures during the permitted season. Since cattle grazing is prevalent on most of the forest, visitors are fairly accustomed to their presence and the range management activities. The site and smell of livestock, encounters with livestock structures like corrals and fences, and seeing the consumption of vegetation is more likely to have a greater influence upon the recreation resource and visitor use than the invasive plant treatment. Because of this greater influence, any effects to a visitor's experience or displacement of use is more likely an independent factor yet could be an immeasurable cumulative effect for any of the action alternatives. An example could be that after successful treatment of the invasive plant near a popular camping location cattle use in the area increases due to the return of more native palatable species.

Wildlife and Fisheries Habitat, and Range Improvements

Habitat improvements for wildlife and fish species include construction of riparian fences, planting of hardwoods along streambanks, development of fish passages under roads and other similar projects. These improvement projects primarily occur in all of the other four recreation areas yet some may also be located in wilderness areas, and are usually limited to a few acres in size. Associated activities include; vehicle access to the project site, use of heavy equipment or power tools, removal of some vegetation, and development of structures. Similar to special use permits, any cumulative effects from invasive plant treatment would be immeasurable to the quality of visitor experience, displacement of use or wilderness character for the action alternatives.

Aggregate Cumulative Effects

In summary, most of the above management actions categories tend to have more of an independent and primary influence upon the recreation resource; however, when associated with an invasive plant treatment they may have a cumulative effect but an effect that is immeasurable because recreation use and experiences are subjective and vary among individuals.

3.7.3 Effects of Herbicide Use on Workers and the Public – Environmental Consequences

The paragraphs below replace the Cumulative Effects discussion for effects of herbicide use on workers and the public, found on pages 401 – 403 of the 2010 FEIS; the remainder of this section is unchanged.

The proposed use of herbicides in all alternatives could result in multiple or additive doses of the same or different herbicides to workers or the general public. People could conceivably be exposed to herbicides in more than one place on the Forest, or elsewhere. However, the herbicides proposed for use have low likelihood to bioaccumulate in humans and are rapidly eliminated from the body. Thus, chronic exposures are not likely to add up in the body. In addition, the extent of treatment is limited to far less than one percent of the Forest, widely distributed. This reduces the potential for repeated exposures to any member of the general public.

Chronic (daily over a period of time) worker exposure was considered in SERA Risk Assessments (see Section 3.1.5); no chronic exposures reach a level of concern at central estimates. Chronic public exposure was also assessed, including repeated drinking of contaminated water, repeated consumption of contaminated vegetation and berries, and repeated consumption of contaminated fish.

A person could be exposed to herbicides by more than one scenario; for instance, a person handling, and then consuming sprayed berries. The cumulative impact of such cases may be quantitatively characterized by adding the HQs for each exposure scenario. Using glyphosate as an example, the typical levels of exposure for a woman being directly sprayed on the lower legs, staying in contact with contaminated vegetation, eating contaminated fruit, and consuming contaminated fish leads to a combined (acute) HQ of 0.012. Similarly, for all of the chronic glyphosate exposure scenarios, the addition of all possible pathways lead to HQs that are two orders of magnitude less than 1, indicating an acceptable level of cumulative risk even with multiple exposure scenarios (R6 2005 FEIS Appendix Q).

Even if an herbicide with a greater hazard quotient than glyphosate was used, berry harvesting (dermal exposure) and the subsequent eating (oral exposure) would allow the body to metabolize some of the initial dose before receiving the second dose, thus reducing the cumulative dose. These factors make the risk implausible that a combined dose would exceed the threshold of concern.

Chronic consumption of contaminated fruit and vegetation exceeded an HQ = 1 at the upper bound estimate for triclopyr BEE, with HQ values = 3 for fruit and 6 for vegetation. However, it is unlikely that a person would eat enough contaminated fruit or vegetation over a long period of time for this to actually occur. Triclopyr is one of the effective herbicides proposed for use on about 15 percent of the invasive plant acreage proposed for treatment (see 2010 FEIS Table 6). The relatively low acreage of treatments, which are scattered widely across the forest makes it highly unlikely that a person would receive chronic exposure to contaminated vegetation.

The upper bound estimates are worst case and unlikely to occur given the precautions that would be applied in this project. For instance, under PDF L-1, triclopyr would not be applied to foliage in areas of known special forest products or other wild food collection areas. No central chronic estimates exceed an HQ of 1, and would not exceed an HQ of 1 even if they were all added together.

Herbicides are sometimes used in combination with additives such as surfactants. NPE surfactant has been associated with human health risks at certain exposure levels. NPE has estrogen-like properties, although they are much weaker (1,000 to 100,000 times weaker) than natural estrogen. NPE is widely used and present in personal care products (moisturizers, deodorants, perfumes, shampoos, and soaps) and detergents. Animal studies suggest that acute exposures at high levels may cause subclinical effects to the liver or kidneys.

The risk analysis for NPE (Bakke 2003) found that typical backpack application of herbicide containing NPE surfactant at typical exposures and a rate of 1.67 lbs/acre would add 0.1 to the cumulative HQ for these types of chemicals. For the public, values ranged between 0.00001 (eating contaminated fish) to 0.2 (consuming a pound of berries at typical exposures).These are relatively small increases in hazard and do not significantly increase the potential for cumulative effects from use of NPE surfactant and herbicides.

Chapter 3.1 (Basis for Cumulative Effects) discusses the past, present and foreseeable future actions, including chemical use, within and adjacent to watersheds surrounding the project area. The human health effects analysis assumes that chemicals are being used according to label guidance on all land ownerships. Glyphosate is the herbicide most likely to be used off National Forest. Glyphosate is accounted for about 9-10 percent of all pesticide use reported (2007 and 2008 Oregon Pesticide Use Reports).. Given the low HQ values associated with glyphosate use on the Forest, and small amount of relative use from this project, this project is not likely to result in enough glyphosate exposure to add to herbicide use off Forest and cause a cumulative effect.

The R6 2005 FEIS Appendix Q discussed the cumulative effects of herbicide exposure over time. Page Q-40 – Q41 noted that since these herbicides persist in the environment for a relatively short time (generally less than 1 year), do not bioaccumulate in humans, and are rapidly eliminated from the body, no cumulative effects from retreatments in subsequent years are predicted. Cumulative effects can be caused by different chemicals with a common metabolite or a common toxic action. With the exception of triclopyr and chlorpyrifos discussed below, none of the other herbicides have been demonstrated to share a common metabolite with other compounds. There is no evidence that any of the herbicides share a common toxic action with any other compound including other pesticides.

The primary environmental metabolite of triclopyr is TCP. TCP is also the primary metabolite of an insecticide called chlorpyrifos. Cumulative doses of TCP could result from additive doses resulting from triclopyr and chlorpyrifos use. Although chlorpyrifos is not generally used in forestry, recent studies have shown drift of chlorpyrifos, and other insecticides, from agricultural lands in the Sacramento/San Joaquin Valley to the Sierra Nevada range. Levels of chlorpyrifos have been measured in watercourses in the Sierra Nevada as high as 0.000013 mg/L. It is unlikely that such high aquatic levels of chlorpyrifos would be found in the EIS area as a result of atmospheric movement because, compared to the previous study area, the surrounding lands in Oregon and Washington have higher rainfall levels and less extensive area of intensive crop cultivation . However, assuming that 10 percent of the applied triclopyr under the typical rate of application could degrade to TCP, and using the pond spill scenario, the amount of TCP from triclopyr would be 0.36 mg/L. Assuming that 100 percent of the chlorpyrifos would degrade to TCP (an over-exaggeration of the rate of degradation), this would add 0.000013 mg/L of TCP, resulting in no appreciable increase in risk.

Estrogenic effects (a form of endocrine disruption) can be caused by additive amounts of nonylphenol (NP), NPE, and their breakdown products. In other words, an effect could arise from the additive dose of a number of different xenoestrogens (estrogens from outside the body), none of which individually have high enough concentrations to cause effects. This can also extend out to other xenoestrogens that biologically react the same. Additive effects, rather than synergistic effects, are expected from combinations of these various estrogenic substances.

When assessing cumulative effects of exposure to NP and NPE, there must be some consideration of the contribution from other sources, such as personal care products (skin moisturizers, makeup, deodorants, perfumes, spermicides), detergents and soaps, foods, and from the environment away from the forest herbicide application site. In addition to xenoestrogens, humans are exposed to various phytoestrogens, which are hormone-mimicking substances naturally present in plants. In all, more than 300 species of plants in more than 16 families are known to contain estrogenic substances, including beets, soybeans, rye grass, wheat, alfalfa, clover, apples, and cherries.

The Forest Service, Pacific Southwest Region analyzed the risks of cumulative estrogenic effects from proposed Forest Service use of NPE, plus worst-case environmental background and consumer product exposures (Bakke 2003). Adding together the cumulative contributions from the worst-case background environment and consumer products, the risk assessment estimated that backpack applicator exposure would add from 0.1 (typical rate) to 10 (maximum rate) to the cumulative HQ, which ranged from 3 (low dermal exposure assumptions) to 270 (high dermal exposure assumptions). For the public chronic exposures at the maximum application rate, the doses of NPE would add 0.00002 to 0.2 to any HQ. These may be negligible depending upon the background exposures, lifestyles, absorption rates, and other potential chemical exposures that are used to determine overall risk to environmental xenoestrogens.

The Forest Service has not evaluated the risks of most of the other herbicides used off-Forest (State Pesticide Use Reports 2007 and 2008).The R6 2005 FEIS considered the potential for synergistic effects of exposure to two or more chemicals: “Combinations of chemicals in low doses (less than one tenth of reference dose, also referred to as a toxicity index or threshold of concern) have rarely demonstrated synergistic effects. Review of the scientific literature on toxicological effects and toxicological interactions of agricultural chemicals indicate that exposure to a mixture of pesticides is more likely to lead to additive rather than synergistic effects (USDA 2005). Based on the limited data available on chemical combinations involving the twelve herbicides considered in this EIS, it is possible, but unlikely, that synergistic effects could occur as a result of exposure to the herbicides considered in this analysis. Synergistic or additive effects, if any, are expected to be insignificant” (USFS 2005a, p. 4-3).

The R6 2005 FEIS also evaluated the cumulative effects on workers and the public from non-herbicide methods. Page Q-1 stated: “The potential for hazard exposure, i.e. risk of injuries, is exacerbated when workers are fatigued, poorly trained, or poorly supervised, and do not follow established safety practices. Appropriate training, together with monitoring and intervention to correct unsafe practices, would minimize risk of worker injury and illness. Compliance with Occupational Health and Safety Administration (OSHA) standards, along with agency, industry and manufacturers’ recommendations reduces the potential exposure and risk of injury to workers”. Cumulative effects to workers are possible because the likelihood of injuries is correlated with the number of worker hours on the job.

Members of the public are usually not at risk from manual and mechanical methods unless they are too close to machinery that is producing flying debris during treatment. Cumulative effects to the public from non-herbicide methods as a result of this project are not likely.

Chapter 3.1 (Basis for Cumulative Effects) discusses a number of ongoing land uses and activities that have the potential to create conditions for invasive plant spread. However, this would not lead to additional herbicide exposure than disclosed for the direct and indirect effects because 1) prevention measures associated with these projects would reduce the likelihood and extent of invasive plant spread and 2) the PDFs and annual and life of the project caps would limit the potential effects over the life of the project, regardless of the spread of invasive plants over time. To the extent that treatments are timely and effective, the amount of treatment could decline over time, reducing the potential for cumulative effects on workers and the public each year.

None of the other foreseeable and ongoing projects on the forest, including Travel Management Plans; Mining Plans and Operations; Mining Plans and Operations; Vegetation Management and Timber Harvest Projects; Prescribed fire and Fuels Treatment; Special Use Permits; Livestock Grazing; or Wildlife and Fisheries Habitat, and Range Improvements would involve human health risks that could combine with this project and cause cumulative effects. Cumulative effects to human health from climate change cannot be discerned at the project level. Climate change would not likely contribute to cumulative effects on human health during the life of the project.

Given the low likelihood of adverse effects from herbicide use proposed in this project, and the fact that no other pesticide use projects are proposed on the forest, cumulative effects on human health from chemical exposure are unlikely to occur within the project area.

3.8.3 Rangeland Resources – Environmental Consequences

> The paragraphs below replace the Cumulative Effects discussion for rangeland resources found on pages 410 - 411 of the 2010 FEIS; the remainder of this section is unchanged.

Past management activities on the Forest in combination with the conservative approach to controlling invasive weeds has resulted in an increase in infested acres and impacts to ecosystem integrity. Various activities such as recreational use, road use, fire and its associated management activities, other management activities, grazing, and climatic events such as drought are all documented to contribute to the potential for invasive species to establish. All of these activities have contributed to the increase in invasive species establishment within the WWNF. Chapter 3.1 discusses the basis for the cumulative effects analysis.

Cumulative impacts relative to grazing resources include past, present, and future grazing by domestic livestock on the affected allotments, which has the potential to reduce native forage, reduce vegetative diversity, and provide for the introduction and/or spread of invasive plants. Additional impacts would be associated with recreation and land use on roads and trails within the affected allotments. Future use of area roads and trails, as well as uncontrolled off road use, would likely result in the introduction and/or spread of weeds. The effect of prolonged drought may include an increase in plant species which are drought tolerant and have a competitive edge during periods of drought over other vegetation. This could include both native and non-native species.

If invasive species continue to increase as they have over the last decade or longer, then this would in time reduce grazing opportunities; for example, by reducing the amount and/or availability of quality forage, decreasing the length of the season of use, and restricting the timing of grazing.

Cumulative effects to permitted livestock grazing and rangeland management of this project by alternative are listed in Table 8. Cumulative effects are expected to be beneficial for Alternatives B, C and D because more aggressive treatments combined with Early Detection Rapid Response activities and cooperative efforts with other federal, state and private landowners would reduce the potential for additional spread and loss of available forage.

Table 7 - Cumulative effects on grazing and rangeland management within the project area

Alternative	Effects on Grazing and Rangeland Management
Alternative A No Action	Over time infested areas would continue to increase and forage plants would be reduced through displacement and reduced ecosystem health. As conditions change over time within the allotments, livestock use would likely be reduced through additional NEPA allotment analysis with the loss of forage.
Alternative B Proposed Action	Some short –term limitations on livestock grazing may occur where treatments affect large acreages. As implementation of the proposed action occurs, it is expected that increased retention of desirable species, vegetation density, and plant vigor of desired native vegetation would increase and/or improve.
Alternative C Riparian Restrictions	Same as the Proposed Action. Restricted treatment options in riparian areas are expected to reduce effectiveness of treatment and therefore have a greater impact on grazing management over time.
Alternative D No Aerial Herbicide Application	Same as the Proposed Action. The small amount of acres proposed for aerial treatment in active or vacant allotments (~400 acres) that would not occur under Alternative D do not substantially change the effects between Alternatives B and D.

Under all alternatives, present and reasonably foreseeable future actions, as detailed in Table 2, would continue to cause ground disturbance across the project area that could result in the introduction and spread of invasive plants. Forest Plan standards require that prevention be considered in all land management planning. Beneficial cumulative effects could occur as Forest

Service efforts are combined with other federal, state, county, and private landowner efforts, reducing the rate of spread on a regional level. Proposed actions on NFS lands would complement these efforts.

The authorized number of AUMs has been decreasing for the past decade, with some allotment closures, vacancies, and with slight decreases during drought years. Thus, factors other than invasive plant management would continue to influence grazing levels regardless of the alternative selected in this EIS. Invasive Plant management and other land management practices may positively influence forage quantity or quality and result in beneficial impacts to grazing.

Implementation of the proposed action with appropriate environmental protection would not result in irreversible or irretrievable loss of range resources. Implementing Alternative 1 (No Action) and Alternative 4 (No Aerial Spraying) would likely result in eventual irreversible impacts on grazing resources as invasive plants would continue to spread and invade in and around the proposed treatment areas. Implementation of Alternative 3 (No Riparian Treatment) would not likely result in irreversible or irretrievable loss of range resources due to implementation of Forest Plan standards and guidelines for managed livestock grazing, as well as mitigation measures or project design features for other project proposals.

In areas where there has been extensive equipment use (such as tractors in logging), or concentrations of livestock or recreational activities, there has been some degree of compaction and/or displacement of soils. For the most part, this is minor and localized. Improvements in livestock grazing practices, as well as reduced and/or improved logging practices is resulting in a slow but continuing improvement in these impacts.

Upland plant communities, and therefore the wildlife species and TES plants and animals that use those communities have also been affected. In some areas, heavy historic livestock impacts (and in some areas heavy and improperly timed large wild ungulate use), less than desirable timber management practices followed by dense regeneration, combined with a lack of naturally occurring fire have caused a loss of understory habitats and forage resources. In some places, recovery is beginning to occur and is likely to accelerate as a combination of improved timber management practices, thinning, use of prescribed fire, and much reduced and better managed livestock grazing allow for a return to more historic stand conditions.

With improved livestock management practices over the past several decades, along with closure and rehabilitation of some roads, and a slow increase in the amount of thinning or fuels management to return conifer stands to a more near natural condition, many areas are currently at or moving toward desired conditions. Reaching the desired soil, water and vegetation desired conditions on most of the remaining benchmark sites are very likely within 10-20 years. Restoring the natural processes such as soil building, nutrient cycling, and more historical/ecological representation of indicator and desirable plant species within the communities is expected to occur more rapidly over time, however, re-building many of these processes is a long-term prospect.

Invasive Species

Some species of invasive plants can be suppressed in areas where livestock graze, especially if the livestock are managed so as to graze on weeds early in their growth cycle. On the other hand, areas where livestock concentrate or have concentrated, may have higher occurrences of bare ground. These patches of bare ground are suitable sites for invasive plants to colonize, especially if other populations (seed sources) are nearby. The difference between excluding livestock and properly managing livestock would be one of spatial extent and degree. For the most part, properly managed livestock grazing results in only light to moderate use of the herbaceous or shrubby plants, maintains or improves vigor, and results in little to no increases in bare soil (e.g. niches for invasion). The exceptions are likely to be in areas of concentrated use such as near gates, water, salt blocks, trails, and so forth. Overall, livestock exclusion would eliminate one potential vector for seed transport and one disturbance factor that has the potential to create niches for invasion. Given that current livestock management is resulting in few areas where bare soil niches are being created, eliminating livestock would result in relatively minor improvement.

Expected decreases in bare ground means there would be more plants holding soil in place while lessening the likelihood of invasion by invasive plants. There would continue to be some unavoidable areas of concentrated use that would be susceptible to invasion by invasive plants or other invasive plants. However, these would become less widespread. Improved prevention tools relative to livestock grazing management to prevent or inhibit transport of weed seeds would also be employed under the proposed action. Overall, this alternative would result in fewer weed seeds (relative to livestock management) and fewer niches for invasion. Other effects, such as fire, timber harvest activities, road maintenance (and limited construction), and recreational activities (especially ORV use) would continue to result in soil disturbance and importation of invasive plant seeds or propagules resulting in increasing invasive plants.

Some livestock grazing permittees participate in invasive plant detection and treatment programs. Elimination of permitted livestock grazing would eliminate this management tool. Of the action alternatives, the proposed action alternative would result in the greatest recovery of currently impacted sites, the best potential to adapt management to control invasive species, and the fewest sites available for invasion. In addition, adoption of prevention tools under this alternative also renders it preferable to the current situation.

Rangeland Vegetation, Forested Vegetation, Soils, Botanical Resources

The effect of invasive plant treatments through the proposed action on the livestock grazing allotments would be to increase native residual vegetation, reduce litter accumulations in some of the areas where it currently exceeds desired conditions, lessen amounts of bare ground where it currently exceeds the desired conditions, and increase the overall vigor of plants. Increasing beneficial vegetation and improving its vigor ensures that plenty of material is available for trapping sediment in runoff and overland flow events. Additionally, adequate litter (not excessive) insulates plant crowns and over wintering buds, protects and covers soil, holds moisture in the ground and allows the plants to continue photosynthesis for carbohydrate production and storage. Greater carbohydrate storage results in more roots being produced by each plant. This increases the erosion defensibility and moisture-holding capability of soils. It also provides a buffer to plants in times of stress (such as drought). Livestock grazing managed within allowable standards and guidelines would aid in prevention of invasive plant spread.

Riparian and Aquatic Resources

Streams have annual disturbance from fluctuating streamflow. Snowmelt flush bares stream edges leaving gravel bars and silt that is primary succession habitat. Invasive plants can easily occupy these sites, but the mesic conditions and well-adapted riparian vegetation readily compete to re-occupy these sites. The riparian vegetation forms a type of biotic resistance that damps the spread of invasive plants. The seed dispersal of invasive plants is periodic, and dispersed by streamwater, birds, and animals along the riparian corridor.

Changes in plant communities have resulted in alteration of habitats for riparian dependent animal species, especially in those areas where multiple impacts including timber harvest, road construction, past improperly managed livestock grazing, and trapping of beaver have been the most intense. For the most part, these areas are the lower elevation willow communities on relatively flat topography. In many instances, these areas have recovered substantially from the heavy historic impacts. However, as with beaver re-introduction and establishment, some recovery has been slow.

Current and future fuels management projects are designed to reduce the risk of catastrophic fires and thus reduce the potential for catastrophic sediment delivery over the long-term. Past and on-going restoration efforts within the burn areas, such as closing roads, mulching, and seeding are also helping reduce erosion and sediment. These efforts combined with either improvements in management of livestock grazing to improve riparian and stream habitat conditions under the proposed action, or exclusion of livestock grazing, would have cumulative benefits to the riparian/aquatic ecosystem.

Fire and Fuels

Disturbances that can be subject to weed invasion vary in frequency and intensity (James et al. 2010). A forest fire that burns at high and moderate severity can completely eliminate the overstory and understory plant canopy and bare soil. The combusted organic material leaves a high nutrient load. Though the disturbance has high intensity, the spike in nutrient load and amount of exposed bare soil decreases rapidly within 5 years as the native vegetation recolonizes the site and the risk of weed invasion declines. In contrast, livestock grazing occurs every season. The scale of the disturbance can be much less intense than a damaging wildfire since grazing exposes a fraction of soil area compared to wildfire; however, the intensity of the grazing increases if livestock are concentrated in specific areas.

Under the proposed action, there would be greater opportunity to respond to needs of prescribed fire to retain fine fuels prior to the burn, and to provide for recovery after the burn due to the flexibility built into the m n some loss of decadent plant fuel.

Assuming that prescribed burning increases slightly and wildfires continue at approximately current levels, there would continue to be large acreages where disturbance regimes are unable to operate at near natural management systems. Overall, forage harvest would not likely increase or decrease significantly from current levels but control over livestock effects would certainly improve much of the suitable rangeland. There would be increased utilization on some portions of the secondary rangeland as livestock distribution is improved. This would result in greater plant vigor but would also result.

Assuming that prescribed burning increases slightly and wildfires continue at approximately current levels, there would continue to be large acreages where disturbance regimes are unable to operate at near natural levels. This would continue the current situation of stagnant bunchgrass plants, some areas of dense, over-mature big sagebrush, and continued encroachment of conifer regeneration into grassland or shrubland communities.

Recreation, Roads, and Trails

Recreation, especially dispersed recreation involving off highway vehicles, under the proposed action is assumed would continue to increase over time. This use would continue to impact soils and plant communities in localized areas. The conflicts inherent between recreationists and livestock would continue but should decrease as livestock management improves and as additional public education efforts have the desired effect. An educated public would experience fewer conflicts and may be more tolerant of livestock grazing and other extractive uses in the future.

Grazing

Grazing lands experience annual disturbance from livestock along with intermittent vehicle use that can create bare soils in livestock congregation areas near water troughs, ponds, salt licks, fences, and streams. Plant parts may stick to animals and be transported into rangelands. The authorized livestock grazing activities on the Forest result in overall moderate level of disturbance and occur within a timeframe of less than 6 months per year. The moderate level corresponds to the small and distributed amount of disturbance across the allotment.

In more recent times, off road vehicle (ORV) use has increased greatly with four wheel drive vehicles pioneering numerous two track roads. All-Terrain Vehicles (ATV) and motorcycles added to the impacts with numerous cross-country trails. Erosion increased, in some areas dramatically, along with detrimental impacts to plant communities, which may include sensitive plant sites. Impacts to livestock grazing permittees also increased as livestock were harassed, gates left open, and grazing systems disrupted. Livestock may use the unauthorized routes as well, contributing to the spread of weeds.

The cumulative effects relative to roads and trails would not be greatly changed from the current situation in that the direct effects of those facilities would continue regardless of alternative selected. The additive effect of livestock impacts plus road and trail impacts would be reduced relative to sediment movement, stream and riparian areas, and to a small extent to upland vegetation. Where roads or trails have been closed to motor vehicle use, unless the road beds are obliterated, livestock would continue to use these travel routes. Where the roads or trails have been obliterated, livestock use would decease on these routes, but may cause the livestock to create new trailing routes, potentially introducing the spread of weed seeds. Roads and trails would continue to be travel corridors for invasive plants, whether livestock grazing is authorized or not. Removing livestock would not decrease invasive plant spread. Livestock grazing managed within allowable use standards is designed to maintain a desirable vegetation and soil condition.

Heritage Resources

As rangeland and livestock management continue to improve and to move toward meeting the desired conditions, most cultural resource sites would experience greater protection in terms of increased vegetative cover providing greater hiding cover for artifacts from collectors.

Elimination of livestock grazing would result in no need for funding to conduct additional surveys and could result in increased open space between grass plants over time as plants stagnate. Increased open space facilitates discovery of artifacts by unauthorized collectors and makes the artifacts susceptible to trampling by animals, hikers, or vehicles.

TES, MIS, and Wildlife Resources

Adaptive management practices planned for livestock management in the spring/fall transition rangelands should help to minimize the overall combined impact of large wild ungulates and livestock. While the livestock timing and intensity can be controlled and managed, the elk and deer would continue to utilize the areas during time periods when plants and soils are most susceptible to damage. Work will continue with the State Department of Wildlife to manage populations within grazing capacities, to encourage deer and elk to remain on higher elevation lands rather than migrating en mass to the lower private lands, and to attempt to distribute the animals across wider ranges. To the extent that these efforts are at all successful, impacts to soil and vegetation should decline slightly. Allowable forage utilization standards for livestock include incidental wildlife forage utilization and are designed to maintain or improve the vegetative and soil resources.

Beaver will likely continue to increase in response to improving riparian (hardwood shrub) habitats. This would further help riparian and aquatic recovery as water relationships improve, sediment is trapped and retained, and streambanks stabilize. However, periodic blow outs of beaver dams can be expected and would result in relatively short term adverse impacts. The combined effect during recovery of early seral stage vegetation establishment and livestock grazing may create an environment conducive to invasive plant invasion.

Aggregate Cumulative Effects

While some ongoing and reasonably foreseeable actions, as outlined in Table 2, are expected to overlap in time and space with invasive plant treatments, no negative additive effects to livestock grazing and management are expected. Implementation of herbicide labelling restrictions and PDFs, as described in the 2010 FEIS (pages 406-410), are expected to prevent adverse effects to large mammals, including livestock, under alternatives B, C, and D, even if weed infestations were to expand. Treatment of invasive plants under the three action alternatives is expected to result in long-term benefits to grazing management, by improving forage. Long-term benefits under the current invasive plants treatment program (Alternative A) would not be realized, as weeds are expected to continue to spread and displace palatable forage in some areas (2010 FEIS page 408).

While invasive plant species are likely to continue to be introduced, and ground disturbing activities (resulting from both resource management activities and from natural disturbances) could allow for establishment of new populations requiring treatment under EDRR, the 8,000 acre/year treatment cap would ensure that effects of treatment do not exceed those considered in the 2010 FEIS and in the SEIS.

3.9.3 Project Costs and Financial Efficiency

This section is unchanged; there are no changes to cumulative effects analysis. The 2010 FEIS financial analysis considered the costs and effectiveness of a range of integrated treatments and considered the spread of invasive plants over time.

3.10 Heritage Resources

The paragraph below is added to the discussion for heritage resources found on pages 427 - 428 of the 2010 FEIS; the remainder of this section is unchanged.

In accordance with the Programmatic Agreement Among the United States Department of Agriculture Forest Service Pacific Northwest Region (Region 6), the Advisory Council on Historic Preservation, and the Oregon State Historical Preservation Officer Regarding Cultural Resources Management in the State of Oregon by the USDA Forest Service (2004), this undertaking meets criteria listed in Appendix C of the programmatic agreement and has no potential to cause effects. The project would have no effect on heritage resources. There would be no direct or indirect effects to heritage resources and, therefore, no cumulative effects.

3.11.3 Impacts to Cultural Uses and Treaty Rights – Environmental Consequences

The paragraphs below replace the Cumulative Effects discussion for heritage resources found on pages 430 - 431 of the 2010 FEIS; the remainder of this section is unchanged.

Effects to treaty-right activities such as gathering, fishing, and hunting would be low. There would be few cumulative effects expected to non-target vegetation, including culturally important plants. The extent and threats posed by treatments are generally very small and localized when compared to the overall larger range of culturally important plants. Continued treatment and suppression of invasive species would reduce competition for available resources and provide an opportunity for culturally important plants to develop and spread. While there may be short-term effects to culturally important plants, cumulative effects would be beneficial and restorative. The types of treatments and short-term nature of treatments would have little to no impact on fishing and hunting.

Access to the project area for treaty-right activities would not be impacted. Access to some plants, at the specific times of treatment, may be slightly impacted. However, plant resources may be available in other locations. Project design calls for signing areas treated with herbicides and for notifying interested Tribes of treatment areas.

Invasive plant treatments that target the plant itself, such as spot spraying, wiping, wicking, or stem injection of herbicides, are more localized and have negligible adverse impacts. A result of broadcast or aerial spraying could be weakening or killing of non-target plants, such as culturally important plants, due to drift. Manual control methods such as hand-pulling or using hand tools, and mechanical control methods such as using power tools and actions such as mowing, weed whipping, and brushing, have negligible impacts. There is an assumption that targeted plants would be identified and treated by people doing the work, and non-targeted plants would be avoided. However, a few culturally important plants may be pulled or cut, due to some possible human error. Biological methods, such as releasing insects and pathogens, also have negligible impacts. Insects and plant pathogens are likely to attack targeted invasive species rather than culturally important plants. Treatments such as mulching, seeding, and fertilizing would have negligible impact to culturally important plants.

There would be few adverse cumulative effects expected with other ongoing or reasonably foreseeable future actions. Each action would have its own prevention plan that would reduce the risk for spread of invasive plants.

Fish or game may be harassed and some plants may be impacted by other resource management activities or recreational activities when they occur at the same time as invasive plant treatments. Other projects have the potential to eliminate single culturally important plants or isolated pockets of plants, with a short-term and localized effect to plant populations.

Grazing animals are likely to consume edible plants, especially in riparian areas, and also in other areas. It is possible to have both control of invasive plants and grazing occurring at the same time within culturally important plant habitats. Invasive plant treatments may be preceded or followed by grazing. Grazing may increase the spread of local invasive plants. However, allotment management plans reduce this risk by requiring the permittee to inventory and report any new invasive plant sites and to take measures to reduce the risk of spreading invasive plants into the forest when livestock is grazed.

Ground-disturbing activities associated with timber harvest are likely to destroy some plants. However, many culturally important plants in the project area occur in riparian areas, scablands, and open areas that are avoided by timber harvest activities. Vehicles used in timber harvest activities may bring seeds or invasive plant species into the forest. However, project designs usually include some form of washing or treating vehicles to eliminate and reduce the risk of spreading invasive plants.

Ground-disturbing activities associated with watershed restoration projects such as culvert replacement and large woody debris placement are also likely to destroy some plants. However, disturbance areas are often small and impacts to the larger range of plants are negligible.

Prescribed burning may open areas of ground and allow for faster and easier infestation by invasive plant species. Burning may prime a susceptible habitat for invasion. However, prevention measures to reduce the probability of invasion are part of current standard prescribed burning practices.

Road reconstruction, obliteration, and decommissioning could destroy plants that have encroached into the open road beds.

All action alternatives may help prevent loss and displacement of culturally important plants that are used for food, medicine, and utilitarian purposes. If invasive plant species continue to expand in the project area, threats to culturally important plants would likely increase.

3.14 Consistency with Forest Service Policies and Plans

Please see Section 3.5.5, Aquatic Organisms and Habitat, of the Supplemental EIS for a detailed analysis of project compliance with PACFISH/INFISH.

Chapter 4

4.1 List of Preparers and Contributors

The list below represents Interdisciplinary Team members and authors for the Draft Supplemental EIS.

David Salo, WWNF Hydrology Program Manager – Soil and Water

Joe Vacirca, WWNF Fisheries Program Manager – Aquatic Organisms and Habitat

Jamie Ratliff, WWNF/Whitman Ranger District Wildlife Biologist – Terrestrial Wildlife

Shawna Bautista, Pacific Northwest Region – Terrestrial Wildlife

Rochelle Desser, Pacific Northwest Region - Workers and Public Safety

Sarah Crump, WWNF Heritage Program Manager – Heritage Resources, Cultural Uses and Tribal Treat Rights

Dan Ermovick, WWNF Recreation & Special Uses Program Manager - Recreation

Maura Laverty, WWNF Range Program Manager – Range Management

Gene Yates, WWNF Botany and Noxious Weeds Program Manager – Botany

Dea Nelson, WWNF

Environmental Coordinator – NEPA

Darcy Weseman, WWNF/Whitman Ranger District – Writer/editor

4.5 Consultation with Others

Notification of the availability of the Draft SEIS is being given to the same parties that were notified regarding the 2010 FEIS. The list below reflects minor updates to the list presented on pages 435 - 437 of the 2010 FEIS and the addition of the agency's list of agencies for which it is mandatory to send notification of the availability of an EIS.

The following is a list of federal, state and local agencies, Tribes, and others notified that the Draft SEIS is available on the Web, or to which this Draft SEIS will be mailed.

Individuals

Joann Anderson
John Binford
Jacob and Wendy Bingham
Bruno Ranch
Chetwood Ranches
Jon Croghan
Teddy & Virginia Daggett
Jeff Dawson
Lyle and Margaret Defrees
Lawson Denny
Flying O Cattle Company, Janet Delong
Robert Forte
Rod George
Willard A. Godfrey
Leo & Marilyn Goebel
Kenneth Grant
James Hansen
Andrew and Mercedes Hansen
Greg K. Johnson
K TrustAbigail
K. Kawananakoa
Vernon & Alice Knapp
Kathryn M. Kreiger

Spencer Scott Lewis

Robert E. & Edna Loftus

Melvin & Jan Marshall

Dorene McCarthy

Ronald K. Niece

Gerald Perren

Judy & Roger Rabourne

Jeanne M. Rachau

Shannon J. Rambo

Michael Riggs

Micahel D. Rutherford

Jennifer Schemm

Thomas Thomayer

Tharrel Tilgner

William & Donna Tsiatsos

Dave Clemens

Fred & Anna May Warnock

Kent Weaver

Ken Witty

Dan Sharrat

Tribes

Confederated Tribes of the Umatilla Indian Reservation
Honorable Gary Burke, Chairman, Board of Trustees

Confederated Tribes of the Umatilla Indian Reservation
Mr. Eric Quaempts, Natural Resources Director

Nez Perce Tribe
Mr. Dave Johnson, Fisheries Director

Nez Perce Tribe
Mr. Mike Lopez, Staff Attorney

Nez Perce Tribe
Mr. Aaron Miles, Natural Resources Director

Nez Perce Tribal Executive Committee
Honorable Silas Whitman, Chairman

Government Officials

Oregon State Governor, Rienard Whitman, NR Policy Director

United States Senator, Tony Snodderly

US Representative, Scott Carlton, Staff

US Senator, Honorable Jeff Merkley

United States Senator, Mike Hanna, Regional Director

US Representative, Kirby Garrett, Staff

United States Senator, Kathleen Cathey, Staff

Counties

Adams County Weed Control

Baker County Weed Coordinator
Adams County Commissioners
Baker County Commissioners
Grant County Commissioners
Idaho County Commissioners
Nez Perce County Commissioners
Union County Commissioners
Wallowa County Commissioners
Idaho County Weed Management , Carl Crabtree
Nez Perce County Weed Control, Hugh Jacobs
Tri-County Cooperative Weed Management, Attn: Mark Lincoln
Grant County Road Department
Union County Weed Control, Public Works Department, Gary Dade
Upper Burnt River Weed Control District, Attn: Ross Shumway
Wallowa County Weed Coordinator, Attn: Allen Schnetzky

Organizations and Government Agencies

Banrac, LLC
Bell Family Partners
Blue Mountain Biodiversity Project, Karen Coulter
Blue Mountain Forum, Jennie Tucker
Eastern Oregon All-Terrain Vehicle Assoc., Mark Barber
Eastern Oregon All-Terrain Vehicle Assoc., Tim Mahan
Eastern Oregon Mining Association, Ken Alexander
Grande Ronde Model Watershed Program, Attn: Jeff Oveson
Hells Canyon Preservation Council, Attn: Derilyn Brown
Intermountain Excursions, Darell Bentz
Oregon Hunters Association, Charlie Brinton
Oregon Parks and Recreation Department/Resource Management and Planning Division
Lisa Van Laanen, Director
Oregon Wild, Attn: Doug Heiken
Pacific Northwest 4-Wheel Drive Assoc., Art Waugh
Red Woods Outfitter, Nolan F. & Karen Woods
Rock'n "J" Properties
Rocky Mountain Elk Foundation, Attn: Steve Martin
Sams Orchard, Dan Sams
Sierra Club, Asante Riverwind
The Wilderness Society, Brad Brooks
Trimble Ranch Co., c/o Allen Duby
Goat Horn Ranch, Attn: H.E. Beau McLendon
Idaho Power Company, Attn: Bret Dumas, Environmental Supervisor
BLM Prineville District Office, Attn: John Day/Snake Resource Advisory Committee - Lisa Clark
Oregon Department of Agriculture, NE Oregon Weed Mgmt Specialist Mark Porter
Oregon Department of Fish and Wildlife, Baker City Field Office
Oregon Department of Fish and Wildlife, Enterprise Field Office

U.S. Department of the Interior, Office of Environmental Policy & Compliance, Attn: Preston A. Sleeger
U.S. Department of the Interior, BLM, Vale District, Attn: Don Gonzalez
VFW AUX, Agnes Roberts
Wallowa Resources, Nils Christoffersen
Wallowa Valley Trail Riders Association, Attn: Randall & Velma Parmelee
Advisory Council on Historic Preservation
Deputy Director APHIS PPD/EAD
National Environmental Coordinator, NRCS
NOAA Fisheries Service NW Region, Habitat Conservation Division
U.S. Army Corps of Engineers, Northwestern Division
Northwest Power Planning Council
U.S. Coast Guard, Commandant CG-47, Office of Environmental Mgmt., Attn: Zante Capuno
Federal Aviation Administration, Regional Director, Northwest Mountain Region
Director, NEPA Policy & Compliance DOE
National Agricultural Library, Acquisitions & Serials Branch
US EPA, Region 10, EIS Review Coordinator

4.7 References

The references below are specific to the Draft SEIS.

Academics Review. 2015. IARC glyphosate cancer review fails on multiple fronts. March 23, 2015. http://academicsreview.org/2015/03/iarc-glyphosate-cancer-review-fails-on-multiple-fronts/, downloaded June 3, 2015

Adams, , C.A. Pearl, B. McCreary, S.K. Galvan, S. J. Wessell, W.H. Wente, C. W. Anderson, and A. B. Kuehl. 2009. Short-term effect of cattle exclosures on Columbia spotted frog (*Rana luteiventris*) populations and habitat in northeastern Oregon, Journal of Herpetology, 43(1):132-138.

Adams, S. B., and C. A. Frissell. 2001. Thermal habitat use and evidence of seasonal migration by Rocky Mountain tailed frogs, Ascaphus montanus, in Montana. Canadian Field-Naturalist 115:251-256.

Allen, Thomas J., Jim P. Brock, and Jeffrey Glassberg. 2005. Caterpillars In the Field and Garden, A Field Guide to the Butterfly Caterpillars of North America. Oxford University Press, Oxford, NY. 232 pp.

Altman, B. American Bird Conservancy. 2003. Inventorying Black Swift Populations At Waterfalls In The Northern Pacific Rainforest Bird Conservation Region.

Arnoson, R. 2015. Toxicologist pans UN glyphosate report, Producer.com, March 27, 2015. http://www.producer.com/daily/toxicologist-pans-un-glyphosate-report/, downloaded June 3, 2015

Audubon WatchList - Black Swift.htm http://audubon2.org/watchlist/viewSpecies.jsp?id=38

Augustine, D.J., and McNaughton, S.J. 1998. Invited paper: Ungulate effects on functional species composition of plant communities: herbivore selectivity and plant tolerance. Journal of Wildlife Management 62: p.1164-82.

Bakke, D. 2003. Human and Ecological Risk Assessment of Nonylphenol Polyethoxylate-based (NPE) Surfactants in Forest Service Herbicide Applications. Unpublished report by the Forest Service Pacific Southwest Regional Pesticide Use Specialist.

Birdsall, J.L., W. Caughey & J.B. Runyon. 2011. Roads impact the distribution of noxious weeds more than restoration treatments in a lodgepole pine forest in Montana, U.S.A. Restoration Ecology, 20(4): 517-523.

Bonham, K. 2015 GMOs are still the best bet for feeding the world, Scientific American, March 31, 2015, http://blogs.scientificamerican.com/food-matters/gmos-are-still-the-best-bet-for-feeding-the-world/, downloaded June 3, 2015.

Brock, Jim P. and Kenn Kaufman. 2003. Butterflies of North America. Houghton Mifflin Company, New York, NY. 384 pp.

Bull, E. L. 2005. Ecology of the Columbia Spotted Frog in northeastern Oregon. U.S.D.A. Forest Service, PNW-GTR-640, Pacific Northwest Research Station, Portland, OR.

Bull, E.L and M.P. Hayes. 2000. Livestock effects on reproduction of the Columbia spotted frog, Journal of Range Management, Vol. 53(3): 291-294.

Buonopane, M., G. Snider, B.K. Kerns, and P.S. Doescher. 2013. Complex restoration challenges: weeds, seeds, and roads in a forested Wildland Urban Interface. Forest Ecology and Management. 295: 87-96

Carpenter, K.D., Sobieszczyk, Steven., Arnsberg, A.J., and Rinella, F.A., 2008, Pesticide occurrence and distribution in the lower Clackamas River basin, Oregon, 2000–2005: U.S. Geological Survey Scientific Investigations Report 2008–5027, 98 p.

Collins, C.T. and Foerster, K.S. 1995. Nest Site Fidelity and Adult Longevity *in* the Black Swift (Cypseloides niger). North American Bird Bander, January-March, Vol. 20 No.1, p.11-14.

Combs, B. Black Swift. Pp. 334-336 in Birds of Oregon: A General Reference. D.B. Marshall, M.G. Hunter, and A.L. Contreras, Eds. Oregon State University Press, Corvallis, OR. 2003.

Currie, D.J. 2001. Projected effects of climate change on patterns of vertebrate and tree species richness in the conterminous United States. Ecosystems. 4: 216-225.

Daugherty, C.H. and A.L. Sheldon. 1982. Age-specific movement patterns of the frog ASCAPHUS TRUEI. Herpetologica 38:468-474.

Dixon, J. S. Nesting of the Black Swift in Sequoia National Park. The Condor, Vol. 37, No. 6. (Nov. - Dec., 1935), pp. 265-267.

Engle, Janice Carol, "Population Biology and Natural History of Columbia Spotted Frogs (*Rana Luteiventris*) in the Owyhee Uplands of Southwest Idaho: Implications for Monitoring and Management" (2001). *Boise State University Theses and Dissertations.* Paper 674.

Environmental Protection Agency (Materna, E.) 2001. Issue Paper 4, Temperature Interaction. U.S. EPA Region 10 Temperature Water Quality Criteria Guidance Development Project. U. S. Environmental Protection Agency, Washington, D. C. EPA-910-D-01-004.

Evans, J. O., and D. R. Duseja. 1973. Herbicide contamination of surface runoff waters. U.S. Environmental Protection Agency, Environmental Protection Technology Series, EPA-R2-73-266. 99 p.

Flory, S.L., and K. Clay. 2009. Effects of roads and forest successional age on experimental plant invasions. Biological Conservation. 142: 2531-2537.

Foerster, K.S. 1987. The distribution and breeding biology of the Black Swift (*Cypseloides niger*) in southern California. M.S. Thesis. California State University, Long Beach.

Foerster, K. S. and C. T. Collins. 1990. Breeding distribution of the black swift in southern California. W. Birds 21:1-9.

Gelbard, J.L. and J.Belnap. 2003. Roads as conduits for exotic plant invasions in a semiarid landscape. Conservation Biology. 17(2): 420-432

Gough, G.A., Sauer, J.R., Iliff, M. Patuxent Bird Identification Infocenter. 1998. Version 97.1. Patuxent Wildlife Research Center, Laurel, MD. http://www.mbr-pwrc.usgs.gov/id/framl

Gough, G.A., Sauer, J.R., Iliff, M. Patuxent Bird Identification Infocenter. 1998. Version 97.1. Patuxent Wildlife Research Center, Laurel, MD. http://www.mbr-pwrc.usgs.gov/id/framlst/infocenter.html

Greenberg, M. 2015. The defense of glyphosate herbicide, DoctorOz.com, http://www.doctoroz.com/article/defense-glyphosate-herbicide, April 6, 2015, downloaded June 3, 2015

Hallock, L.A. and McAllister, K.R. 2005. Rocky Mountain Tailed Frog. Washington Herp Atlas. http://www1.dnr.wa.gov/nhp/refdesk/herp/

Hansen, M.J. and A.P. Clevenger. 2005. The influence of disturbance and habitat on the presence of non-native plant species along transport corridors. Biological Conservation 125: 249-259.

Hendricks, P., Compiler. 2005. Surveys for Animal Species of Concern in Northwesternst/infocenter.html

Hendricks, P., Compiler. 2005. Surveys for Animal Species of Concern in Northwestern Montana. Report to Montana Department of Fish, Wildlife, and Parks, State Wildlife Grants Program, Helena, Montana. Montana Natural Heritage Program, Helena, MT. 53 pp.

James J.J., B.S. Smith, E.A. Vasquez, and R.L. Sheley. 2010. Principles for ecologically based invasive plant management, Invasive Plant Science and Management, 3:229–239.

Jofre, M.B. and W. H. Karasov. 1998. Direct effect of ammonia on three species of North American anuran amphibians, Environmental Toxicology and Chemistry, Vol. 18, No. 8, pp. 1806–1812.

Jones, D., N. Singhasemanon, D. Tran, J. Hsu, J. Hernandez, and H. Feng. 2000. Surface Water Monitoring for Pesticides in the Hupa and Karuk Territories. State of California, Department of Pesticide Regulation, Sacramento, CA. 14 pp. plus appendices.

Kniss, A. 2015. Glyphosate and cancer: what does the data say? Control Freaks, Wyoming Weed Science in (almost) Real Time. March 28, 2015, http://weedcontrolfreaks.com/2015/03/glyphosate-and-cancer-what-does-the-data-say, downloaded June 3, 2015.

Knorr, O. A. 1961. The geographical and ecological distribution of the black swift in Colorado. Wilson Bulletin 73: 155-170.

Knorr, O. A. and M. S. Knorr. 1989. The black swift in the Chiricahua Mountains of Arizona. Southwest Nat. 35:559-560.

Lonsdale, W.M. 1999. Global patterns of plant invasions and the concept of invasibility . Ecology 80(5): p.1522-36.

Marin, M. On the Behavior of the Black Swift. The Condor, Vol. 99, No. 2. (May, 1997), pp. 514-519.

Marin, M. Food, Foraging, and Timing of Breeding of the Black Swift In California. Wilson Bull., 11 l(l), 1999, pp. 30-37

Mayer, F.L. and M.R. Ellersieck, 1986. Manual of acute toxicity: Interpretation and data base for 410 chemicals of freshwater animals. Resource Publication 160. U. S. Fish and Wildlife Service. Department of the Interior, Washington, D.C., 579 p.

Michael, C.W. Black Swifts Nesting in Yosemite National Park. The Condor, Vol. 29, No. 2. (Mar. - Apr., 1927), pp. 89-97.

Montana Fish, Wildlife and Parks - Animal Guide Website http://fwp.mt.gov/fieldguide/detail_ABNUA01010.aspx

Naiman, R.J., H. Decamps, and M.E. McClain. 2005. *Riparia*: *Ecology, Conservation, and Management of Streamside Communities.* Elsevier Academic Press, Burlington, MA. 430 pp.

NatureServe. 2007. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: August 27, 2007).

Olson, D.H. 2011. Conservation Assessment for the Rocky Mountain Tailed Frog in Oregon and Washington. U.S.D.A. Forest Service Region 6 and U.S.D.I. Bureau of Land Management Interagency Special Status and Sensitive Species Program, Portland, OR. 33 pp.

Opler, Paul A., Harry Pavulaan, Ray E. Stanford, Michael Pogue, coordinators. 2006. Butterflies and Moths of North America. Bozeman, MT: Mountain Prairie Information Node. http://www.butterfliesandmoths.org/ (Version 08292007)

Opler, P. A. and A. B.Wright. 1999. A Field Guide to the Western Butterflies. Second Edition. Peterson Field Guide Series. Houghton Mifflin Company, New York, New York, USA, 540 pp.

Oregon Department of Agriculture. 2008. Pesticide Use Reporting System. 2007 Annual Report. Available at http://www.oregon.gov/ODA/PEST/purs_index.shtml.

Oregon Department of Agriculture. 2009. Pesticide Use Reporting System. 2008 Annual Report. Available at http://www.oregon.gov/ODA/PEST/purs_index.shtml.

Parks, C., Wisdom, M.J., Kie, J.K. 2005. The influence of ungulates on non-native plant invasion of rangelands: a review, in: USDA Forest Service. 2005b. Pacific Northwest Region Invasive Plant Program, Preventing and Managing Invasive Plants, Vol. 3. USDA Forest Service, Pacific Northwest Region, Portland, OR. October 2005, R6-NR-FHP-PR-02-05, pp. D-33 – D-52.

Partners in Flight Science Committee 2013. Population Estimates Database, version 2013. Available at http://rmbo.org/pifpopestimates. Accessed on 3 September 2014.

Pauchard, Anibal and Paul B. Alaback. 2006. Edge type defines alien plant species invasions along *Pinus contorta* burned, highway and clearcut forest edges. Forest Ecology and Management 223: 327–335.

Pilliod, D.S., C.R. Peterson and P.I. Ritson. 2002. Seasonal migration of Columbia spotted frogs (*Rana luteiventris*) among complementary resources in a high mountain basin**,** Canadian Journal of Zoology, 80: 1849-1862.

Pyle, Robert Michael. 2002. The Butterflies of Cascadia, A Field Guide to All the Species of Washington, Oregon, and Surrounding Territories. Seattle Audubon Society, Seattle, Washington. 420 pp.

Rashin, E. and C. Graber. 1993. Effectiveness of best management practices for aerial application of forest pestiides. TFW-WQ1-93-001. Washington State Department of Ecology, Olympia, Washington. 127 pp.

Reid, Leslie; Lisle, Tom. 2008. Cumulative Effects and Climate Change. (May 20, 2008). U.S. Department of Agriculture, Forest Service, Climate Change Resource Center. http://www.fs.fed.us/ccrc/topics/cumulative-effects.shtml

Ridgely, R.S., T.F. Allnutt, T. Brooks, D.K. McNicol, D.W. Mehlman, B.E. Young, and J.R. Zook. 2003. Digital Distribution Maps of the Birds of the Western Hemisphere, version 1.0. NatureServe, Arlington, Virginia, USA.

Ross, D. A., J. K. Reaser, P. Kleeman, and D. L. Drake. 1999. *Rana luteiventris* (Columbia Spotted Frog): mortality and site fidelity. *Herpetological Review* 30 (3):163. i0022-1511-43-1-132-Ross1.

Sauer, J. R., J. E. Hines, and J. Fallon. 2005. The North American Breeding Bird Survey, Results and Analysis 1966 - 2005. Version 6.2.2006. USGS Patuxent Wildlife Research Center , Laurel, MD

Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2014. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2012. Version 02.19.2014 USGS Patuxent Wildlife Research Center, Laurel, MD*

Schultz, C., and R. Levad. 2001. Black Swift survey protocol. San Juan National Forest and Rocky Mountain Bird Observatory, Grand Junction, CO.

Science Media Centre. 2015. Expert reaction to carcinogenicity classification of five pesticides by the International Agency for Research on Cancer (IARC). March 20, 2015. HTTP://WWW.SCIENCEMEDIACENTRE.ORG/EXPERT-REACTION-TO-CARCINOGENICITY-CLASSIFICATION-OF-FIVE-

PESTICIDES-BY-THE-INTERNATIONAL-AGENCY-FOR-RESEARCH-ON-CANCER-IARC/, downloaded June 3, 2015.

Scott, J. A. 1986. The Butterflies of North America. Stanford University Press, Stanford, California, USA, 583 pp.

Scott, J.A., O. Shields, and S.L. Ellis. 1977. Distribution and Biology of a Pleistocene Relict: Ochlodes Yuma (Hesperiidae). Journal of the Lepidopterists' Society 31(1): 17-22.

Seastedt, T.R., R.J. Hobbs, and K.N. Suding. 2008. Management of novel ecosystems: are novel approaches required? Front. Ecol. Environ. 6(10): 547-553.

SERA (Syracuse Environment Research Associates, Inc.). 2011. Glyphosate Human Health and Ecological Risk Assessment. Final Report, # SERA TR-052-22-03b, submitted to the USDA Forest Service by Syracuse Environmental Research Associates, Inc. March 25, 2011. http://www.fs.fed.us/foresthealth/pesticide/pdfs/Glyphosate_SERA_TR-052-22-03b.pdf

Sibley, C.G., and B.L. Monroe, Jr. 1990. Distribution and Taxonomy of Birds of the World. Yale University Press, New Haven, CT. xxiv + 1111 pp.

Sibley, D. A. 2000. National Audubon Society The Sibley Guide to Birds. Alfred A. Knopf, New York, New York.

Sfilgoj, E. 2015. EPA plans response to IARC glyphosate finding . . . but not just yet, CropLife, April 6, 2015, http://www.croplife.com/editorial/epa-plans-response-to-iarc-glyphosate-finding-but-not-just-yet/, downloaded May 27, 2015.

Simon. 2012. Opinion and Order on Motion for Partial Vacatur, Case No. 3:10-cv-01397-SI, U.S. District Court for the District of Oregon, Portland Division, filed December 12, 2012, 12pp.

Smith, E. 1928. Black Swifts Nesting Behind a Waterfall. The Condor, Vol. 30, pp. 136-138.

Stiles, F. G., and A. J. Negret. 1994. The nonbreeding distribution of the black swift: a clue from Colombia and unsolved problems. Condor 96:1091-1094.

Swearingen, J. and K. Saltonstall. 2010. Phragmites Field Guide: Distinguishing Native and Exotic Forms of Common Reed (Phragmites australis) in the United States. Plant Conservation Alliance, Weeds Gone Wild. http://www.nps.gov/plants/alien/pubs/index.htm

Trombulak, Stephen C and C. A. Frissell. 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology, 14 (1): 18-30.

USDA Forest Service. 2005a. Preventing and Managing Invasive Plants, Final Environmental Impact Statement., Pacific Northwest Region Invasive Plant Program, Pacific Northwest Region, Portland, OR. R6-NR-FHP-PR-02-05. Available on the web at http://www.fs.usda.gov/detail/r6/forest-grasslandhealth/invasivespecies/?cid=stelprdb5302157

USDA Forest Service. 2005b., Preventing and Managing Invasive Plants, Record of Decision. USDA Forest Service, Pacific Northwest Region Invasive Plant Program, Pacific Northwest Region, Portland, OR. October 2005, R6-NR-FHP-PR-02-05. 39 pp. + appendices. Available on the web at http://www.fs.usda.gov/detail/r6/forest-grasslandhealth/invasivespecies/?cid=stelprdb5302157

USDA Forest Service. 2008. Source and Effectiveness of Project Design Features/Criteria for Herbicide Use in Invasive Plant Treatment Projects Forest Service Region Six. Unpublished report. 17pp.

USDA Forest Service. 2009a. Considering Climate Change in Land Management and Project Planning. Letter from Joel D. Holtrop, Deputy Chief for National Forest System, to Regional Foresters, Station Directors, Area Director, IITF Director , Deputy Chiefs and WO Directors, File code: 1950/1920, January 16, 2009. On file.

USDA Forest Service. 2009b. Climate Change Considerations in Project Level NEPA Analysis. Internal Paper available at: http://www.fs.fed.us/emc/nepa/climate_change/includes/cc_nepa_guidance.pdf

USDA Forest Service. 2010a. Wallowa-Whitman National Forest Invasive Plants Treatment Project, Final Environmental Impact Statement, Volumes 1 & 2. March 2010. Available on the web http://www.fs.usda.gov/detail/wallowa-whitman/landmanagement/planning/?cid=stelprdb5192845.

USDA Forest Service. 2010b. Wallowa-Whitman National Forest Invasive Plants Treatment Project, Record of Decision. April 2010. Available on the web http://www.fs.usda.gov/detail/wallowa-whitman/landmanagement/planning/?cid=stelprdb5192845.

USDA Forest Service. 2011. Biological Assessment Designated Critical Habitat for Columbia River Basin Bull Trout Consultation Re-initiation.

USDA Forest Service, Pacific Northwest Research Station. 2015. Knocking Out Knotweed: Research Pins Down a Rogue Invasive. Science Findings, Issue 169, http://www.fs.fed.us/pns/publications/scfi.shtml

USDC/NOAA National Marine Fisheries Service. 2009. Endangered Species Act Section 7 Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation. Umatilla and

Wallowa-Whitman National Forests Invasive Plant Treatments. Northwest Region, Seattle, Washington. 71 pp.

USDI Fish and Wildlife Service. 2009. Concurrence and Biological Opinion for the Invasive Plant Project, Umatilla and Wallowa-Whitman National Forests, Umatilla, John Day, Walla-Walla, Imnaha, Snake, Pine, Powder, and Grande Ronde Subbasins (Oregon, Idaho, Washington), La Grande Field Office, Oregon. 134 pp.

USDI Fish and Wildlife Service. 2011. Biological Opinion for the Invasive Plant Project, Umatilla and Wallowa-Whitman National Forests, Umatilla, John Day, Walla-Walla, Imnaha, Snake, Pine, Powder, and Grande Ronde Subbasins (Oregon, Idaho, Washington), La Grande Field Office, Oregon. 34 pp.

USGS (United States Dept. of the Interior, Geological Survey). 2006. Gilliom and others. The Quality of Our Nation's Waters—Pesticides in the Nation's Streams and Ground Water, 1992–2001: U.S. Geological Survey Circular 1291,172 p.

Wai-Ping, V. and M. B.Fenton. 1989. Ecology of spotted bat (*Euderma maculatum*) roosting and foraging behavior, Journal of Mammalogy, Vol. 70, No. 3, pp. 617-622.

Warren, Andrew D. 2005. Lepidoptera of North America 6, Butterflies of Oregon: Their Taxonomy, Distribution, and Biology. Department of Zoology, Oregon State University, Corvallis, Oregon.

Zouhar, K., J.K. Smith, S. Sutherland, and M. Brooks. 2008. Wildland fire in ecosystems: fire and non-native invasive plants. Gen. Tech. Rep. RMRS-GTR-42-vol. 6. Ogden, UT: United States Department of Agriculture Forest Service, Rocky Mountain Research Station. 355 p.

4.8 Index

The Index below is specific to the Final SEIS.

Chapter 5. Responses to Comments

5.3. List of Respondents with Identification Numbers

Table 8 – List of respondents with identification numbers

ID #	First Name	Last Name	Title	Organization Name	City	State	Notes
1	Mark	Porter	Integrated Weed Management Specialist	Oregon Department of Agriculture, Noxious Weed Control, Northeast Oregon	Union	OR	supports the proposed action
2	Brian	Clapp	Coordinator	Wallowa Canyonlands Partnership, Wallowa Resources	Enterprise	OR	supports the proposed action
3	Christine B.	Reichgott	Manager	US EPA Region 10, Environmental Review and Sediment Management Unit	Seattle	WA	water quality, monitoring, other comments
4	William	Harvey	Chairman	Baker County Board of Commissioners	Baker City	OR	Supports Alternative B
5	R. L.	Denny	Rancher		Elgin	OR	supports the proposed action
6	Susan	Roberts	Commissioner	Wallowa County Board of Commissioners	Enterprise	OR	supports the proposed action
7	Karen	Coulter	Director	Blue Mountain Biodiversity Project	Fossil	OR	stale analysis, bull trout effects, sensitive species
8	Tom	Buchele	Managing Attorney	Earthrise Law Center	Portland	OR	stale analysis, bull trout effects, sensitive species

5.4 FS Direction Relative to Comments and Responses (FSH 1909.15 Chapter 20)

Forest Service Handbook at 1909.15 §25.1 directs the review, analysis and response to substantive comments on the Draft SEIS as follows, incorporating CEQ guidance at 40 CFR 1503.4:

(a) An agency preparing a final environmental impact statement shall assess and consider comments both individually and collectively, and shall respond by one or more of the means listed below, stating its response in the final statement. Possible responses are to:

(1) Modify alternatives including the proposed action.

(2) Develop and evaluate alternatives not previously given serious consideration by the agency.

(3) Supplement, improve, or modify its analyses.

(4) Make factual corrections.

(5) Explain why the comments do not warrant further agency response, citing the sources, authorities, or reasons which support the agency's position and, if appropriate, indicate those circumstances which would trigger agency reappraisal or further response.

One or more possible response types (1-5 above) are used for each comment.

5.5 Responses to Comments

1. COMMENT (7,8):

"The Forest Service should not rely on a stale analysis regarding its decision to move forward with the proposed action. "The Forest Service should consider re-analyzing all aspects of the FEIS rather than just the cumulative impacts and compliance with PACFISH/INFISH because the FEIS is now five years old and is consequently stale. The draft SEIS makes clear that its scope is "narrower than the scope of the 2010 FEIS" and is simply addressing "the inadequacies identified by the District of Oregon in *League of Wilderness Defenders/Blue Mountain Biodiversity Project v. Connaughton*," meaning it only addresses cumulative impacts and compliance with PACFISH/INFISH. U.S. FOREST SERV., DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT: WALLOWA-WHITMAN NATIONAL FOREST INVASIVE PLANTS TREATMENT PROJECT iii (Mar. 2015) [hereinafter DRAFT SEIS]. By narrowing the scope, the Forest Service is failing to consider new science and data that could be relevant to other aspects of an environmental impacts analysis.

"The Ninth Circuit has held that the Forest Service may not rely on stale data and analyses in its environmental impact analysis. *See N. Plains Resource Council, Inc. v. Surface Transportation Board*, 668 F.3d 1067, 1085–87 (9th Cir. 2011) (relying on *Lands Council v. Powell*, 395 F.3d 1019, 1031 (9th Cir. 2005), which found six-year-old data to be stale). Here, not only is the Forest Service relying on stale data in its environmental impact analysis, the whole analysis is stale. The original FEIS is over 500 pages long, relying on numerous studies that are all now at least five years old. Moreover, the underlying Regional FEIS, to which the 2010 FEIS tiers, is even older and more stale. By choosing to only re-analyze cumulative impacts and compliance with PACFISH/INFISH, holding all other parts of the FEIS and regional FEIS still adequate, the Forest Service has relied on a stale FEIS that relies on stale data and analyses. There has been a great deal of significant published scientific research about the potential adverse impacts from using many of the herbicides at issue. BMBP includes a partial list of that recent, unconsidered research at the end of this comment and attaches copies of those documents to its hard copy submission. Ignoring such recent, relevant science when preparing an SEIS is flatly inconsistent with NEPA and its implementing regulations.

"Relying on a stale analysis could have many negative environmental impacts. For example, the Forest Service did not consider whether there may be a better alternative available now that was not available five years ago for its alternatives analysis in Chapter 2 of the FEIS. Instead, the draft SEIS makes clear that this chapter remains unchanged. DRAFT SEIS at 4. If the Forest Service reanalyzed the entire FEIS, new science regarding invasive species control may have led to the consideration of an alternative that may have fewer impacts on the environment but accomplish the same purpose than the alternatives suggested in Chapter 2 of the FEIS. Possible new science regarding the alternatives available in Chapter 2 of the FEIS is just one example of why the Forest Service should re-analyze all aspects of the FEIS instead of relying on a stale analysis."

RESPONSE:

The purpose and need for this supplement is to analyze and correct specific violations identified by the District Court of Oregon and the Ninth Circuit Court of Appeals which will allow a determination on whether and to what extent analysis of supplemental information might influence a decision to use herbicides in the management of invasive plants.

For this project, the District Court ordered us to supplement the cumulative effects analysis and Ninth Cirquit Court of Appeals directed the Forest Service to demonstrate that the project meets PACFISH/INFISH management direction.

This document provides an assessment of topics based on comments received on the DSEIS that were considered to be within the scope of the DSEIS that claimed that they could or should be assessed for sufficiency, relevancy and significance as new information or changed conditions since the 2004 FEIS and ROD. These topics include those that were not included or specifically analyzed in The "Supplemental Information Report" of October 2015 (DSEIS Appendix A). It also includes topics addressed in DSEIS Appendix A where new information or circumstances may exist since the publication of the 2010 Record of Decision.

The sufficient and new information evaluated in the 2015 Supplemental Information Report did not present a substantially different picture of the environmental consequences regarding the use of herbicides to manage invasive plants from what was already presented and considered in the 2010 FEIS. None of the information was found to be significant or would result in a change to the purpose and need for this project; therefore, no further environmental analysis or documentation (correction, supplement, or revision to an environmental document) for these topics will be conducted.

We also considered whether other environmental changes or new information might result in the need for additional supplemental analysis.   Potential new information included: 1) several species being listed as sensitive by the Forest Service, 2) spread of invasive plants has occurred and 3) updates have been made to four herbicide risk assessments since the 2010 FEIS was published. 1) Effects on new sensitive species are discussed in the 2015 DSEIS. 2) Effects from the spread of invasive plants were found to be within the expected scope of impacts and therefore do not trigger the need for further EIS supplementation. 3) While we do not have the staffing or expertise to evaluate and respond to all published herbicide studies, we do review literature regarding herbicide toxicity as it is published and rely on herbicide risk assessments updates to ensure that best available science informs our herbicide planning and use. Four risk assessments have been updated since 2010; however, these updates were within the scope and range of effects reported in the 2010 FEIS.

The commenter further provided citations of ten studies published since the release of the 2010 FEIS. These studies provide no new information on effects to resources beyond the scope or range of effects that were considered in the 2010 FEIS. These 10 studies are reviewed below.

World Health Organization, International Agency for Research on Cancer, IARC Monographs Volume 112: evaluation of five organophosphate insecticides and herbicides March 20, 2015.

Carcinogenicity of tetrachlorvinphos, parathion, malathion, diazinon, and glyphosate, The Lancet, News, 1-2, March 20, 2014.

These two papers discuss whether glyphosate exposure may lead to cancer in people. The World Health Organization's International Agency for Research on Cancer (WHO/IARC) announced (March 20, 2015) a change in their classification of glyphosate to "probably carcinogenic." Guyton et al., on behalf of the IARC Monograph Working Group, published a two-page summary in the *Lancet* (2015) further explaining the IARC evaluation of glyphosate and four other pesticides. Their review cited five studies examining the effects of glyphosate. SERA's 2011 glyphosate risk assessment addressed the issue of glyphosate and cancer. All five of the studies were cited in the Forest Service risk assessment for glyphosate (SERA 2011). Based on these and other studies, both the Forest Service risk assessment and the EPA have reached a different conclusion than the IARC regarding the carcinogenicity of glyphosate. SERA 2011 states, "Given the marginal mutagenic activity of glyphosate, the failure of several chronic feeding studies to demonstrate a dose-response relationship for carcinogenicity, and the limitations in the available epidemiology studies on glyphosate, the Group E classification in U.S. EPA/OPP (1993a, 2002) [evidence of non-carcinogenicity] appears to be reasonable".

The IARC have not yet published the monograph supporting their reclassification of glyphosate; thus, that science is not yet available. Furthermore, from the information given in the IARC 2a classification for glyphosate, as well as the *Lancet* (2015) article, several scientists have questioned the IARC finding, citing weak evidence from poorly supported conclusions that were reached in the supporting studies (e.g., Academics Review 2015, Arnoson 2015, Bonham 2015, Greenberg 2015, Kniss 2015, Science Media Center 2015). The weight of evidence is against carcinogenicity (Greenberg 2015, Arnoson 2015). At worst, the question of glyphosate's carcinogenicity is a scientific controversy, to be addressed by the scientific community and the EPA. However, in an e-mail statement to *CropLife* magazine (Sfiligoj 2015), Carissa Cyran, the EPA's chemical review manager for the Office of Pesticide Programs, said the EPA last year reviewed more than 55 epidemiological studies conducted on the possible cancer and non-cancer effects of glyphosate. "Our review concluded that this body of research does not provide evidence to show that glyphosate causes cancer, and it does not warrant any change in EPA's cancer classification for glyphosate." And the EPA is not alone in their assessment of glyphosate.

According to Ms. Cyran, “This is the same conclusion reached in 2004 by the United Nations’ Food and Agriculture Organization and affirmed this year by Germany’s pesticide regulatory officials.” And in November 2015, the European Food Safety Authority released their final re-assessment of glyphosate, concluding that glyphosate is not likely to be genotoxic or pose a carcinogenic threat to humans. The EPA plans to review glyphosate in the near future, including the IARC finding. For now, there exists no new information or changed circumstances regarding the carcinogenicity of glyphosate that fall outside the scope or range of effects considered in the 2010 FEIS and Forest Service risk assessment for glyphosate.

Battaglin, W.A., M.T. Meyer, K.M. Kuivila, and J.E. Dietze. 2014. *Glyphosate and its degradation product AMPA occur frequently and widely in U.S. soils, surface water, groundwater, and precipitation;* Journal of the American Water Resources Association, Vol. 50, No.2, 275 (April 2014)

Coupe, R.H., S.J. Kalkhoff, P.D.Capel, and C. Gregoire. 2011. *Fate and transport of glyphosate and aminomethylphosphonic acid in surface waters of agricultural basins;* Pest Manag Sci (2011) Wiley Online Library

These studies address the potential for glyphosate to be detected in the environment after use.

No new information is presented in Battaglin, et al. that was not considered in the 2010 FEIS. Battaglin found that “*(c)oncentrations of glyphosate were below the levels of concern for humans or wildlife; however, pesticides are often detected in mixtures. Ecosystem effects of chronic low-level exposures to pesticide mixtures are uncertain*.”

The research conclusion reached in Coupe et al. (2011) is also consistent with the 2010 FEIS. Coupe found that

> “*Glyphosate is applied to existing vegetation, and much of the herbicide is intercepted by vegetation before reaching the soil surface. To be effective, glyphosate has to be sorbed into the plant, and, once in the plant, it is unavailable to be transported off site by runoff. The pathway of the water from the field to the stream is also a control on the transport of glyphosate. Those basins in which the majority of the water arrives at the stream having passed through the soil transports less glyphosate because of its high affinity for sorption to soil particles. Each of these factors plays an important role in determining the amount of glyphosate that moves off site. The factors need to be considered together to understand the fate and transport of glyphosate to agricultural streams.”*

This study was conducted in intensive agricultural basins of the Midwest United States and France, which would receive far higher applications of glyphosate than contemplated for this project. Coupe found that while glyphosate use in a watershed results in some occurrence in surface water; the watersheds most at risk for the offsite transport of glyphosate are those with high application rates, rainfall that results in overland runoff and a flow route that does not include transport through soil. The 2010 FEIS also addressed the potential for small amounts of glyphosate to reach water; however, the design features and herbicide use buffers would minimize or eliminate this potential. The use of aquatic labeled formulations is required when there is the potential for delivery to water. The action alternatives do not propose extensive application of glyphosate at high rates and interception by soil is likely to occur given the design features that limit use during wet periods and limitations on broadcast near streams and along roads more that may deliver herbicide through the ditch network.

McMullin,R.T., F.W. Bell, and S.G. Newmaster.2012. The effects of triclopyr and glyphosate on lichens, Forest Ecology and Management 264 (2012) 90-97.

This study concluded, "Aerial applications covering large areas may reduce the abundance of particular species, which will allow vascular plants or tolerant lichen species an opportunity to replace them. To preserve lichen diversity on the landscape, herbicide concentrations, application rates and patterns need to be considered and studied in more detail."

The results of this study are outside scope of the project. The aerial application of glyphosate has not been proposed in any alternative and the aerial application of triclopyr would be prohibited (FEIS p. 79-80). Moreover, the findings in this study regarding herbicide toxicity to lichens are consistent with the analysis in the FEIS, which assumed herbicides would impact lichens (FEIS p. 144).

Santadino, M. & C. Coviella & F. Momo. 2014. Glyphosate sublethal effects on the population dynamics of the earthworm *Eisenia fetida* (Savigny, 1826), Water, Air, & Soil Pollution, 225:2207.

This study lies outside the scope of the analysis because the researchers were concerned with the large-scale application of glyphosate on genetically modified crops in agricultural settings. "The results presented here show that the biomass, the number of earthworms, and the dynamics of the earth-worm populations can be affected by the regular use of herbicides in agriculture." This project would apply glyphosate as largely spot treatments, a much smaller scale than agricultural fields covering hundreds or thousands of acres.

Guilherme, S, M.A. Santos, I.Gaivao and M. Pacheco. 2014. Genotoxicity Evaluation of the Herbicide Garlon and its active ingredient (triclopyr) in fish (*Anguilla anguilla* L.) using the comet assay*;* Published online in Wiley Online Library.

The authors summarized their study, findings that, "for the first time in fish, the genotoxic potential of the herbicide Garlon as well as its active ingredient triclopyr. Moreover, the formulation Garlon showed to be more genotoxic than triclopyr individually. Consequently, the application of alternative formulations of triclopyr-based herbicides without kerosene should be considered in the framework of forestry and agriculture sustainable management."

The 2010 FEIS accounted for Garlon (triclopyr-BEE) formulations, which may contain kerosene, and their affects to fish, and mitigated these concerns with large stream and lake side buffers (FEIS p. 79-80 and PDF H-2). The FEIS considered alternative formulations of triclopyr-based herbicides without kerosene, as later suggested in Guilherme et al. (2014). Only triclopyr-TEA formulations, which do not contain kerosene, would be permitted within 150 feet of streams, and within 15 feet, only as spot or hand-select applications at 1 lb or less ai/acre (FEIS p. 79-80 and PDF H-2). Based on the project design, the fact that triclopyr is effective on only a small percentage (about 15%) of the Forests' weeds (FEIS Table 6, p. 58-59), and the short half-life of triclopyr in surface water (0.5 to 3.5 days with a central estimate of 2 days (2011 Risk Assessment pg. 61), the likelihood of adverse effects to fish from triclopyr would remain very low.

Louhaichi, M. and M.F. Carpinelli, L.M. Richman and D.E. Johnson. 2012. Native forb response to sulfometuron methyl on medusahead-invaded rangeland in Eastern Oregon. The Rangeland Journal, 34, pp. 47-53.

The study recommends that control of medusahead with metsulfuron methyl be weighed against the damage to non-target vegetation. The concerns over herbicide impacts to non-target native vegetation have been accounted for in the FEIS (p. 143, 152). Monitoring and restoration of treatment sites are accounted for in the project design: PDF's P-1, P-2, P-3.

Relyea, R. 2012. New effects of roundup on amphibians, Ecological Applications, 22(2) 2012, pp. 634-647.

Moore, H. D.P Chivers, M.C.O. Ferrari. 2015, Sub-lethal effects of Roundup on tadpole and anti-predator responses, Ecotoxicology and Environmental Safety 111(2015) 281-285.

Relyea examined the effect of RoundUp Original MAX formulation of glyphosate, which he presumed to contain POEA surfactant, and which he reports to be toxic to fish and amphibians, on tadpole morphology. Moore et al. (2014) examined effects of Roundup Weathermax formulation of glyphosate, also containing POEA among other surfactants (Modesto and Martinez 2010) on the antipredator responses of wood frog tadpoles.

For this project, glyphosate formulations containing POEA that pose a high risk to aquatic organisms would not be applied in or near aquatic amphibian habitat.

2. COMMENT (7, 8):

"The Forest Service Should Consider Newly Designated Sensitive Species in the SEIS. The Forest Service should consider the cumulative impacts of all sensitive species, including the new sensitive species. The draft SEIS fails to consider cumulative impacts to newly designated sensitive species, such as liverwort and green spleenwort. Rather, in Appendix A of the draft SEIS, the Forest Service provides a laundry list of newly designated sensitive species. DRAFT SEIS 117–118. The Forest Service intentionally excluded these new sensitive species from "the body of the EIS in order to keep the supplement completely focused on the inadequacies identified by the court." E-mail from Rochelle Desser to Gene Yates (Feb.03, 2015). The Forest Service illegally and improperly decided to consider these species in a supplemental information report in an attempt to keep the draft SEIS as narrow as possible while still addressing the concerns identified in *League of Wilderness Defenders/Blue Mountains Biodiversity Project v. U.S. Forest Serv.* However, Judge Simon found the cumulative impacts analysis of the FEIS illegal because the FEIS did not present a "full and fair discussion of environmental impacts[.]" *League of Wilderness Defenders/Blue Mountains Biodiversity Project v. U.S. Forest Serv.*, No. 3:10-CV-01397-SI (D. Or. Aug. 10, 2012) at 55. Considering the effects of the Project on sensitive species is certainly part of discussing "environmental impacts." The fact that these species were designated as sensitive species after the issuance of the FEIS is irrelevant. By excluding an analysis of the new sensitive species from the cumulative impacts analysis in the draft SEIS, the Forest Service is again failing to provide a "full and fair discussion of environmental impacts."

"The USFS also violated this direction from the Court and violated NEPA by artificially and arbitrarily limiting the scope of the analysis in the SEIS. The SEIS should, at a minimum, include a discussion and analysis of all new information regarding the impacts of the proposed action, and not just the specific errors identified by the court. See 40 CFR Sec. 1502.9(c).

"Moreover, even if the Forest Service could analyze the sensitive species in a supplemental information report rather than the SEIS, the Forest Service does not provide an adequate analysis of these species anywhere in the project record. For example, the document cited in Appendix A merely provides a laundry list of all new sensitive species without any analysis. *See* EUGENE YATES, AMENDMENT TO BIOLOGICAL EVALUATION FOR SENSITIVE PLANTS: INVASIVE PLANTS TREATMENT PROJECT (Apr. 26, 2014). Additionally, the only Supplemental Information Report in the record also does not analyze impacts to these species. *See* SHAWNA L. BAUTISTA, WILDLIFE REPORT—SUPPLEMENTAL INFORMATION REPORT: WALLOWA-WHITMAN INVASIVE PLANT EIS (Nov. 14, 2014). The Forest Service has not included any other supplemental information report in the record. An analysis of all sensitive species should be in the actual EIS itself, but if it is not in the EIS, it certainly needs to be in the project record. However, based on the current project record, the Forest Service has not provided any analysis of the impacts to new sensitive species in the draft SEIS or elsewhere. If such an analysis exists, failing to provide it to the public and BMBP when BMBP submitted a FOIA request asking for all such analysis, is directly contrary to NEPA, as the U. S. Dist. Court in Oregon recently held. *LOWD v. Connaughton*, 2014 WL 6977611, * 14-19 (D.Or. 2014)."

RESPONSE:
Analysis of the more recently designated sensitive wildlife and plant species, including cumulative effects, was included in the DSEIS Appendices A and B. Additional analysis of newly designated plant sensitive species has been included. Both analyses of newly designated wildlife and plant sensitive species have been moved from the Appendix to Chapter 3 of the FSEIS.

3. COMMENT (7, 8):

"The Forest Service should analyze the Project's impacts to bull trout.
"The Forest Service should err on the side of caution and consider the effects of the Project on bull trout in its SEIS since the Forest Service is currently testing waters in the Wallowa-Whitman National Forest to determine whether bull trout are present. Despite that, the draft SEIS only mentions bull trout in reference to the 2011 Biological Assessment and Biological Opinion regarding bull trout. *See* Draft SEIS at 2.

"In 2009, the Fish and Wildlife Service ("FWS") produced a biological opinion to analyze whether the Project would jeopardize the continued existence of bull trout or result in the destruction or adverse modification of bull trout critical habitat. U.S. FISH & WILDLIFE SERV., CONCURRENCE AND BIOLOGICAL OPINION FOR THE INVASIVE PLANT PROJECT 1 (Mar. 10, 2009). The FWS found no jeopardy, but noted that the Forest Service must reinitiate formal consultation if "new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion[.]" *Id.* at 87. In 2011, the FWS issued another Biological Opinion because in 2010 the FWS designated bull trout critical habitat, which qualified as new information not considered in the original Biological Opinion. U.S. FISH & WILDLIFE SERV., BIOLOGICAL OPINION FOR THE INVASIVE PLANT PROJECT 1 (Mar. 1, 2011). Again, the FWS found no jeopardy. *Id.* at 14. Based on these findings, the Forest Service determined that "the previous ESA consultation with regulatory agencies . . . will be adequate for the Supplement[.]" DRAFT SEIS at 2. Specifically, the Forest Service determined it did not need to additionally effects on analyze bull trout because "no new information included in this SEIS reveals effects to listed species or critical habitat in a manner or extent not previously considered." *Id.* However, the Forest Service then provides no discussion of any new information regarding current conditions of bull trout to determine if circumstances have changed in such a manner the biological opinions did not consider.

"For example, the Forest Service failed to discuss the potential increased presence of bull trout in the Project area. The Forest Service conducted eDNA testing for bull trout in the Wallowa-Whitman National Forest in the summer of 2014. The Forest Service expects to receive lab results regarding the presence of bull trout in May 2015. The Forest Service must actually consider this information and any additional new information it has regarding bull trout in the SEIS. Further, if bull trout are present, the Forest Service should reinitiate consultation with the FWS because the presence of bull trout in the Project area would qualify as new information that was not considered by either biological opinion, and the USFS must revise the SEIS to reflect such new information and circulate it again as a draft for public comment."

RESPONSE:

The Forest Service fully considered the effects to bull trout in the FEIS and subsequent biological assessment and biological opinion during the consultation for bull trout and bull trout critical habitat. The results of the eDNA study were not available at the time the Draft SEIS was published. The final report for the study has now been completed, the eDNA sampling did not detect the presence of bull trout in the waters of Eagle Creek watershed. Therefore, the distribution of bull trout within the project area remains the same as analyzed in 2010. There is no "increased presence" of bull trout in the project area to consider. The USFWS biological opinion for bull trout states that, under 50 CFR SS402.16, "reinitiation of formal consultation is required . . . if . . . (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in (the) Opinion . . .." Because the eDNA survey data has not shown bull trout to occupy an larger range than known and analyzed in the 2010 FEIS, there is no new information that has revealed effects to bull trout not previously considered in the FEIS or in the project biological opinions.

Consultation for bull trout critical habitat, which was revised by the U.S. Fish and Wildlife Service following the release of the FEIS, was reinitiated and the Forest Service received a biological opinion dated March 1, 2011.

4. **COMMENT (3):** (Christine, B. Reichgott, Manager, U.S. EPA, Region 10).

Continue to work with the Idaho and Oregon Departments of Environmental Quality and tribes affected by the project to ensure that state and tribal water quality standards will be met throughout the proposed project period.

RESPONSE:

The Environmental Protection Agency has expanded the National Pollutant Discharge Elimination System (NPDES) permitting program to include pesticide applications on, near or over waters of the United States. Pesticide applications to control weed and algae pests in, over or at water's edge from point sources require a Pesticide General Permit (PGP). Forest Service units in Oregon obtain the PGP from Oregon Department of Environmental Quality; in Idaho, the PGP is obtained from the EPA. An NPDES Permit was approved by the Oregon DEQ May 18, 2012 and expires September 31, 2016. This permit covers pesticide applications within 3 feet or over water bodies in Oregon and requires annual reporting of said applications or adverse incidents. The Oregon permit (File #121983) was obtained May 5, 2012; the Idaho permit (#IDG87A709) was obtained as of May 2, 2012. Both permits are on file.

The FEIS provided a means to notify American Indian tribes with annual treatment plans (PDF M-1).

5. **COMMENT (3):**
   Continue to work with the U.S. Fish and Wildlife Service and National Marine Fisheries Service, as well as the Idaho Department of Fish and Game and Oregon Department of Fish and Wildlife to monitor risks to species and take corrective measures as needed to protect biota and habitat during implementation of the project.

RESPONSE:
The Biological Opinions require annual advance notice to the USFWS and the NOAA Fisheries of yearly treatment plans and post-treatment reports, and further specify the factors that would trigger a reinitiation of Section 7 consultation.

6. **COMMENT (3):**
   "Consider approaches for climate impact assessment outlined in the Council on Environmental Quality's recent "Revised Draft Guidance for Greenhouse Gas Emissions and Climate Change Impacts." And include estimates of greenhouse gas emissions in the final SEIS with practical mitigation measures for reducing them during the project period."

RESPONSE:
We followed Forest Service guidance for addressing a project's impact on climate (USDA 2009). This guidance advises a quantitative analysis of greenhouse gas emissions when needed to aid in choosing among alternatives for projects with potential to emit or sequester more greenhouse gases, such as energy facilities, transmission lines, oil and gas development or leases. Because this project does not fall into any of these categories, we have not included a quantitative or qualitative estimate of greenhouse gas emissions.

7. **Comment (1, 2, 4, 6):**
   The commenters all write in support of Alternative B, which each views as being the most effective and efficient among the alternatives to control invasive plants.

Response: Response Not Needed

8. **Comment (5):**
   Supports the project to spray weeds.

Response: Response Not Needed

Appendix A - Changed Conditions and Updated Scientific Information Related to the 2010 Wallowa Whitman National Forest Invasive Plant Treatment Project

Introduction

Forest Service policy for implementing regulations under the NEPA outlines a procedure for review of actions that are awaiting implementation when new information or changes occur and should be considered for correction, supplementation, or revision; Forest Service Handbook (FSH) 1909.15, section18. If new information or changed circumstances relating to the environmental impacts of a proposed action or decision come to the attention of the responsible or deciding official after a decision has been made and prior to implementation, the official must review the information carefully to determine its importance. If, after an interdisciplinary review and consideration of new information within the context of the overall project or decision, the Responsible Official determines that a correction, supplement, or revision to an environmental document is not necessary, implementation should continue and the results of the interdisciplinary review is to be documented in the project file (FSH 1909.15, section 18.1).

This report includes new or updated information that does not address the inadequacies identified in Simon 2012. It considers whether or not this new information or change in circumstances is within the scope and range of effects considered in the original analysis. This report includes updated information for 1) invasive plants, 2) federally listed plants and sensitive plants designated after 2010, 3) wildlife Potentially Endangered and Threatened Species (PETS) and Management Indicator Species (MIS), 4) soils and water resources, 5) aquatic organisms, 6) recreation, and 7) human health.

Invasive Plant Inventory

The 2010 Invasive Plants Treatment Project FEIS reported 40 species in 1740 sites encompassing 24,434 acres. The data set for the FEIS was "locked" in 2007 to accommodate spatial analysis. In the intervening period forest personnel conducted additional inventory for invasive plants and mapped new sites. The existing condition now stands at 49 species in 3003 sites covering 47,180 gross acres. Nine species account for most of the increase in infested acres:

Scientific Name	Common Name
Cardaria draba	whitetop
Centaurea stoebe ssp. micranthos	spotted knapweed
Centaurea diffusa	diffuse knapweed
Chondrilla juncea	rush skeletonweed
Cirsium arvense	Canada thistle
Cynoglossum officinale	houndstongue
Hieracium officinale	meadow hawkweed
Hypericum perforatum	St. Johnswort
Onopordum acanthium	Scots thistle
Potentilla recta	sulphur cinquefoil

The 2010 FEIS anticipated that new species and new sites would be detected during the life of the project.

> "*New sites or species would be treated as part of the Forest's annual program as long as the type of effective treatment needed for the new site is covered in the methods shown in Chapter 2. The Project Design Features provide layers of caution relative to herbicide use, including annual acreage caps, which would be applied to new and known sites to ensure adverse effects are minimized."* (FEIS p. 10.)
> "*The Proposed Action also includes treatment of invasive plant sites that are presently nonexistent or as yet undiscovered, including new plant species that currently have not been found on the Forest. As described in Chapter 1, detecting and treating new infestations when they are small (referred to as Early Detection/Rapid Response or EDRR) increases effectiveness of the invasive plant program and minimizes adverse effects. Thus, the Proposed Action includes treatment of new detections using methods as those used on known sites."* (FEIS p. 23)
>
> "*Though the invasive plant inventory was thorough, it is reasonable to assume not all invasive plants sites have been located and that new sites will emerge on the landscape. Therefore, ongoing monitoring of treated sites would also look for new infestations. Newly discovered infestations would likely receive a high priority for treatment under the Early Detection Rapid Response (EDRR) strategy. Such treatments would be done under the same guidance of the R6 2005 ROD, other Forest Plan standards, product labels, and PDFs used for known treatment sites.*" (FEIS page 46)
>
> *"The 2006 inventory is estimated to include 95 percent of the existing sites; however, these sites may be spreading and new sites may likely become established during the life of the project. New sites would be subject to an implementation planning process…so that the effects of treating new sites are within the scope of the analysis in this EIS ..."* (FEIS page 82)
>
> "*The specific timing, place and prescription for invasive plant treatments during the life of this project are not known… Forest Service projections suggest that recreational use of roads and trail (both motorized and nonmotorized) will continue to increase and will continue to be conduits for the distribution of invasive plants. Other land management and use activities such as grazing, vegetation management, fuels management (Healthy Forest Initiative), wildfire, and fire suppression will continue to cause ground disturbances that can contribute to the introduction, spread and establishment of invasive plants on National Forest System lands (USDA 2005). Many of these uses and activities on the Forest and adjacent ownerships have, and will continue in the vicinity of Wallowa-Whitman National Forest"*
>
> *"This project would be implemented over several years as funding allows, until no more treatments were needed or until conditions otherwise changed sufficiently to warrant this EIS outdated. .Site-specific conditions are expected to change within the life of the project; treated infestations would be reduced in size, untreated infestations would continue to spread, specific non-target plant or animal species of local interest could change, and/or new invasive plants could become established within the project area. The effects analysis considers a range of treatments applied to a range of site conditions to accommodate the uncertainty associated with the project implementation schedule."* (FEIS page 109)

Figure 13 in the 2010 FEIS (page 92) indicates that invasive plants are likely to spread if herbicide use is severely restricted (as been the case during most of the years since the 2010 ROD because of a Court's partial vacatur of the ROD). During this period, the forest has mapped an average of 111 new sites per year, and we have observed existing sites, that cannot be treated because of the Court remand, to have doubled in size. (Smergut-Wall 2014, Schaeffer 2014)

Throughout Chapter 3, specialists considered the impact of spreading weeds, the uncertainty regarding where and how much area would need treatment over the life of the project, and that the project was designed to allow for flexibility and rapid response.

In addition, the ROD limited treatments to 8,000 acres per year, including a maximum of 4,000 in riparian areas, with a lifetime project cap of 40,000 acres (FEIS page 49). This ensures the validity of the effects analysis no matter the rate or extent of invasive spread over the life of the project. Each treatment site will be assessed using the implementation planning process to ensure treatment is within the project's scope (FEIS pp. 85-86). Therefore, even though the increased invasive plant acreage would prompt a need to treat more sites and acres than originally mapped at the onset of the FEIS analysis, the area of land treated each year would remain capped at 8,000 acres and the effects from treating that area would not differ from what has been analyzed in the EIS (because effects from treatments were shown not to persist longer than one year). Though additional time may be required to attain desired conditions, the environmental effect of treating additional sites over time would remain the same as disclosed in the FEIS and supplement.

In light of the preceding discussion, the increase in inventory is not a changed condition that requires additional NEPA analysis. The cumulative effects analysis in the supplement will consider spread since 2010 and expected future spread along vectors on the WAW.

Change in Invasive Plant Sites, Infested and Gross Acres from WAW IPEIS 2010 FEIS to April, 2013

Scientific Name	Common Name	FEIS Site Count	FEIS Infested Acres	FEIS Gross Acres	2013 Site Count	Count Change	2013 Infested Acres	2013 Gross Acres	Acres Change
Acroptilon repens	Russian knapweed	4	7	26	5	1	1.58	24.44	-1.56
Aegilops cylindrica	jointed goatgrass	0	0	0	2	2	1.52	1.52	1.52
Ailanthus altissima	tree of heaven	0	0	0	4	4	13.42	33.47	33.47
Anchusa officinalis	common bugloss	1	1500	5813	8	7	6150.14	6150.14	337.14
Cardaria draba	whitetop	179	819	1489	303	124	717.68	2174.52	685.52
Carduus acanthoides	spiny plumeless thistle	0	0	0	1	1	0.0005	0.0005	0.00
Carduus nutans	nodding plumeless thistle	6	7	27	9	3	5.95	37.59	10.59
Carduus pycnocephalus	Italian plumeless thistle	0	0	0	10	10	11.66	11.66	11.66
Centaurea	knapweed	25	30	119	177	152	3.64	41.61	-77.39
Centaurea stoebe ssp. micranthos	spotted knapweed	169	227	907	84	-85	265.69	1872.29	965.29
Centaurea debeauxii	meadow knapweed	1	0	0	2	1	0.37	31.92	31.92
Centaurea diffusa	diffuse knapweed	384	1038	4150	495	111	1270.65	5122.72	972.72
Centaurea pratensis	Tyrol knapweed	0	0	0	1	1	0.01	0.02	0.02
Centaurea solstitialis	yellow star-thistle	181	492	1966	200	19	561.49	2100.25	134.25
Chondrilla juncea	rush skeletonweed	36	98	390	97	61	6699.66	7035.57	6645.57
Centaurea virgata	squarrose knapweed	2	2	7	0	-2	0.00	0.00	-7.00
Cirsium arvense	Canada thistle	154	849	3395	296	142	1784.35	5811.30	2416.30
Cirsium vulgare	bull thistle	2	6	22	4	2	1.23	24.10	2.10
Conium maculatum	poison hemlock	3	2	7	3	0	3.22	6.57	-0.43
Convolvulus arvensis	field bindweed	1	1	3	26	25	33.88	167.82	164.82
Crupina vulgaris	common crupina	1	71	284	9	8	43.32	306.86	22.86
Cuscuta campestris	fiveangled dodder	2	2	10	1	-1	0.24	2.41	-7.59

Change in Invasive Plant Sites, Infested and Gross Acres from WAW IPEIS 2010 FEIS to April, 2013

Scientific Name	Common Name	FEIS Site Count	FEIS Infested Acres	FEIS Gross Acres	2013 Site Count	Count Change	2013 Infested Acres	2013 Gross Acres	Acres Change
Cynoglossum officinale	houndstongue	64	245	980	170	106	921.06	3408.95	2428.95
Cytisus scoparius	Scotch broom	4	29	115	5	1	114.98	115.14	0.14
Dipsacus fullonum	Fuller's teasel	2	8	30	2	0	10.27	30.11	0.11
Euphorbia esula	leafy spurge	12	26	102	16	4	49.61	130.73	28.73
Hieracium aurantiacum	orange hawkweed	0	0	0	1	1	9.76	9.76	9.76
Hieracium caespitosum	meadow hawkweed	29	9	16	44	15	5256.81	5256.81	5240.81
Hieracium pratense	meadow hawkweed	0	0	0	28	28	5.68	13.32	13.32
Hypericum perforatum	common St. Johnswort	56	151	603	142	86	785.75	1612.83	1009.83
Iris pseudacorus	paleyellow iris	0	0	0	4	4	0.61	0.66	0.66
Lepidium latifolium	broadleaved pepperweed	1	0	1	10	9	9.07	9.50	8.50
Leucanthemum vulgare	oxeye daisy	0	0	0	2	2	2.24	2.24	2.24
Linaria dalmatica	Dalmatian toadflax	130	182	728	274	144	166.43	739.21	11.21
Linaria vulgaris	butter and eggs	11	14	55	21	10	42.09	109.16	54.16
Lychnis coronaria	rose campion	0	0	0	7	7	0.69	0.69	0.69
Lythrum salicaria	purple loosestrife	3	1	3	9	6	49.97	50.56	47.56
Onopordum acanthium	Scotch thistle	157	461	1844	242	85	1060.93	2551.18	707.18
Polygonum cuspidatum	Japanese knotweed	3	19	78	11	8	2.78	89.71	11.71
Potentilla recta	sulphur cinquefoil	34	47	187	135	101	507.37	885.53	698.53
Rubus armeniacus	Himalayan blackberry	3	4	15	15	12	45.92	45.92	30.92
Salsola iberica	prickly Russian thistle	1	2	10	1	0	0.49	9.74	-0.26
Salvia sclarea	Clary sage	1	6	22	4	3	12.62	47.78	25.78
Saponaria officinalis	bouncingbet	0	0	0	7	7	0.66	7.10	7.10
Senecio jacobaea	stinking willie	53	22	86	56	3	5.13	76.47	-9.53

Change in Invasive Plant Sites, Infested and Gross Acres from WAW IPEIS 2010 FEIS to April, 2013

Scientific Name	Common Name	FEIS Site Count	FEIS Infested Acres	FEIS Gross Acres	2013 Site Count	Count Change	2013 Infested Acres	2013 Gross Acres	Acres Change
Solanum elaeagnifolium	silverleaf nightshade	2	3	11	1	-1	4.96	9.19	-1.81
Taeniatherum caput-medusae	medusahead	22	230	921	57	35	214.12	994.86	73.86
Tribulus terrestris	puncturevine	1	3	12	1	0	12.31	12.31	0.31
Ventenata dubia	North Africa grass	0	0	0	1	1	3.48	3.48	3.48
		1740	**6613**	**24434**	**3003**	**1263**	**26866**	**47180**	**22746**

Herbicide Risk Assessments

Chapter 3.1.5 describes the herbicide risk assessments that formed the basis for the effects analysis in the FEIS. The glyphosate, imazapyr, picloram, and triclopyr risk assessments were updated in 2011.

Herbicide risk assessments are available online at http://www.fs.fed.us/foresthealth/pesticide/risk.shtml, and herbicide labels are available at http://www.fs.fed.us/foresthealth/pesticide/labels.shtml

Herbicide Active Ingredient	Date	Reference Number
Glyphosate	March 25, 2011	SERA TR-052-22-03b
Imazapyr	December 16, 2011	SERA TR-052-29-03a
Picloram	September 29, 2011	SERA TR-052-27-03a
Triclopyr BEE and TEA	May 24, 2011	SERA TR 052-25-03a

Chapters 3.2 through 3.16 were reviewed to determine whether the updated risk assessments influenced findings of direct and indirect effects. In some cases, hazard quotient values for similar exposures did increase or decrease in the updated risk assessments, compared to disclosures in the FEIS. These are discussed in the sections below. However, these differences are not substantial and do not result in changes to the project design features or overall conclusions about impacts.

Botany

The potential adverse effects of treatment on non-target plants are not influenced by the change in the invasive plant inventory or updates to the herbicide risk assessments.

Spalding's catchfly

No changes have occurred in the listing of threatened and endangered plants. Several new sites of the threatened Spalding's catch-fly (*Silene spaldingii*) have been discovered since the Biological Assessment (BA) was completed and Biological Opinion (BIOP) for the project was received from the USFWS. Four sites are within 100 feet of mapped invasive plant sites. None of the recently discovered catchfly sites are within 300 feet of sites proposed for aerial application.

SISP2 – 1232 is 50 feet map distance from sulfur cinquefoil (*Potentilla recta*)
SISP2 – 1270 is within 20 feet map distance of whitetop (*Lepidium draba*)
SISP2 – 2328 is reported to be within 100 feet of sulfur cinquefoil and medusahead (*Taeniatherum caput-medusae*)
SISP2 – 2340 is reported to be within 100 feet of sulfur cinquefoil and medusahead

The effects from proposed applications to Spalding's catchfly at these sites, or for the species, would not differ from what has already been described in the FEIS and project BA. The four new small patches of Spalding's catchfly do not change the nature of the species' "widely spaced" distribution in the project area. At over 2 miles distant from proposed aerial application sites, the location of the four new Spalding's catchfly patches does not increase the risk of unintended application or drift from aerial spray applications resulting in short-term damage to individuals or small groups of plants. Therefore, the presence of these four new patches of Spalding's catchfly does not alter or create conditions or effects in a manner or to an extent that have not been previously considered in the biological assessment, biological opinion and project FEIS, and does not trigger a reinitiation of Section 7 consultation under the ESA.

> "As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or (4) new species is listed or critical habitat designated that may be affected by the action. Whenever the amount or extent of incidental take is exceeded, any operations causing such take must cease, pending reinitiation of consultation with the Service." (Project BIOP)

Regional Forester's Sensitive Plants

The ROD signed May 2010 used the 2004 Regional Forester's sensitive species list, the list in effect at the time the project was initiated. This list has since been revised. The current list of sensitive species designated by the Regional Forester went into effect December 9, 2011. Some plant species have removed and several plant species were added to the current sensitive species list. Table 1 displays plant species newly designated on the 2011 RFSSS list for occurrence on the Wallowa-Whitman National Forest, but that were not analyzed as sensitive species in the 2010 FEIS.

Table 1 Scientific Name	Common Name	Taxon	TE&P or SSS Category	WAW
ANASTROPHYLLUM MINUTUM	LIVERWORT	BR	OR-SEN	D
ANTHELIA JULACEA	LIVERWORT	BR	OR-SEN	D
BARBILOPHOZIA LYCOPODIOIDES	LIVERWORT	BR	OR-SEN	D
HARPANTHUS FLOTOVIANUS	LIVERWORT	BR	OR-SEN	D
JUNGERMANNIA POLARIS	LIVERWORT	BR	OR-SEN	D
LOPHOZIA GILLMANII	LIVERWORT	BR	OR-SEN	D
PELTOLEPIS QUADRATA	LIVERWORT	BR	OR-SEN	D
PREISSIA QUADRATA	LIVERWORT	BR	OR-SEN	D
PTILIDIUM PULCHERRIMUM	LIVERWORT	BR	OR-SEN	D
SCHISTIDIUM CINCLIDODONTEUM	MOSS	BR	OR-SEN	D
ASPLENIUM TRICHOMANES-RAMOSUM	GREEN SPLEENWORT	VA	OR-SEN	D
CAREX CAPILLARIS	HAIRLIKE SEDGE	VA	SEN	D
CAREX LASIOCARPA VAR. AMERICANA	SLENDER SEDGE	VA	OR-SEN	D
CAREX MEDIA	INTERMEDIATE SEDGE	VA	SEN	D
CAREX RETRORSA	RETRORSE SEDGE	VA	OR-SEN	D
CAREX SAXATILIS	RUSSET SEDGE	VA	OR-SEN	D
CAREX SUBNIGRICANS	DARK ALPINE SEDGE	VA	OR-SEN	D
CAREX VERNACULA	NATIVE SEDGE	VA	OR-SEN	D
CHEILANTHES FEEI	FEE'S LIP-FERN	VA	SEN	D
CYPERUS LUPULINUS SSP. LUPULINUS	A CYPERUS	VA	OR-SEN	D
DELPHINIUM BICOLOR	FLATHEAD LARKSPUR	VA	OR-SEN	D
JUNCUS TRIGLUMIS VAR. ALBESCENS	THREE-FLOWERED RUSH	VA	OR-SEN	D
LIPOCARPHA ARISTULATA	ARISTULATE LIPOCARPHA	VA	SEN	D

PINUS ALBICAULIS	WHITEBARK PINE	VA	SEN	D
PYRROCOMA SCABERULA	ROUGH PYRROCOMA	VA	OR-SEN	D

Table 1. Sensitive plants with documented occurrence on the Wallowa-Whitman National Forest added to the RFSSS list December 2011.

Two species listed in Table 1 are reported to have invasive plants growing amidst or adjacent occurrences or patches of *Cyperus lupulinus* ssp. *lupulinus* and *Pyrrocoma scaberula*. These sites would be avoided by herbicide application through project design features under alternatives B, C, and D. Under alternative A, continued management, sites would be avoided by herbicide spray as well. The effects to these species from herbicide applications would follow the same pathways and rationale for effects that have been described in the project biological evaluation and FEIS for the other sensitive plant species. The outcome determinations for these two species would be no different than for determinations made in the FEIS for other sensitive species: may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability for the population or species (MIIH) following the same rationale provided in the FEIS. These sites will be avoided by herbicide application, but there is a small risk of exposure to herbicides when conducting applications in close proximity to sensitive plants. No additional design features are warranted. Invasive plants pose a greater threat to these species than treatment. Annual implementation planning (2010 FEIS Chapter 2.2.3, pages 85-86) requires that resources of concern be listed and additional surveys completed as needed for species of local interest and their habitats.

Wildlife

<u>Summary</u>

The direct and indirect effects disclosures in the 2010 FEIS were found to remain valid after considering changes in habitat conditions, updated risk assessment information, and changes in invasive plant inventory. New species of interest have been listed since 2010. Effects on these species are considered. Invasive plant treatment would not likely contribute to a trend in federal listing for these species and no additional design features are warranted. Annual implementation planning (2010 FEIS Chapter 2.2.3, page) requires that resources of concern be listed and additional surveys completed as needed for species of local interest and/or their habitats.

The following discusses updated information related to sensitive species that were listed in 2004 and considered in the 2010 FEIS**.**

Painted Turtle

The conclusions of the 2010 FEIS remain valid. This finding is made in light of the increase in invasive plant inventory and updates to the four herbicide risk assessments.

Effects of treatments are discussed under the Wildlife Effects Section. The painted turtle is not documented on the Forest; however, potential habitat exists on approximately 8,669 acres. Twenty nine acres of the existing waterbody and shoreline habitat are proposed for treatment under the action alternatives. Any ground based treatments could result in short-term disturbance to the painted turtle. In addition, ground based mechanical treatments could result in mortality under any of the alternatives. However, PDF J-4 requires that the local biologist review all areas proposed for treatment to ensure that known painted turtle locations are identified and that treatment timing, methods, or herbicide formulations can be adjusted if necessary to reduce impacts. As a result, the likelihood of adverse treatment related effects is low under all alternatives. In addition to PDFs that restrict herbicide use within aquatic habitats, PDF J-5 requires that the local biologist review treatment locations, timing and methods if necessary to minimize adverse impacts to this species. As a result, and considering the small amount of suitable habitat proposed for treatment (29 acres) it is unlikely that a painted turtle would occur within a treatment area or be exposed to toxic levels of herbicides under any alternative.

Columbia Spotted Frog and Northern Leopard Frog

Conclusions of the 2010 EIS remain valid. This finding is made in light of the increase in invasive plant inventory and updates to the four herbicide risk assessments.

Northern leopard frog does not occur on the WWNF. Disturbance, trampling of juveniles and adults, and herbicide exposure are the possible direct effects to Columbia spotted frog analyzed. Indirect effects include the effectiveness at which each alternative mitigates habitat loss by invasive plants. Alternative B remains the most effective at protecting and restoring Columbia spotted frog habitat. All of these direct and indirect effects are possible for all alternatives, but unlikely because invasive plants are not known to occur in occupied habitat. For suitable habitat (105 acres of treatment in non-aquatic habitat) and newly discovered infestations, pre-treatment assessment (PDF A-1) would confirm presence or absence of Columbia spotted frog. Potential adverse effects to amphibians from herbicide are greatly reduced by PDFs that restrict herbicide application rates, herbicide choice, and require buffers. More specifically, 1) herbicide use buffers (F-3, H-1, H-2, H-3, H-8, H-10 through H-12) virtually eliminate the potential for herbicide to be delivered to water in concentrations of concern (2010 FEIS, p.243).

Gray Flycatcher

The updated risk assessments resulted in a change to HQ’s for insect-eating small birds: glyphosate at the highest application rate and upper residue rates slightly exceeds the NOAEL (HQ=1.5) in acute exposures, but only for formulations that contain POEA surfactants. Risk to terrestrial insects, as a food source, is also discussed. All other results for insect-eating small birds remain the same as discussed in 2010.

Conclusions of the 2010 EIS remain valid in light of the updated risk assessments and invasive plant inventory. Disturbance and herbicide exposure are the possible direct effects analyzed. Indirect effects include the alteration of prey habitat by invasive plants, potentially shifting insect prey distributions. All of these direct and indirect effects are possible for all alternatives and remain the same as described in the FEIS.

Sharp-Tailed Grouse

Conclusions of the 2010 EIS remain valid in light of the updated risk assessments and invasive plant inventory. The updated risk assessments resulted in a change to HQ’s associated with exposure to grass-eating large birds (the scenario used to assess risk to adult sharp-tailed grouse) for glyphosate:

1. Typical rate, upper exposure assumptions, and chronic exposure slightly exceeded the NOAEL (HQ=1.1)
2. High rate, upper exposure assumptions, and acute exposure also slightly exceeded the NOAEL (HQ=1.1)
3. High rate, upper exposure assumptions, and chronic exposures exceeded the NOAEL with HQs ranging from 1.7 to 4 depending upon which vegetation type is considered (short grass vs. tall grass).

All other results for grass-eating large birds are the same as discussed in 2010. The 2010 FEIS found that triclopyr at typical and high application rates exceeded the NOAEL in both acute and chronic exposures. At highest application rate, the NOAEL is exceeded for central exposure estimates at acute (HQ=1.9) and chronic (HQ=3) exposures. Picloram and imazapyr still do not exceed the NOAEL in any exposure duration or assumption.

For sharp-tailed grouse, we also use the scenario of an insect-eating small bird to account for sharp-tailed grouse chicks, which are heavily dependent upon insects (as in the 2010 FEIS).The updated risk assessments resulted in a change to HQ's for insect-eating small birds: glyphosate at the highest application rate and upper residue rates slightly exceeds the NOAEL (HQ=1.5) in acute exposures, but only for formulations that contain POEA surfactants. The risk from terrestrial insects as a food source is also discussed. All other results for insect-eating small birds remain the same as discussed in 2010.

Direct effects to sharp-tailed grouse include disturbance during implementation of proposed treatments. Although much of the broadcast applications would occur in areas that are dominated by invasive plants, which would not likely be utilized by sharp-tailed grouse. Also, if sharp-tailed grouse actually occurred within a treatment site, the pre-treatment assessment (A-1) would ensure that treatment methods or timing would be adjusted, if necessary, to reduce or eliminate adverse effects. While potential for mortality exists, implementation of PDFs, combined with the small amount of suitable habitat proposed for treatment would effectively eliminate the likelihood that treatment related mortality would occur. This remains true in light of updated risk assessments and invasive plant inventory.

Greater Sage Grouse

Sage grouse are now documented on the Wallowa-Whitman. The 2010 FEIS contained an analysis for greater sage grouse because it was suspected on the forest (but not documented).

The updated risk assessments resulted in a change to HQ's for grass-eating large birds (the scenario used to assess risk to adult sage grouse) and glyphosate:

1. Typical rate, upper exposure assumptions, and chronic exposure slightly exceeded the NOAEL (HQ=1.1)
2. High rate, upper exposure assumptions, and acute exposure also slightly exceeded the NOAEL (HQ=1.1)

High rate, upper exposure assumptions, and chronic exposures exceeded the NOAEL with HQs ranging from 1.7 to 4 depending upon which vegetation type is considered (short grass vs. tall grass).

All other results for grass-eating large birds are the same as discussed in 2010: that is, triclopyr at typical and high application rates exceed the NOAEL in both acute and chronic exposures. At highest application rate, the NOAEL is exceeded for central exposure estimates at acute (HQ=1.9) and chronic (HQ=3) exposures. Picloram and imazapyr still do not exceed the NOAEL in any exposure duration or assumption.

For sage grouse, we also use the scenario of an insect-eating small bird to account for sage grouse chicks, which are heavily dependent upon insects (as in the 2010 FEIS). The updated risk assessments resulted in a change to HQ's for insect-eating small birds: glyphosate at the highest application rate and upper residue rates slightly exceeds the NOAEL (HQ=1.5) in acute exposures, but only for formulations that contain POEA surfactants. Risk to terrestrial insects, as a food source, is also discussed. All other results for insect-eating small birds remain the same as discussed in 2010.

No impacts to sage grouse are predicted with any alternative, because only six acres of suitable habitat are proposed for treatment. Project PDFs (F-1, F-4, J-5a to J-5c) effectively minimize risk to sage grouse.

American Peregrine Falcon

The updated risk assessments are consistent with findings in the 2010 FEIS. Conclusions of the 2010 EIS remain valid in light of the updated risk assessments and changes in the invasive plant inventory. Potential effects described in the FEIS, which include disturbance to foraging Peregrines caused by noise, people and vehicles associated with proposed treatment, have not changed. Due to the small amount of habitat proposed for treatment the possibility of disturbance is low, and with implementation of PDF J-3 there are no adverse effects to nest habitat anticipated under any alternative. There are no adverse effects from EDRR or proposed herbicides/surfactants anticipated under any alternative.

Bald Eagle

The updated risk assessments are consistent with findings in the 2010 FEIS. Conclusions of the 2010 EIS remain valid in light of the updated risk assessments and changes in the invasive plant inventory. Disturbance and herbicide exposure are the possible direct effects analyzed. Indirect effects include the alteration of prey habitat by invasive plants, potentially shifting prey distributions. All of these direct and indirect effects are possible for all alternatives.

Spotted Bat

The updated risk assessments contain new data resulting in changes to Hazard Quotients for small mammals consuming contaminated insects for glyphosate and triclopyr. In the previous risk assessments no estimated acute exposure exceeded the NOAEL for small mammals consuming contaminated insects. In the new risk assessment, only upper estimates of exposure for the highest application rates of glyphosate and triclopyr (7 lbs/ac and 6 lbs/ac respectively) exceed the NOAEL. For glyphosate, the upper estimate HQ=3 for formulations with POEA, and HQ=1.4 for aquatic formulations. For triclopyr, the upper estimate HQ=1.3. No estimated exposures for imazapyr or picloram exceeded the NOAEL for small mammals consuming contaminated insects, even at highest application rates.

Conclusions of the 2010 EIS remain valid in light of the updated risk assessments and invasive plant inventory. The spotted bat is not currently known to occur on the Forest. However, the Forest contains approximately 221,514 acres of suitable habitat, including approximately 3,161 acres that are infested with invasive plants. Direct effects to roosting bats would not occur because no trees or cliffs would be disturbed during any treatments. Additionally, no disturbance to foraging bats is anticipated because treatments occur during the day and bats forage at night. Under Alternative A, indirect effects to the spotted bat could occur from a localized reduction in native plant/insect diversity (foraging habitat) within affected watersheds as invasive plants continue to increase. There could potentially be a negative effect to spotted bats from ingesting insect prey contaminated by herbicide. However, it is not anticipated that a spotted bat, if present, would be exposed to levels of any herbicide or surfactant that would exceed the reported NOAEL under any alternative because their prey is unlikely to be sprayed, the bats are unlikely to forage exclusively on contaminated insects, PDF F-1 limits triclopyr applications to spot spray, and PDF F-4 requires use of the lowest effective application rates.

Bighorn Sheep

The results of new risk assessments are that picloram exceeds the NOAEL (HQ=3) for grass-eating large mammals at the highest application rate, but only for chronic exposures and upper exposure estimates. All central estimates of exposure are below the NOAEL (HQ<1). The results for triclopyr, glyphosate and imazapyr are the same as discussed in the 2010 FEIS.

The potential effects of invasive plant treatment methods on bighorn sheep include disturbance caused by noise, people and vehicles, and exposure to herbicides. Approximately 24 percent (623 acres) of the bighorn sheep habitat with invasive plants is adjacent to roads and trails, where they would be fairly accustomed to human disturbance and noise. On the remaining infested acres within bighorn sheep habitat, treatment activities could potentially disturb bighorn sheep, but disturbance would be limited to a few days during treatment. Invasive plant treatments might occur within 1 percent of bighorn sheep habitat, so the potential for disturbance and herbicide exposure is low, and unaffected habitat which could be used for any displaced animals is widely available. PDFs F-1 and F-4 eliminate the potential for ingestion of toxic amounts of triclopyr, NPE, glyphosate or sulfometuron methyl by limiting application rates and broadcast applications. As a result, implementation of these PDFs and the small percentage of habitat treated would effectively reduce the likelihood that bighorn would be exposed to toxic levels of herbicide.

Conclusions of the 2010 EIS remain valid in light of the updated risk assessments and changes in the invasive plant inventory.

California Wolverine

California wolverine was discussed in the 2010 FEIS, however presence not documented on the Forest. The wolverine is currently proposed for listing as a threatened species under the Endangered Species Act, and wolverine has now been documented on the WWNF.

The updated herbicide risk assessments indicate risks are the same or less than what was reported for wolverine in 2010. In the 2010 analysis, triclopyr exceeded the NOAEL. The updated risk assessments indicates that all estimated doses from operational herbicide exposure scenarios, including triclopyr, are below the no-effect level (NOAEL).

Conclusions of the 2010 EIS remain valid in light of the updated risk assessments and invasive plant inventory. . Disturbance and herbicide exposure are the possible direct effects analyzed. Due to the wolverine's preference for more remote, wilderness habitat, the lower incidence of invasive plants and their treatment in wolverine habitat, the low level of treatment disturbance in wolverine habitat, and all herbicide exposures modeled resulting in doses below the NOAEL (HQ less than 1), no effect to wolverines is expected.

MIS

The following section discusses changed conditions related to Management Indicator Wildlife Species discussed in the 2010 FEIS.

Deer and Elk

Conclusions of the 2010 EIS remain valid in light of the updated risk assessments and invasive plant inventory. Disturbance and herbicide exposure are the possible effects analyzed. Less than 1 percent of the total suitable elk habitat on the forest is proposed for treatment (FEIS 2010, p.187, Table 34), and the possibility that elk would be in the treatment areas is low. However, any animals on-site during treatment could be displaced from the area in the short-term while treatments are actually occurring. Although forest-wide elk distribution is not expected to be influenced by proposed treatments, there could be localized benefits to elk forage because invasive plants can reduce the ability of an area to support elk and deer. Alternative B is expected to be the most effective at containing or eradicating existing and future invasive plant infestations within elk habitat. However, all alternatives would reduce existing and new infestations, and contribute to the long-term maintenance of native plant diversity and elk foraging habitat. Alternative A would provide the least benefit to elk because invasive plants would continue to expand within affected watersheds and result in the long-term loss of elk foraging habitat. Considering the herbicides likely to be used on invasive plants in elk habitat, and the PDFs that restrict uses of triclopyr and NPE surfactants, no adverse effects to elk from herbicide exposures are expected or indicated (FEIS 2010, p. 248-253).

Pileated Woodpecker and Cavity Excavators

The updated risk assessments resulted in a change to HQ's for insect-eating small birds: glyphosate at the highest application rate and upper residue rates slightly exceeds the NOAEL (HQ=1.5) in acute exposures, but only for formulations that contain POEA surfactants. Risk to terrestrial insects, as a food source, is also discussed. All other results for insect-eating small birds remain the same as discussed in 2010.

Conclusions of the 2010 EIS remain valid in light of the updated risk assessments and invasive plant inventory. Disturbance and herbicide exposure are the possible direct effects analyzed for all alternatives. It is possible that adults could be disturbed by activity associated with proposed treatments but disturbed birds would likely move into unaffected suitable habitat. Considering the small amount of suitable habitat affected, any disturbance related effects would be minor and of limited extent. It is not expected that the pileated woodpecker or any cavity excavator would be exposed to toxic levels of herbicide under any alternative. Invasive plants do not adversely affect habitat for these species. As a result indirect effects to habitat would be minor under all alternatives.

American Marten

The updated risk assessments contain new data and additional scenarios for exposure to canids/mammalian carnivores. All estimated doses from typical or highest application rates exposure scenarios, including triclopyr, are below the no-effect level (NOAEL). In the 2010 analysis, triclopyr exceeded the NOAEL.

Conclusions of the 2010 EIS remain valid in light of the updated risk assessments and invasive plant inventory. . Direct effects from invasive plant treatments are discussed under the Wildlife Effects Section. Invasive plant treatment sites do not occur within preferred marten habitat because marten are closely associated with heavily forested areas and tend to avoid areas that lack overhead cover. However, invasive plant infestations that occur along disturbed roadsides in forested areas would be treated. These roadsides may be used during foraging and dispersal by marten. Of the 174,956 acres of suitable marten habitat on the forest, 941 acres contain invasive plants. Due to the small and scattered nature of treatment areas, any animal disturbed would move into unaffected habitat. As a result any disturbance effects would be short term and localized.

There is no suitable marten habitat proposed for aerial spraying and less than 10 acres occur within riparian areas. As a result there is little difference between alternatives in terms of treatment; although less than 20 percent of existing infestations would be treated under Alternative A. The potential for exposure of martens to herbicides is low because marten prefer forested areas that are less likely to contain invasive plants, and less than 1 percent of the forest-wide suitable habitat is proposed for treatment. However, an individual could move through an area that has been sprayed and come into direct contact with herbicides or ingest contaminated prey. There are no herbicides that exceeded the toxicity value for an acute or chronic exposure to a carnivorous mammal. Potential for exposure of marten to herbicides is further reduced by the fact that they forage over large areas and would not consume all of their diet from contaminated prey. As result there are no adverse effects from herbicide exposure anticipated under any alternative.

Soils and Water

The findings related to direct and indirect impacts to soils and water have not changed since the release of the 2010 FEIS. There are no relevant additional 303d listings or TMDLs. The updated risk assessments and changes in invasive plant inventory do not result in changes to findings.

Aquatic Organisms

The findings related to direct and indirect impacts to fish and aquatic organisms have not changed since the release of the 2010 FEIS. Changes in risk assessments resulted in some increases in HQ values. The toxicity threshold for glyphosate (without surfactant) for effects to fish has changed from 0.5 to 0.1mg/l, due to findings in a paper regarding potential impact on salmon olfactory sensitivity. This increases the HQ values given the same exposure; however, this does not change the overall impact analysis or findings about non-lethal impacts (glyphosate is considered one of the riskier herbicides relative to non-lethal impacts on aquatic resources).

A study to better discern the distribution of bull trout has been completed. Results from this study did not detect an increased presence of bull trout in sampled watersheds.

Recreation

The updated inventory and risk assessments do not result in changes to findings related to direct and indirect impacts to recreation in the 2010 FEIS.

Human Health

Since the Wallowa-Whitman NF Invasive Plant Treatment FEIS was published, four of the Herbicide Risk Assessments were updated (2011). These are glyphosate, imazapyr, picloram and triclopyr (TEA and BEE). The pre-2005 risk assessments are compared to the 2011 risk assessments in the table below:

Glyphosate Risk Assessment (2003)	Glyphosate Risk Assessment (2011)	Changed Condition Findings
No operational worker exposures over a threshold of concern.	No operational worker exposures over a threshold of concern.	No change.
No public health exposures over a threshold of concern (non-accidental).	A new public health scenario was modeled in the 2011 risk assessment: acute consumption of contaminated vegetation (not fruit) by a woman immediately after spraying. The 2011 glyphosate risk assessment indicates that the HQ value would equal 1.4 at the “upper bound” estimate for the herbicide application rate of 2lb per acre. No other non-accidental human health exposures exceeded the reference dose.	The new scenario of consumption of contaminated vegetation is unlikely because a woman would have to consume 1 pound of vegetation immediately after spraying, which is unlikely. The HQ = 1.4 is a slight exceedance over the threshold of concern. The threshold of concern is several orders of magnitude below the level thought to cause a human health impact. Therefore, this change does not substantially affect the findings in the 2010 Wallowa Whitman FEIS.
For an accidental spill of 200 gallons of herbicide into a small pond, the HQ = 2 for a small child drinking water out of the pond immediately after the spill.	No change. Because of the herbicide handling and transportation safety PDFs that limit the amount of herbicide that could be transported, and the low plausibility of a child drinking from a pond immediately after a spill, the risk associated with this scenario remains low in all alternatives for the Wallowa Whitman project.	No change. Because of the herbicide handling and transportation safety PDFs that limit the amount of herbicide that could be transported, and the low plausibility of a child drinking from a pond immediately after a spill, the risk associated with this scenario remains low in all alternatives for the Wallowa Whitman project.
	Additional exposure scenarios have been added to the updated risk assessment (for example, a woman swimming in a stream that has been contaminated with herbicide for one hour). The amount of herbicide that is modeled to reach the stream is based on the GLEAMS estimate of 10 acres of broadcast spray along 1.6 miles of stream. All exposure estimates were below a threshold of concern for dermal exposure or water consumption.	No change in findings.

Imazapyr Risk Assessment (2004)	Imazapyr Risk Assessment (2011)	Changed Condition Findings
No human health exposures scenarios (worker, public or accidental) exceeded the threshold of concern.	No human health exposures scenarios (worker, public or accidental) exceeded the threshold of concern. Additional exposure scenarios have been added to the updated risk assessment (for example, a woman consuming contaminated vegetation or swimming in a stream that has been contaminated with herbicide for one hour). The amount of herbicide that is modeled to reach the stream is based on the GLEAMS estimate of 10 acres of broadcast spray along 1.6 miles of stream. All exposure estimates were below a threshold of concern for dermal exposure or water consumption.	No change.

Picloram Risk Assessment (2003)	Picloram Risk Assessment (2011)	Changed Condition Findings
No worker exposure scenarios exceeded the threshold of concern.	No worker exposure scenarios exceeded the threshold of concern.	No change.
No non-accidental public exposures over a threshold of concern.	A new public health exposure scenario modeled in the 2011 risk assessments: chronic consumption of contaminated vegetation (not fruit) by a woman immediately after spraying. The HQ value of 2 was calculated at the upper bound (the central estimate was 3 orders of magnitude below 1). This indicates a slight exceeding of the reference dose, however, the reference dose is orders of	The new scenario of consumption of contaminated vegetation is unlikely because a woman would have to consume 1 pound of vegetation immediately after spraying, which is unlikely. The HQ = 2 is a slight exceedance over the threshold of concern. The threshold of concern is conservation and is several orders of magnitude below the level thought to cause a human

Picloram Risk Assessment (2003)	**Picloram Risk Assessment (2011)**	**Changed Condition Findings**
	magnitude below the level thought to cause an effect. This scenario is unlikely because a woman would have to consume 1 pound of vegetation immediately after spraying, which is unlikely. No other non-accidental human health exposures exceeded the reference dose (including new exposure scenarios such as swimming).	health impact. Therefore, this change does not substantially affect the findings in the 2010 Wallowa Whitman FEIS.
For an accidental spill of 200 gallons of herbicide into a small pond, the HQ = 3 for a small child drinking water out of the pond immediately after the spill.	The 2011 accidental spill scenario for a child drinking water after 200 gallons are spilled into a pond went down from HQ =3 to HQ =1. This appears to be because the reference dose (threshold of concern) for this scenario was increased in 2011.	No change. This is an extreme and implausible exposure scenario, especially given the project design features associated with the Wallowa Whitman project that restrict the amount of herbicide that would be transported to the field. Nor is it plausible that a child would drink water out of a pond immediately after a spill.

Triclopyr (2003)	Triclopyr (2011)	Changed Condition Findings
Triclopyr TEA – HQ = 1.6 for general worker exposure.	Triclopyr TEA - HQ = 1.6 for general worker exposure	No change. There appears to be an error in the R6 2005 FEIS that uses a value of 16 for chronic worker exposure, and this is referenced in the 2010 Wallowa Whitman FEIS. The risk assessment value, based on an application rate of 1 lb per acre, for backpack spraying was 1.6 (not 16), at the upper bound. This indicates a lower level of risk than was reported in the Wallowa Whitman FEIS.

Triclopyr (2003)	Triclopyr (2011)	Changed Condition Findings
Triclopyr TEA - Several acute public health exposures exceeded a threshold of concern for TEA. These included: HQ = 3 for direct spray of a child at the upper bound estimate, HQ = 7 for direct spray of a woman at the upper bound estimate, and HQ = 1.3 for a woman brushing up against contaminated vegetation at the upper bound estimate. No HQ values exceeded 1 at central estimates.	Triclopyr TEA - Reduced HQ values for some of the upper bound, implausible exposure scenarios (HQ reduced from 3 to 0.2 for direct spray of a child, HQ reduced from 7 to 0.5 for direct spray of a woman). For a woman eating 1 lb of contaminated fruit directly after spraying, the upper bound HQ value increased from below 1 to 4. The increase in HQ is due to a reduction in the toxicity threshold because of potential additional sensitivity of a woman of child bearing age. However, the central bound remains below an HQ of 1. A new exposure scenario was included in the 2011 risk assessment that was not in the 2003 risk assessment, for a woman eating about a pound of contaminated vegetation (not fruit) resulted in an upper bound HQ of 27 and a central estimate of HQ = 3 for acute exposures. Upper bound chronic estimates for a woman eating contaminated fruit or vegetation over a long period time also increased in the 2011 risk assessment, with respective upper bound HQ values calculated at 3 and 6, respectively. No other non-accidental scenarios (including swimming) exceed a threshold of concern.	The changes in the values in the risk assessment do not change the interpretations of risk in the Wallowa Whitman FEIS. This is because the scenarios described in the risk assessment are unlikely to actually occur. Triclopyr use is limited to spot or selective application. Direct spray of a person is implausible with these methods. Consumption of contaminated fruit is implausible both because the amount of fruit that would have to be consumed and the project design features that require posting of treated areas and use of dye to mark treated areas. It is even less likely that someone would eat a pound of contaminated vegetation after it has been sprayed. Upper bound estimates also are extreme; central estimates are more realistic, especially given the project design features associated with the Wallowa Whitman project.

Triclopyr (2003)	**Triclopyr (2011)**	**Changed Condition Findings**
Triclopyr TEA - For an accidental spill of 200 gallons of herbicide into a small pond, the HQ = 2 for a small child drinking water out of the pond immediately after the spill.	Triclopyr TEA - For an accidental spill of 200 gallons of herbicide into a small pond, the HQ = 2 for a small child drinking water out of the pond immediately after the spill.	No change.
Triclopyr BEE - Worker exposures over a threshold of concern included: HQ = 1.6 for general exposure; HQ = 4 for a worker wearing gloves saturated with herbicide for one hour (upper bound estimates)	Triclopyr BEE - Worker exposures over a threshold of concern included: HQ = 6 for general exposure (upper bound estimate); HQ = 7 for a worker wearing gloves saturated with herbicide for one hour (upper bound estimates). Central estimates are below a threshold of concern.	There appears to be an error in the R6 2005 FEIS that uses a value of 16 for chronic worker exposure, and this is referenced in the 2010 Wallowa Whitman FEIS. This indicates a lower level of risk than was reported in the Wallowa Whitman FEIS. The increase in the upper bound estimates for accidental worker exposure do not indicate a greater level of risk than disclosed in the Wallowa Whitman 2010 FEIS. The upper bound estimate is extreme and assumes no project design features are followed. Standard worker precautions are requiring licensed applicators supervise projects make upper bound accidental exposures unlikely to actually occur.

Triclopyr (2003)	Triclopyr (2011)	Changed Condition Findings
Triclopyr BEE: Public health exposures over a threshold of concern included: HQ = 6 for direct spray of a child at the upper bound estimate, HQ = 11 for direct spray of a woman at the upper bound estimate. None of the central estimates for these scenarios exceeded an HQ = 1. The HQ = 1.7 was calculated for a woman brushing up against contaminated vegetation at the upper bound estimate. Under this same scenario, HQ values were 1.3 at the central estimate. No other public exposure scenarios exceeded a threshold of concern.	Triclopyr BEE: Direct spray of a child at the upper bound estimate is below 1; HQ for direct spray of a woman at the upper bound estimate is 1.4. HQ values for consumption of 1 lb of fruit contaminated with triclopyr BEE increased from an HQ below 1 to an HQ of 4 (at the upper bound). The new scenario of a woman eating 1 lb of contaminated vegetation resulted in an HQ value of 27 at the upper bound, and 3 at the central estimates. Chronic consumption of contaminated fruit and vegetation included HQ values = 3 for fruit and 6 for vegetation. No other non-accidental scenarios (including swimming) exceed a threshold of concern.	The changes in the values in the risk assessment do not change the interpretations of risk in the Wallowa Whitman FEIS. This is because the scenarios described in the risk assessment are unlikely to actually occur. Triclopyr use is limited to spot or selective application. Direct spray of a person is implausible with these methods. Consumption of contaminated fruit is implausible both because the amount of fruit that would have to be consumed and the project design features that require posting of treated areas and use of dye to mark treated areas. It is even less likely that someone would eat a pound of contaminated vegetation after it has been sprayed. Upper bound estimates also are extreme; central estimates are more realistic, especially given the project design features associated with the Wallowa Whitman project, including avoiding use of triclopyr (especially BEE) in areas of high public use and forest product gathering.
Triclopyr BEE - For an accidental spill of 200 gallons of herbicide into a small pond, the HQ = 2 for a small child drinking water out of the pond immediately after the spill.	Triclopyr BEE - For an accidental spill of 200 gallons of herbicide into a small pond, the HQ = 2 for a small child drinking water out of the pond immediately after the spill.	No change.

The following section indicates paragraphs in the human health section of the Wallowa Whitman FEIS that are influenced by the new risk assessment findings.

> The updated scientific risk assessments do not indicate that workers or the public would be adversely affected by herbicides used in the manner proposed for this project, assuming PDFs are followed and inadvertent consumption of contaminated vegetation is avoided. The PDFs are intended to add a layer of caution for all herbicide use, including herbicide use that may be associated with calculated HQ values greater than 1. For glyphosate, picloram, and triclopyr (both formulations), HQ values exceeded a threshold of concern for the new scenario of a woman eating a pound of contaminated vegetation immediately following spraying. However, the likelihood of this scenario actually occurring is implausible due to the type of vegetation that would be collected (mainly herbs) and the marking of treated areas with dye.
>
> Even with direct contact, risks from this project would be relatively low (activity with an HQ less than 1 is estimated for a person being directly sprayed for most of the herbicides proposed. Triclopyr BEE and TEA has worst case estimates that exceed 1 for these exposures, however PDFs are in place to minimize likelihood of adverse effects, for instance triclopyr is restricted to spot (backpack) applications, minimizing application rates of all triclopyr formulations, and following safe work practices and herbicide labels.

Worker Exposure to Herbicides

The glyphosate risk assessment (SERA 2011) stated that "some recent studies raise concern that glyphosate and some glyphosate formulations may be able to impact endocrine function through the inhibition of hormone synthesis (Richard et al. 2005; Benachour et al.2007a,b), binding to hormone receptors (Gasnier et al. 2009), or the alteration of gene expression (Hokanson et al. 2007)" (all references as cited in SERA 2011). Evaluation of the studies indicates that endocrine disruption effects were indicated for surfactants in the formulations rather than glyphosate itself. The current project requires the use of the aquatic formulation of glyphosate which does not contain the types of surfactants implicated in concern over endocrine effects. A commercial surfactant would be added to glyphosate when preparing the solution for application, but the surfactant type of choice is methylated seed oil/crop oil concentrate, which is typically a corn oil derivative and not implied in causing endocrine effects. PDFs reduce the application rate for NPE surfactants and address this concern.

Public Exposure to Herbicides

The updated risk assessments increased some HQ values, and reduced others; however, the overall findings in the 2010 FEIS remain valid. The 2011 risk assessments included a new exposure scenario of a woman eating 1 pound of contaminated vegetation immediately after spraying. This leads to higher HQ values than consumption of contaminated fruit. Actual adverse effects are still not expected due to the unlikely nature of the scenario occurring, restriction of triclopyr use to backpack (targeted) applications only (PDF F-1), the use of dye in herbicide applications, public notification (PDF K-1), not using triclopyr on potential food items (PDF L-1) and other standard safety practices.

Final Conclusions.

The new and updated information provided in this report does not present a substantially different picture of the environmental consequences disclosed in the 2010 FEIS. The new information and changed circumstances are within the scope and range of effects considered in the original analysis. The information does not change determinations or findings made in the 2010 FEIS for these resources. Therefore, a correction, supplement or revision to the 2010 FEIS, based on the information considered above, is not necessary.

List of Preparers

Rochelle Desser, Forest Health Protection – Workers and Public Safety

Shawna Bautista, Pacific Northwest Region, Terrestrial Wildlife, Human Health Risk

Assessment

Gene Yates, WWNf Botany and Invasive Plants Program Manager

Jamie Ratliff, WWNF, Whitman Ranger District, Wildlife Biologist

Dea Nelson, Environmental Coordinator

Appendix B –Amendment to Wildlife Biological Evaluation – Summary Determinations of Effect

Prepared by Shawna L. Bautista, Regional Invasive Plant Coordinator, Pesticide Use Coordinator, and Journey-level Wildlife Biologist and Jamie Ratliff, Wildlife Biologist, Wallowa-Whitman National Forest

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Table B-1 summarizes results of the analysis of species added to the Regional Forester's Sensitive Species List for Region 6 since the publication of the EIS. The body of the analysis is found in Section 3.3.6 of the final SEIS.

Table B-1 Determination statements for newly listed sensitive wildlife species

Species/Habitat	Determination All Alternatives	Rationale
Black Swift	No impact	The magnitude and duration of disturbance or herbicide exposure is low level and short term. Proposed project would target only invasive plants and there is no indication that insect prey of black swifts is found on invasive plants.
Harlequin Duck	No impact	The magnitude and duration of disturbance or herbicide exposure is low level and short term. Invasive plant treatments are likely to be rare within harlequin duck habitat and there are no records of harlequin ducks breeding on the forest.
Black Rosy Finch	No impact	Treatments would not occur along high alpine cliff faces within the Wallowa mountains. Invasive plants are typically treated so that they are killed before seeds are formed. Triclopyr is not used on the invasive plants which produce seeds known to be consumed by birds.
Wallowa Rosy Finch	No impact	Treatments would not occur on high alpine barren ground or talus slopes within the Wallowa mountains. Invasive plants are typically treated so that they are killed before seeds are formed. Triclopyr is not used on the invasive plants which produce seeds known to be consumed by birds.

Species/Habitat	Determination All Alternatives	Rationale
Lewis’ Woodpecker	No impact	The specific plant species targeted for treatment do not provide foraging or nesting habitat for Lewis’ woodpecker. A bird could not consume enough contaminated insects in a day to reach a dose of glyphosate that would cause an adverse effect.
White-headed Woodpecker	No impact	The white-headed woodpecker would not be exposed to herbicides from the proposed project because of their nesting and foraging habits. The magnitude and duration of disturbance is low level and short term.
Rocky Mountain Tailed Frog	No impact	The proposed project would not change habitat or microclimate conditions for this frog due to the limited amount of invasive plants within its habitat. Disturbance is unlikely because these frogs are primarily nocturnal. Riparian buffers virtually eliminate the potential for herbicide in concentrations of concern to be delivered into the water.
Townsend’s Big-eared Bat	No impact	The likelihood of disturbing roosting bats is remote because the magnitude and duration of disturbance is low level and short term. It is highly unlikely that bats would be exposed chronically to contaminated insects given the small acres treated and the relatively large area over which bats forage.
Fringed Myotis	No impact	The likelihood of disturbing roosting bats is remote because the magnitude and duration of disturbance is low level and short term. It is highly unlikely that bats would be exposed chronically to contaminated insects given the small acres treated and the relatively large area over which bats forage.
Western Ridged Mussel	No impact	No herbicides would be directly sprayed into the water. There are very limited acres of invasive plants adjacent to mussel and snail habitats. The size and distribution of the invasive plant populations and the ephemeral nature of glyphosate in the environment make it impossible to achieve lethal concentrations

Species/Habitat	Determination All Alternatives	Rationale
		of herbicide.
Shortface Lanx	No impact	No herbicides would be directly sprayed into the water. There are very limited acres of invasive plants adjacent to mussel and snail habitats. The size and distribution of the invasive plant populations and the ephemeral nature of glyphosate in the environment make it impossible to achieve lethal concentrations of herbicide.
Columbia Pebblesnail	No impact	No herbicides would be directly sprayed into the water. There are very limited acres of invasive plants adjacent to mussel and snail habitats. The size and distribution of the invasive plant populations and the ephemeral nature of glyphosate in the environment make it impossible to achieve lethal concentrations of herbicide.
Hells Canyon Land Snail	No impact	The Hells Canyon land snail is not known to occur on the forest. Disturbance or herbicide exposure is unlikely considering this snail's preferred habitat is talus slopes.
Fir Pinwheel	No impact	Disturbance or herbicide exposure is unlikely considering this snail's preferred habitat is talus slopes.
Western Bumblebee	MINL[1]	Invasive plants are often treated before they flower. Target invasive plants provide only a small number of the wide variety of food plants utilized by western bumblebees. PDF A-1 requires occurrence of sensitive species is confirmed prior to treatment so that methods and timing can be adjusted to avoid impacts.
Silver-bordered Fritillary	MINL[1]	Mechanical treatments are not proposed in the meadow and riparian habitat for this butterfly. Food plants would not be targeted for treatment. PDF A-1 requires occurrence of sensitive species is confirmed prior to treatment so that methods and timing can be adjusted to avoid impacts. Invasive plants are often treated before they flower.
Johnson's Hairstreak	No impact	The hairstreak's larval food plant occurs high in the canopy of

Species/Habitat	Determination All Alternatives	Rationale
		conifer trees and no adult food plants would be treated.
Intermountain Sulphur	MINL[1]	Food plants would not be targeted for treatment. PDF A-1 requires occurrence of sensitive species is confirmed prior to treatment so that methods and timing can be adjusted to avoid impacts. Invasive plants are often treated before they flower.
Yuma Skipper	MINL[1]	Food plants would not be targeted for treatment. PDF A-1 requires occurrence of sensitive species is confirmed prior to treatment so that methods and timing can be adjusted to avoid impacts. Invasive plants are often treated before they flower.

[1] MINL - May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To The Population Or Species.