United States
Department of
Agriculture

Forest
Service

August 27, 2007

Environmental Assessment

Metolius River Wood Restoration Project

Sisters Ranger District, Deschutes National Forest
Jefferson County, Oregon

Large wood in the Metolius River in Riverside Campground, circa 1925.

For Information contact:
Michael Riehle
PO Box 249
Sisters, Oregon
(541)-549-7702
mriehle@fs.fed.us

TABLE OF CONTENTS

PAGE

List of Tables

List of Figures

SUMMARY

The Sisters Ranger District of the Deschutes National Forest proposes to place logs and whole trees into the Metolius River to increase pool habitat and cover for spring Chinook salmon, bull trout, redband trout, and other native fish. The project area is located near Camp Sherman, Oregon and under the management direction of the Northwest Forest Plan. This action is needed because wood that was in the river or that would have fallen into the river was removed in the past century for salvage logging, erosion control, development, and boating safety. This historical removal of wood has caused a shortage of in-stream wood, pools, and fish cover. In addition, the rate of natural infall of large wood is slow due to the low density of ponderosa pines along much of the river. Pools, often created by wood, are a primary component for chinook salmon rearing habitat and are infrequent in the project area. Chinook salmon will be reintroduced in the watershed in 2008 and surveys have found that the pool frequency is below that desired for good juvenile chinook survival.

The Proposed Action (Alternative 2) would add large wood to near historic levels at 206 sites over 11 miles of river, from Riverside Campground to Jefferson Creek. The project would provide increased habitat for all fish species but in particular, chinook salmon. Habitat for chinook salmon is low in the Metolius River due to the lack of pools. The program to reintroduce chinook salmon above Pelton Round Butte Dams is focused on the Metolius River providing the majority of the spring chinook salmon habitat in the upper Deschutes River Basin. This project is designed to improve the success of a sustainable population over time.

Project design criteria and mitigation measures will limit potential effects and provide for resource protection. The Action Alterntives may disturb the substrate of the river during non-spawning seasons and disturb the river bank in small areas. Some of the skid trails used to move logs to the river bank may affect a small number of Peck's penstemon, a Sensitive plant. However, habitat for the species will be protected and in some respects, it may increase from the disturbance. Cultural resource sites will be avoided and protected. Northern bald eagle and osprey nest sites will be protected by observing seasonal restrictions and no fly helicopter zones near the nests. Survey and manage mollusks sites will be avoided. Habitat for the mollusks will be protected by not removing down wood within 30ft of the river and avoiding known sites. The recreation setting will be protected by avoiding the peak recreation use periods and areas. Scenic quality of the river corridor will be protected by mimicking the natural arrangement of wood along the river bank, using logs with root wads attached, and disguising cut end of logs. River banks will be revegetated and skid trails will be restored by scattering large wood or subsoiling the road to promote rapid recovery.

In addition to the Proposed Action the Forest Service also evaluated the following Alternatives:

- ***Alternative 1 No action****- This Alternative would not propose an active program to restore wood in the Metolius River and would allow the recovery of wood in the river to occur though natural processes. This Alternative would maintain the current program of managing danger trees near recreation facilities and roads and some of those trees would be felled in the river tosupplement natural recruitment. This program allows approximately 5 trees per year to be felled into the river.*

- ***Alternative 3-*** *This Alternative would propose an active wood restoration program on 173 sites above Bridge 99 only. This Alternative proposes to exclude the river segment*

downstream of Bridge 99 and rely on natural processes to regain the wood lost from removal in the past. This Alternative avoids conflict with boaters by not adding wood in a reach that receives more rafting than the upstream segments.

Based upon the effects of the Alternatives, the Responsible Official will answer the following questions based on the environmental analysis: 1) will the Proposed Action proceed as described, or be modified and 2) what mitigations and monitoring requirements will be applied to the project.

For this decision, the District Ranger is the Responsible Official. The Responsible Official will decide the location, intensity of activities, and mitigation measures that balance the Purpose and Need for the project with the potential environmental effects.

INTRODUCTION

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental Effects that would result from the proposed action and Alternatives. The document is organized into four parts:

- *Introduction:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Comparison of Alternatives, including the Proposed Action:* This section provides a more detailed description of the agency's proposed action as well as Alternative methods for achieving the stated purpose. These Alternatives were developed based on key issues raised by the public and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each Alternative.
- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other Alternatives. This analysis is organized by resource area: Boating Safety, Natural Recovery, Hydrology, Fisheries, Botany, Cultural Resources, Wildlife, Recreation and Scenic Quality. Within each section, the affected environment is described first, followed by the description of the No Action Alternative that provides a baseline for evaluation and comparison of the other Alternatives that follow.
- *Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendix:* Appendix A provides a Monitoring Plan for the project. Appendix B provides the Project Design Criteria for the project from the programmatic Biological Assessment for Stream Restoration Activities. Appendix C is the Terms and Conditions from the Biological Opinions from the US Fish and Wildlife Service and National Marine Fisheries Service.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Sisters Ranger District Office in Sisters, Oregon.

Background

The Metolius River is one of the largest spring-fed drainages in Oregon. It originates in the forested hills of the Cascade Range from springs two miles south of Camp Sherman. The Metolius River flows about 29 miles before meeting the Deschutes River at Lake Billy Chinook. No human-made dams or reservoirs regulate the Metolius River. The Metolius River has a remarkably uniform flow because it is primarily spring fed. Very little water is diverted for consumptive use.

The upper river provides spawning habitat for kokanee salmon, rainbow trout, and brown trout. The river system also supports a popular trophy fishery for bull trout, a federally threatened species which spawn the Metolius River and in tributaries. Habitat restoration and enhancement measures may provide benefits to existing resident fish and could increase the potential for restoring self-supporting anadromous fish populations.

The Metolius River has long been recognized as an important recreation destination because of the fishery and scenic quality. The clear water, stable flow and tall ponderosa pine along the river banks make it a popular destination for camping, fishing, hiking, and boating.

Because of past removal of wood from the river, the Forest Service began a program to restore wood in the Metolius River in the mid 1980s. The project was supported by Trout Unlimited and Santiam Flyfishers. The project began in the Riverside Campground area and spanned to the area just upstream of Bridge 99. The project involved adding logs and rocks to the river for fish habitat, sometimes using green trees growing along the river. The project received some criticism because of the removal of large green ponderosa from the river corridor and the use of rock which looked out of place in the Metolius River. Some of the early work used lodgepole pine and rebar for anchoring. These logs did not grow vegetation like the other species of logs used. Some of the logs placed in the lower segment moved during subsequent floods.

Since that project, other riparian projects have protected the river bank along high-use trails and a small number of trees were added to the river as mitigation for the danger tree program along campgrounds, recreation residences, and roads.

The Metolius River was added to the federal system by the Omnibus Oregon Wild and Scenic Rivers Act of 1988. Through the Wild and Scenic River Act, the Forest Service must ensure the protection *and* enhancement of native fish populations as an Outstandingly Remarkable Value (ORV). The wild fish populations of the Metolius River are protected through Oregon Fish and Wildlife's Wild Fish Policy. The river is also designated a State Scenic Waterway from the Metolius Springs to Candle Creek.

The Metolius River is a Key Watershed under the Northwest Forest Plan in 1994. The Metolius Watershed Analysis and the Updated Watershed Analysis identified that the upper Metolius River was one of the few river segments that did not meet the objectives of in-stream wood and fish

habitat. The recommendations called for restoration of wood to restore habitat for fish (USDA 2004).

In 2004, Houslet reported the rate of new wood entering the Metolius River by natural infall or the danger tree program (Houslet 2004). He found that the rate of new wood entering the river was slow and had not achieved the objectives for in-stream wood in the 15 years since the last large scale habitat project. Lovtang (2005) found that the upper Metolius River and Lake Creek had the highest growth rates for chinook salmon. He also found the highest density of chinook salmon in areas where water was slowed by wood or other obstructions to the current.

In 2005 the Federal Energy Regulatory Commission issued a new license for the Pelton Round Butte Hydroelectric Project on the Deschutes River. Part of the new license calls for new surface withdrawal facilities and fish passage at Round Butte Dam. The reintroduction of fish passage for Chinook salmon, steelhead and sockeye salmon is scheduled in 2009, with adults being passed as early as 2011.

This project proposes to restore fish habitat in a timely fashion to ensure successful reintroduction of Chinook salmon and the recovery of bull trout and redband trout in the upper Deschutes Basin.

Purpose and Need for Action

The ***purpose*** of the project is to restore fish habitat in the Metolius River. The river has been slow to recover from a legacy of the removal of wood in the early half of the 1900's. Many of the forest stands in the project area provide low rates of natural recruitment of wood due to the low stand densities of ponderosa pine forests along the river corridor. Additionally, recreation development has reduced the potential for new wood to fall into the river.

There is a ***need*** to provide in-stream wood and pool habitat created by in-stream structures. Wood forms pools and slow water that are important for rearing salmon in the first year of life. Wood also creates vegetated islands that are important for many aquatic species. Habitat for chinook salmon is low in the Metolius River due to the lack of pools and surveys have found that the pool frequency is below that desired for good juvenile chinook survival. Chinook salmon will be reintroduced above Pelton Round Butte Dam in the next five years. The program to reintroduce chinook salmon above Pelton Round Butte Dams is focused on the Metolius River providing the majority of the spring chinook salmon habitat in the upper Deschutes River Basin. Chinook habitat is listed as Essential Fish Habitat under the Magnuson-Stevens Act.

The Need for Action has been identified in a number of planning documents. The Metolius Watershed Analysis Update identifies the need for the restoration of in-stream wood for fish habitat. The Metolius Wild and Scenic River Plan (USDA 1997) calls for restoration of in-stream wood in areas of poor wood recruitment. Active restoration may augment wood recruitment or increase in-stream structure where natural processes have been altered. In addition, in-stream wood in the upper Metolius River does not met the desired future condition due to decades of wood removal.

Common management objectives include protection of watershed values, including bull trout habitat and Wild and Scenic River values. Protection of in-stream and riparian resources and visual integrity is a requisite of habitat restoration and wood manipulation.

Desired Future Condition

Desired density of large wood is in the range of 46 to 155 pieces of large wood per mile, based on the densities of Jack Creek and unaltered streams in the John Day and Malhuer River watersheds (Table 8). Desired amount of pool habitat is 18 to 26 pools per mile. Good habitat for rearing chinook salmon includes pool habitat that ranges from 40 to 60% of the stream area, based on a literature review by Burke and others (2003). Bull trout also require pool habitat and abundant overhead cover in the form of wood, undercut banks and vegetation (Goetz 1989). Maintenance of spawning habitat, primarily in the upper 4 miles of river, is a primary objective for the protection of the kokanee salmon, sockeye salmon, and redband trout population.

Cover along the streambanks and islands are an important feature that needs to be maintained in the Metolius River. Complex habitat and cover provided by wood and the vegetation that grows on the wood is a desired future condition for habitat for chinook salmon, bull trout, and redband trout. Islands that are formed by large wood create habitat for a diverse mix of plant species and is a key component of the ecological/vegetation values to be protected in the Metolius Wild and Scenic Plan. These ecological values would be maintained while protecting public safety, natural scenic values and the cultural values of the river.

The project is designed to move fish habitat in the Metolius River toward meeting the desired condition of restored large wood and pool habitat while maintaining water quality and protecting non-target species from negative effects. A sustainable and harvestable population of salmon above the dams is desired above the Pelton Round Butte Dams.

Proposed Action

The Sisters Ranger District proposes to restore fish habitat in the Upper Metolius River by providing in-stream wood that will act as rearing and resting habitat. Structures will be placed in critical areas over a span of 11 miles of river. Structures will only be placed on National Forest lands. The project will focus on areas of poor natural recruitment from riparian areas due to development, removal, or low density riverside forests.

In the Proposed Action, 206 structures with approximately 930 logs would be added to the Metolius River between the headwaters and Jefferson Creek (Figure 1 and 2). This would increase in-stream large woody debris (LWD) densities by up to11 times the existing levels in some reaches. LWD densities would not change in reach 4 and would only increase by 1.5 times in reach 6 because these

reaches are within narrow, fast canyons and it would be difficult to access the sites and secure the logs so as not to impact boater safety.

Wood will be added to the river through a variety of techniques including using hand crews, an excavator from the river bank, an excavator in the river bed, and a helicopter. Anchoring wood will rely on natural placements that will be secured by digging a slot into the river bank and placing the log and covering it with the soil (keyed into the stream bank), retaining the root wads on the logs, and placing entire whole trees along the river edge. Aggregations of logs can be integrated together to resist movement during high water. In some cases, wood can be wedged between standing trees and extend out into the river.

Source wood will be gathered from a variety of places. One source is hazard trees already felled or going to be felled along roads in the B&B Fire, Black Crater Fire, and Lake George Fire areas. These trees are large and well suited for river wood and effects from collection are minimal given their roadside location. Other locations for collection of wood include B&B Fire Recovery Project units not included in the salvage sales but covered under the B&B Fire Recovery EIS, or firelines in the Black Crater Fire, Lake George Fire or other fire areas where there is an excess of trees for fire line restoration needs.

All restoration work will need to observe seasonal restrictions for wildlife and fish. Prevention of the spread of weeds will be included in the contracts and Survey and Manage mollusk and heritage sites will be protected by avoiding disturbance of the sites. River boating safety will be maintained because log structures should not create navigational hazards. All wood placements will be reviewed to ensure that Scenic Quality management standards are met.

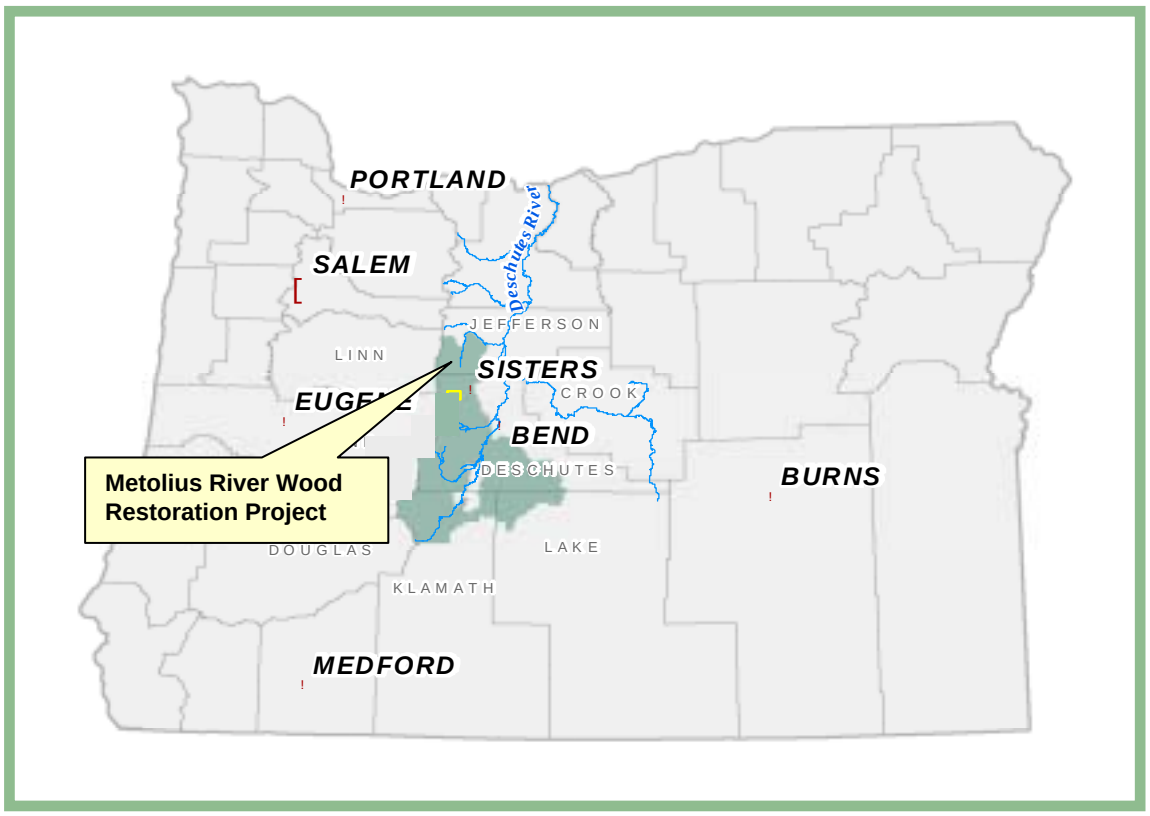

Figure 1. Locator map of the Metolius River Wood Restoration Project in relation to the State of Oregon and the Deschutes National Forest (shaded dark).

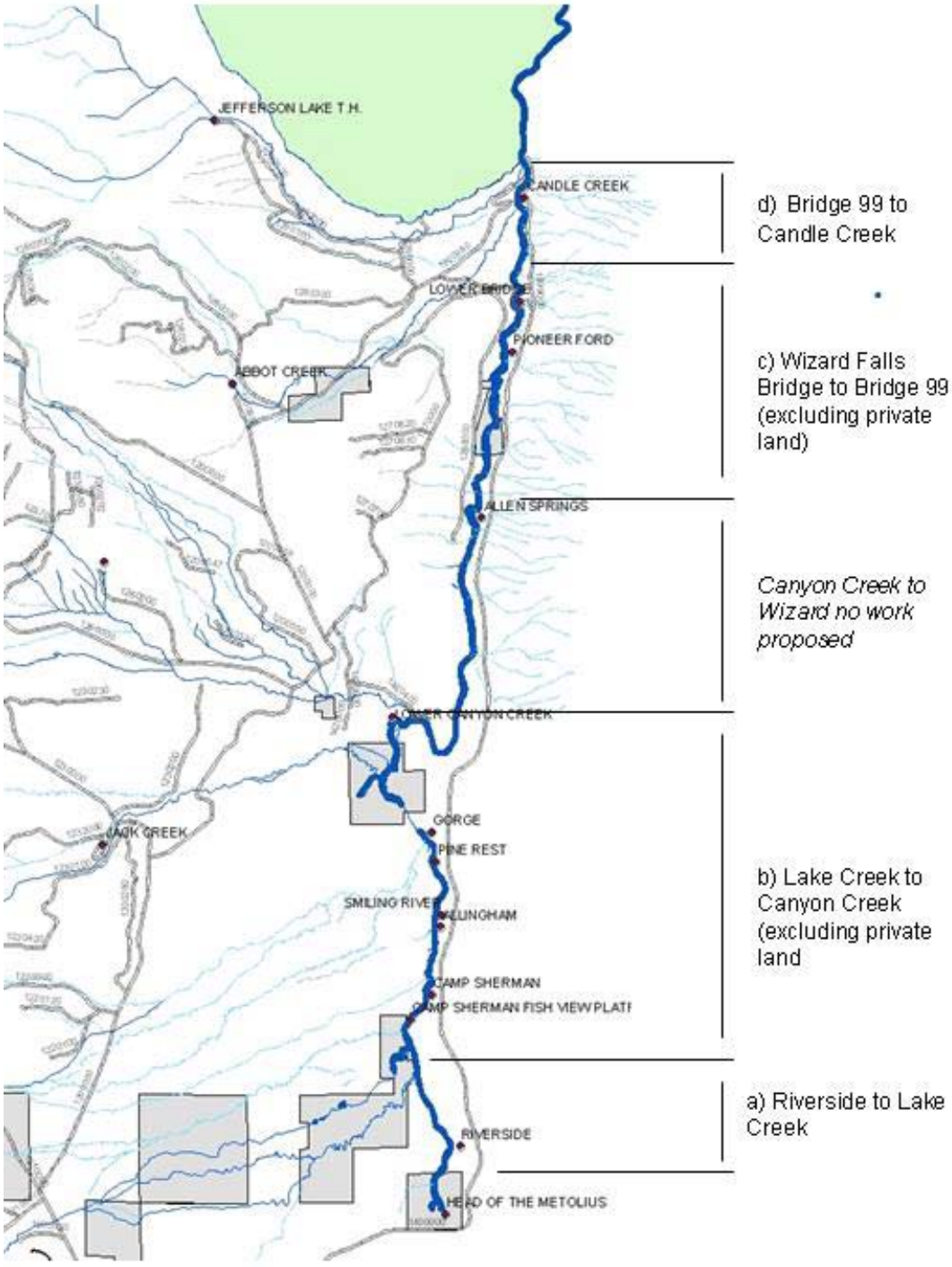

Figure 2. Vicinity map of project area for Alternative 2 and 3. River segments proposed for wood placement include a) Riverside to Lake Creek, b) Lake Creek to Canyon Creek, c) Wizard Falls Bridge to Bridge 99, and d) Bridge 99 to Candle Creek. Only Alternative 2 proposes work downstream of Bridge 99 (Lower Bridge). All work proposed is exclusive of private land.

Decision Framework

Given the purpose and need, the Deciding Official will review the Proposed Action and the other Alternatives in order to make the following decisions:

The decision to be made by implementing the Proposed Action or Alternative 3 would be to place logs at various locations in the Metolius River to provide fish habitat; what type of equipment will be used for log placement; and what mitigations and monitoring requirements would be applied to the project. The decision will be based on the results obtained from the analysis by Forest Service specialists and any public comment received.

Public Involvement

The proposal was listed in the Deschutes-Ochoco National Forests Schedule of Proposed Actions (SOPA) starting on April 2006. The proposal was provided to the public and other agencies for comment in September 2006. Approximately 16 responses were received during the scoping period. A field trip was conducted on October 24, 2006, to review past work and the Proposed Action. A phone call outreach with local groups was conducted in November and December of 2006. Groups such as Trout Unlimited, Native Plant Society, Central Oregon Fly Fishers, Northwest Rafters Association, Santiam Fly Casters, Friends of the Metolius, Forest Homeowners Association and others were contacted via the scoping mailing list. In addition, as part of the public involvement process, the agency requested public input in a newsletter mailed on November 22, 2006. Notices of the project and links to the newsletter were posted on the Central Oregon Flyfishers newsletter website and on the Friends of the Metolius Website in December 2006.

A presentation describing the project was given to the Camp Sherman Community Association and the Friends of the Metolius in January and May, respectively. Additionally, talks were given the SisterS Kiwanas, the Deschutes Chapter Meeting of Trout Unlimited, and the Camp Sherman Bamboo Fly Rod Fair. Scoping identified a number of issues and concerns. The comments covered boating safety concerns, scenic quality, allowing natural recovery of wood, and support for recovery of fish habitat.

Boating Safety-

- There is a long standing use of boating below Bridge 99 and wood causes hazards to safe boating. Existing wood in the river already leads to close boater safety calls.
- Floods dislodge wood from habitat projects and cause hazards elsewhere downstream.
- Notification will be needed to inform boaters of increased difficulty of floating the river.
- Put logs in the river upstream of Bridge 99 where they will not impact people that float the river.

Scenic Quality-

- Leave the river as is - its one of the wildest boating rivers in the Northwest.

Natural Recovery-

- The Forest Service should have a hands-off approach to habitat recovery. Wood should be left alone and not cleared. It shouldn't be put into the river either. Let the river recover through natural processes.

- Mimic natural processes and arrangements with natural anchoring techniques and preserve the scenic quality. No heavy equipment in the riparian area.

- Nature is doing fine to maintain habitat below Bridge 99.

Fish habitat recovery-

- There are fewer fish in the river and maybe adding wood is the solution.

- Adding wood in the Metolius is needed to recover fish habitat by restoring wood that was removed in the past. Deal with the causes of reduced wood in the river. Use hazard trees from roads or burn areas.

- Be more aggressive in habitat manipulation. The reach downstream of Wizard Falls needs wood because of the fast water more than Camp Sherman area.

- Avoid effects to spawning fish.

Using the comments from the public, other agencies, and the Confederated Tribes of the Warm Springs Reservation of Oregon (Tribes) (see *Issues* section), the interdisciplinary team developed a list of issues to address these comments and concerns.

Management Direction

The action Alternatives meet all the applicable standards and guidelines in the Metolius Wild and Scenic River Plan (USDA Forest Service 1997) and the Deschutes National Forest Land and Resource Management Plan (LRMP) as amended by the Record of Decision for Amendments to the Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (Northwest Forest Plan). The entire project (11 miles) is located in Riparian Reserves as designated by the Northwest Forest Plan and the Metolius Wild and Scenic River corridor. The following standards and guidelines are applicable to the project:

Deschutes Land and Resource Management Plan Standards and Guidelines

Fisheries (FI-4) Habitat improvement work will be pursued based on the contribution of the work to fishery objectives and targets. Improvement work will adopt measures to protect other resources as needed.

Riparian Areas (RP-10) Manage woody debris and riparian vegetation to: 1) maintain or enhance stream channel and bank structure, and 2) provide structural fish habitat to meet the objectives for resident fish populations provided for in the Forest Plan.

Riparian Areas (RP-20) Heavy equipment may be used in the riparian ecosystem if their use would maintain or improve riparian dependent resources. The use of heavy equipment may be allowed in the transition ecosystems if achievement of vegetative, soil, water objectives are met.

Riparian Areas (RP-37) Opportunities to restore riparian values in campgrounds (developed and non-developed), along trails, and on special use summer home sites will be pursued.

Riparian Areas (RP-39) Large organic material which is beneficial to fish, wildlife or water quality will be preserved in riparian areas, stream or river channels and lakes adjacent to summer homes. Streambank erosion or esthetic enhancement are not adequate reasons for its removal. The material may be altered if it creates a safety hazard, however it contribution to the riparian resources will be preserved.

Cultural Resources (CR-2) Cultural resource properties located during inventory will be evaluated for eligibility to the National Register of historic Places.

Cultural Resources (CR-3) In concert with inventories and evaluations the Forest will develop thematic Register nominations and management plans for various classes of cultural resources.

Cultural Resources (CR-4) Project level inventories or the intent to conduct such shall be documented through environmental analysis for the project.

Metolius Wild and Scenic River Plan

The Deschutes National Forest Land and Resource Management Plan (LMRP) identifies the Metolius River as a Wild and Scenic River. The Deschutes LRMP was amended in 1997 by the Record of Decision for Metolius Wild and Scenic River Management Plan (MWSRMP), which replaces the interim direction provided in Deschutes LRMP for Management Area MA-28 (USDA 1997). The MWSRMP provides the goals, objectives, and standards and guidelines for the management of the Metolius River.

Segment 1, from the south Deschutes National Forest boundary near the headwater springs to Bridge 99, is designated as Recreational river. The highly intact natural surroundings and historic character of the human alterations provides the setting for recreation which emphasizes enduring traditional activities (camping, fishing, hiking).

Segment 2, from Bridge 99 to Lake Billy Chinook, is designated as a Scenic river. The area is managed to protect and perpetuate a predominantly unmodified environment where natural ecological processes can continue. The diversity of habitat provides for a wide variety of wildlife, especially riparian-dependent and riverine species.

The Outstandingly Remarkable Values (ORVs), identified in the Metolius River Resource Assessment (1992) and associated with the Metolius Wild and Scenic River Corridor include ecological (including vegetation), water quality, fisheries, wildlife, scenery, recreation, cultural, and geology. Consistency with the Plan was assessed in terms of whether actions are within the standards and guidelines listed in the Metolius Wild and Scenic River Plan for the ORVs.

The following are standards and guidelines used to design the project to be consistent with the plan and the Wild and Scenic Rivers Act.

Ecological ORV (Riparian Vegetation)

Restore riparian vegetation in areas that are outside the range of desired conditions as defined by the limits of acceptable change (MTEV-2). Vegetation communities are dominated by shrubs and trees that overhang the stream and provide shade sufficient to maintain stream temperatures.

Heavy equipment may only be used in the riparian areas for restoration of riparian resources provided that effects to soils, water, or vegetation can be mitigated and immediately restored (MTEV-7).

Planting should be predominantly of native stock, preferably from within the watershed, or short lived non-native stock (MTEV-8).

Water Quality ORV

Water quality standards are established to maintain or improve existing water quality (MTWQ-1).

Applicable water quality parameters include: Turbidity – No more than 10 percent increase in natural stream turbidity as established through baseline monitoring. Baseline monitoring of percent fines in the Metolius River would continue.

Fish Habitat ORV

Restoration of fish habitat is primarily through natural processes of infall and distribution (MTFH-1).

Active habitat restoration may be performed in areas where hazard tree management or wood adjustment for boating have altered natural processes, or the availability of large woody material has been altered (MTFH-2).

Active habitat restoration will appear comparable to habitat formed from natural processes. (MTFH-3).

In-stream work including fish habitat restoration is performed only between May 1 and August 1 of any year to protect rearing and spawning fish (MTFH-4). (Seasons of in-water work are negotiated with Oregon Department of Fish and Wildlife (ODFW), U.S. Fish and Wildlife Service USFWS), and National Marine Fisheries Service (NMFS).

Upstream from Gorge Campground, natural in-fall of wood that poses an imminent hazard may undergo minor manipulation for safety, but not to provide boating passage. Hazards brought to the attention of the managing agencies may be trimmed, limbed or otherwise rendered safe with a minimum reduction in the habitat value. Imminent hazards are defined as those which are located in such a way that they cannot be detected in time to avoid by standing up or portaging around them. (MTFH-5).

Between Gorge Campground and Bridge 99, minimum safe boating passage is maintained in a manner that minimizes riparian impact and retains the most benefit to in-stream habitat (MTFH-6).

Downstream from Bridge 99, there is no wood manipulation (MTFH-7).

Priority Actions under the W&S River Plan:

- Inventory fish habitat conditions, determine areas that will not meet habitat objectives through natural processes, begin restoration and effectiveness monitoring.
- Develop corridor interpretation program, including consistent signing and brochures, and campfire programs.

Recreation ORV

Boating will be managed to accomplish these primary objectives: to emphasize boater education on boating a natural river with wood safely, to preserve riparian and in-stream resources and habitat, to protect the primitive recreation experience in the lower river, to manage use consistent with public trust doctrine, and to minimize administration and enforcement.

Boater education and information emphasizes safety; in-stream wood and resource protection; and respect for tribal lands, values and rights (MTBB-4).

Scenery ORV

The desired appearance of the Metolius corridor is that of a natural-appearing landscape which is characterized by the dominance of the river and the desired vegetative conditions and objectives set forth in this plan.

Compliance with the Northwest Forest Plan: Key Watersheds and Riparian Reserves

The NWFP provides standards and guidelines for Key Watersheds and Riparian Reserves (RRs) that prohibit or regulate activities that retard or prevent attainment of the ACS Objectives at the watershed scale (see below). Key watersheds under the NWFP contribute directly to the conservation of the threatened bull trout and resident fish populations.

All action Alternatives in the Metolius River Wood Restoration Project comply with the Riparian Reserve and Key Watershed standards and guidelines in the NWFP. Key watersheds have the highest priority for watershed restoration and watershed analysis is required to set priorities for restoration. Based on the evaluation of the short-term, long-term, and cumulative effects, the Metolius River Wood Restoration Project is designed to "contribute to maintaining or restoring the fifth-field watershed over the long-term."

The following standards and guidelines apply to the project:

> Riparian Reserves (RM-2) Adjust dispersed and developed recreation practices that retard or prevent attainment of Aquatic Conservation Strategy Objectives. Where adjustment measures such as education use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific site closures are not effective, eliminate the practice or occupancy.
>
> Riparian Reserves (RA-2) Fell trees in Riparian Reserves when they pose a safety risk. Keep felled trees on-site when needed to meet coarse woody debris objectives.
>
> Riparian Reserves (FW-1) Design and implement fish and wildlife habitat restoration and enhancement activities in a manner that contributes to attainment of the Aquatic Conservation Strategy objectives.
>
> Key Watersheds (C-7) Key watersheds are the highest priority for watershed restoration.
>
> Key Watershed (C-7) Watershed analysis is required prior to management activities.

Northwest Forest Plan: Compliance with the Aquatic Conservation Strategy

An essential piece of the Northwest Forest Plan is the Aquatic Conservation Strategy (ACS) which "was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands" (USFS 1994, B-9). Management activities proposed for watersheds must meet the nine ACS objectives as specified in the Northwest Forest Plan (pages C31-C38). This section will discuss how each alternative either meets, or does not meet the intent of the Aquatic Conservation Strategy Objectives of the Northwest Forest Plan, and analyzes effects of the Alternatives and their compliance with the ACS for hydrologic functions and fisheries habitat.

ACS Objective 1: Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

The Action Alternatives do not prevent the attainment of this objective and may benefit the diversity, distribution, and complexity of watershed and landscape-scale features by adding wood to the river. The wood being added would restore habitat conditions (pool like habitat and side channels) to which fish species native to the Metolius River are adapted. The existing conditions are below the natural range of variability for large wood, pools and habitat diversity for fish based on the watershed analysis (USDA 1995 , USDA 2004). The watershed analysis identified the restoration of in-stream wood in the upper Metolius River as priority in this Key Watershed. Landscape scale aquatic habitat will move toward the natural range of habitat complexity and diversity. The impacts of the project will be to restore large wood and associated habitat features at the watershed scale over the long-term. Because of the spring fed nature of the watershed the large wood placed will be functioning for decades and approach the natural range of large wood densities. Short term impacts to the riparian area and stream bank stability will be off set by the additional habitat complexity. Short-term disturbances will recover quickly because of the stable flow regime of the river.

ACS Objective 2: Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include flood plains, wetlands, upsweep areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

The Action Alternatives do not prevent the attainment of this objective. Connectivity within and between watersheds would not be affected by this project. Open connectivity of floodplains and tributaries are within the natural range of variability and this project will maintain those connections. The Metolius Watershed analysis identified only a few restrictions of the floodplains and they are not impacted with this project. There are no long-term impacts to connectivity other than the maintenance of downstream supply of wood that will be restored to the river. Short-term supply of wood downstream will be maintained within the natural range of variability.

ACS Objective 3: Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

The Action Alternatives do not prevent the attainment of this objective and may act to maintain and restore the physical integrity of the aquatic system, shorelines, banks, and bottom configurations by adding trees to the river and river bank. Wood restoration activities proposed will be implemented with Project Design Features to maintain the physical integrity of the aquatic system on a local scale and at the watershed scale. The minimal streambank disturbance will be local and will be within the natural range of small site specific disturbance from blow down trees that were within the historic conditions. The Watershed Analysis cited blow down

storms that added much wood to the river and this proposed project is within that range. The streambank disturbance will be short-term and will not impact the watershed scale processes because they are limited in size. The long term impacts will be to add diversity to streambank habitat and may serve to increase streambank structure of the long term.

ACS Objective 4: Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

The Action Alternatives do not prevent the attainment of this objective. Water quality will be maintained by this project. Water quality and water clarity is an outstandingly remarkable value identified in the Wild and Scenic Plan and the watershed analysis. There will be minor short-term change to water clarity while the work is performed but these changes will be extremely short-term and will clear up in a matter of hours. Short-term impacts to water clarity will be site specific and not impact water quality over the watershed scale because of dilution and settling. There are no long-term impacts to water quality expected and the project will maintain the water quality of the river over the long-term and water quality will remain a remarkable feature of the river. The project will meet State Water Quality Standards for turbidity by meeting the conditions of the permit.

ACS Objective 5: Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

The Action Alternatives do not prevent the attainment of this objective and may in the long-term maintain and restore the sediment regime by addition of stable large wood within the Riparian Reserve. Localized short term effects such as soil compaction and minimal ground disturbance are likely to have minimal impacts because only a small percentage of the riparian reserve would be affected. These sites will be restored to prevent runoff and any sediment inputs to the river. Fine sediment is a limiting factor to aquatic organisms as identified in the Metolius watershed analysis and the reduction of sediment inputs to the river and its tributaries is a priority. The project to restore wood to the river will be implemented with BMPs to maintain the physical integrity of the aquatic system on a local scale and will prevent large scale impacts at the watershed scale. Because of the spring-fed flow regime of the river, transport of fine sediment is slow and infrequent (USDA 1995). Project Design Features are aimed to prevent the addition of fine sediments from the project work sites and to restore the natural range of fine sediments in the river. Long term benefits of the wood placements may serve to sort the sediments in the river and create new spawning sites of well sorted gravels in the long term.

ACS Objective 6: Maintain and restore in-stream flows sufficient to create and restore riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and

wood routing. The timing, magnitude, duration and spatial distribution of peak, high, and low flows must be protected.

The Action Alternatives do not prevent the attainment of this objective. In-stream flows are not affected by this project and will be maintained in the range of natural, historic flows. There are no long term impact to flow and flows will not be impacted at the site specific or watershed scale. The watershed analysis highlights the spring-fed flow regime of the Metolius River as unique and the Wild and Scenic Plan identifies the stable flow regime as outstandingly remarkable. Flows will not be affected because water will not be diverted for the project and the small amount of compaction caused by the project would not be large enough magnitude or intensity to increase overland flow.

ACS Objective 7: Maintain and restore timing, variability, and duration of flood plain inundation and water table elevation in meadows and wetlands.

The Action Alternatives do not prevent the attainment of this objective. There would be no effects to floodplain inundation because the flow regime will not change. Wetland and meadow water tables will be maintained with implementation of this project. Local changes to water level at the stream bank will occur at placed wood structures but these impacts are local and sites specific and will not impact floodplain function, frequency of inundation or wetland flooding. The watershed analysis identified side channels as import habitat for bull trout and other species and this project will promote development of these features and will restore these functions more within the range of natural conditions before the removal of wood in the past. The long term benefit to side channel and streambank complexity will be a long term restoration of floodplain function at the watershed scale in the upper Metolius River.

ACS Objective 8: Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distribution of coarse woody debris sufficient to sustain physical complexity and stability.

The Action Alternatives do not prevent the attainment of this objective and may in the long term maintain and restore the species composition and structural diversity for fish and island plant communities by adding stable large wood within the Riparian Reserve and in-stream. Localized short term effects such as soil compaction and minimal ground disturbance are likely to have minimal impacts due to the small amount of area impacted in the Riparian Reserves and the limited scale of operations along the river bank. Wood placements proposed will be implemented with Project Design Features to maintain the physical integrity of the aquatic system on a local scale. The project will restore large wood to a complexity and stability found in the natural range in the upper river and will move the habitat conditions for fish species into more natural conditions based on watershed analysis findings.

ACS Objective 9: Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

The Action Alternatives do not prevent the attainment of this objective and may in the long term maintain and restore habitat to support native species by addition of stable large wood within the Riparian Reserve and in-stream. A priority that was identified in the watershed analysis, the restoration of in-stream wood will restore pool habitats for well distributed native fish such as bull trout, redband trout and Chinook salmon. Native plant communities associated with islands and identified in the watershed analysis as unique habitats are formed by in-stream wood and will have increased habitat that will be better distributed along the river. Vertebrate species associated with large wood, such as dippers, otter, nesting geese and ducks, and other riparian dependent species will have more habitat distributed along the upper 11 miles of river. There may be some minor short term disturbance of the streambed and river bank used by native fish in the river at the sites being worked but the long term benefit of restoring large wood to the river will maintain habitat for native fish for decades to come and will benefit the populations in the entire Metolius Watershed because of the importance of the rearing habitat in the upper 11 miles.

Statement of Consistency with ACS Objectives

In summary, the activities described above are consistent with the ACS objectives. The Action Alternatives are consistent with the findings of the Watershed Analysis in that it would restore the in-stream wood to more natural levels and restore pool habitat for native redband trout, bull trout, and Chinook salmon habitat. The project will maintain watershed and landscape scale features such as downed large woody debris in the river and within the floodplain. The proposed project contributes to ACS objectives 1, 3, 8, and 9 by maintaining and restoring large wood to the Metolius River. Wood will be added to the river and therefore will increase the large woody debris supply to downstream of the project. The physical integrity of nearby aquatic systems, water quality, in-stream flows, species composition, and habitat complexity are likely to be improved and restored by the proposed activities.

Regional Invasive Plant EIS and Manual Direction

Forest Service Manual (FSM) direction requires that Noxious Weed (now termed Invasive Plants) Risk Assessments be prepared for all projects involving ground-disturbing activities. For projects that have a moderate to high risk of introducing or spreading noxious weeds, Forest Service policy requires that decision documents must identify noxious weed control measures that will be undertaken during project implementation (FSM 2081.03, 29 November 1995). The project risk assessment can be found in project file (Pajutee, 2007).

The Region 6 Invasive Plant FEIS Record of Decision (USDA 2005) provides a list of prevention practices to be applied at the project level. In October 2004, Forests in Region 6 were directed to develop local invasive plant prevention practices and the Deschutes and Ochoco National Forest have developed practices for local situations (USDA, 2006). Particularly relevant to this project would be the requirements for pre-project inventories, rapid detection and

monitoring, minimizing ground disturbance, requiring clean equipment, soil seedbank salvage and rapid revegetation with native plants (see Project Design Features section).

Other Planning Documents

Metolius Watershed Analysis

Findings of the Metolius Watershed Analysis (USDA 1995, USDA 2004) have concluded that the upper Metolius River has low in-stream wood density and low fish habitat complexity. The recovery rate for in-stream wood is slow in the dry ponderosa pine type. The recommendations from the analysis concluded that restoration of in-stream wood was needed to support fish habitat in this Key Watershed that supports a key population of bull trout in the Lower Deschutes subbasin.

The following planning documents and regulations were also used to analyze and design the project:

Northwest Power and Conservation Council – Deschutes Subbasin Plan

In Metolius River habitat complex, restore and maintain in-stream habitat complexity (a high priority strategy) with a minimum of 20 pieces of large wood or comparable natural structure per 100 meters of stream channel (320 pieces/mile).

Oregon Department of Fish and Wildlife – Metolius Subbasin Fish Management Plan

Frequency of large wood was greater historically. Plan and implement restoration activities in cooperation with USFS, CTWS, PGE and other interested parties.

USFWS Deschutes Basin Bull Trout Draft Recovery Plan

Increase or improve in-stream habitat by restoring recruitment of large woody debris or by using other methodologies; possible areas include lower Lake Creek and the upper main stem Metolius.

Clean Water Act

The State of Oregon, as directed by the Clean Water Act (CWA) and the Environmental Protection Agency, is responsible for the protection of rivers and other bodies of water in the public interest. Beneficial uses as defined by the State of Oregon for the Metolius River and Metolius subwatersheds are listed in Table 1. To show that water quality is being protected, states are required by the CWA to adopt water quality standards which must be approved by the Environmental Protection Agency. Best Management Practices (BMP) and state-wide management plans are a requirement of the CWA and are used to meet water quality standards. Water bodies that do not meet the State Standards for water quality are identified on the State of Oregon 303(d) list for water temperature exceeds above the state standards. The Metolius River is identified on the State 303(d) list for temperature.

Table 1. Beneficial uses for Deschutes River Basin (ODEQ 2002) and water quality parameters that might be influenced by the Metolius River Wood Restoration Project.

Beneficial Use	Associated Water Quality Parameter
Public Domestic Water Supply	Turbidity, Chlorophyll *a*
Private Domestic Water Supply	Turbidity, Chlorophyll *a*
Industrial Water Supply	Turbidity, Chlorophyll *a*
Irrigation	None
Livestock Watering	None
Anadromous Fish Passage	Biological Criteria, Dissolved Oxygen, pH, Sedimentation, Temperature, Total Dissolved Gas, Toxics, Turbidity
Salmonid Fish Rearing	Dissolved Oxygen, Sedimentation, Temperature
Salmonid Fish Spawning	Same as Salmonid Fish Rearing
Resident Fish and Aquatic Life	Same as Anadromous Fish Passage
Wildlife and Hunting	None
Fishing	Aquatic Weeds or Algae, Chlorophyll *a* , Nutrients
Boating	None
Water Contact Recreation	Aquatic Weeds or Algae, Bacteria, Chlorophyll *a* , Nutrients, pH
Aesthetic Quality	Aquatic Weeds or Algae, Chlorophyll *a*, Nutrients, Turbidity

Applicable Laws and Executive Orders

The following additional laws and executive orders, with implementing regulations as appropriate, apply to the analysis and implementation of the Metolius River Wood Restoration Project.

- American Antiquities Act of 1906
- Migratory Bird Act of 1918
- National Historic Preservation Act of 1966 (as amended)
- National Environmental Policy Act (NEPA) of 1969 (as amended)
- Endangered Species Act (ESA) of 1973 (as amended)
- Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as amended)
- National Forest Management Act (NFMA) of 1976 (as amended)
- Clean Water Act (CWA) of 1977 and 1982 (as amended)
- Executive Order 13186 (migratory birds)
- Executive Order 13112 (invasive plants)
- Bald and Golden Eagle Protection Act of 1940 (as amended)
- Federal Noxious Weed Control Act of 1974 (as amended)
- American Indian Religious Protection Act of 1980
- Archaeological Resource Protection Act of 1980
- Executive Order 11593 (cultural resources)
- Executive Order 11988 (flood plains)
- Executive Order 11990 (wetlands)
- Executive Order 12898 (environmental justice)

Issues

The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" As for significant issues, the Forest Service identified two Key Issues raised during internal and external scoping. These issues were used to build Alterative 3 and include:

Key Issues

1. **Boating safety:** A number of public comments centered on the need to avoid creating unsafe obstacles to boating, primarily downstream of Bridge 99, where most of the rafting occurs. Recreation (boating) is one of the ORV values associated with the river. The majority of the project area is located in the section designated as a Recreation Segment in the plan (above Bridge 99). Downstream of Bridge 99, the Wild and Scenic Plan calls for allowing for natural processes to dominate and there is no manipulation of wood for boat safety called for in the Plan.

   Indicator: Change in boating skill level needed to safely boat the river (as measured by whitewater Class ratings) downstream of Wizard Falls Bridge.

2. **Recovery through natural process:** Several members of the public raised the issue that the river should recovery through natural processes and not be disturbed.

   Indicator: Are the amounts of pool habitat and large wood in the river meeting the desired future condition.

   Indicator: Length of time needed in each Alternative to meet the habitat goals and desired future condition.

The following are Analysis Issues, which were used to determine the effects of the alternatives on issues that are otherwise required in this assessment. These issues include Hydrology, Fish Habitat Protection, Sensitive and Invasive Plants, Cultural Site Protection, Wildlife, Recreation, Scenic Quality and Wild and Scenic River Consistency.

Analysis Issues

Hydrology- The Metolius River is designated as a National Wild and Scenic River and water quality and the springs are Outstanding Remarkable Values identified in the Management Plan. The river is listed under the 303(d) list of the Clean Water Act as exceeding the water temperature criteria for bull trout habitat. The project will need to protect water quality and the free flow character of the river.

> *Indicator: Comply with the turbidity management called for under Oregon Department of Environmental Quality regulations.*

Fish Habitat Protection and Restoration- The amount of large wood and percent pools will be restored towards the desired levels for quality Chinook salmon habitat. The Oregon Department of Fish and Wildlife (ODFW) and U. S. Fish and Wildlife Service (USFW) have seasonal in-stream work windows that are negotiated to protect spawning fish and developing fish fry. This issue is not Key because the protection of fish habitat is already required by law and regulation. Seasonal operations will be negotiated with the Oregon Department of Fish and Wildlife, US Fish and Wildlife Service and National Marine Fisheries Service to avoid disturbance of spawning fish and spawning beds.

> *Indicator: Miles of stream meeting the desired future condition for in-stream pieces of wood per mile and percent of channel area in pool habitat.*

Sensitive Plants and Invasive Plants- Peck's penstemon is rare endemic plant in the project area. This issue is not Key because mitigation measures of avoidance and reduced disturbance will protect plants. Mitigation for the protection of the plant will be the selection of a method of moving logs that will cause minimum disturbance to the plants and monitoring will be done to determine the success of the protective measures.

Ribbon grass is an invasive ornamental located on the stream banks of the Metolius River and on some islands. Project design should ensure that this invasive is not spread. This issue is not Key because the avoidance of spreading invasive species is already required by regulation. Mitigations are proposed to reduce the spread of ribbon grass and monitoring will be used to detect any new ribbon grass patches and physical removal will be attempted.

> *Indicator: Number of sites with protection measures implemented for Pecks penstemon and Agoseris elata sites.*

> *Indicator: Number of sites with prevention measures to prevent the spread of invasive plants.*

Cultural Site Protection: Many cultural resource sites are located along the Metolius River. Sites will need to be avoided or monitored during project implementation. This issue is not Key because the protection of cultural sites is already required by law and regulation. Mitigation at suspected subsurface sites will include monitoring of any digging into the river bank to determine if new sites exist.

Indicator: Protection of 12 known sites and with monitoring of project activity in the vicinity of these sites.

Wildlife Protection- Wizard Falls Fish Hatchery has a Bald Eagle nest within ½ of the river. Seasonal and operating distance buffers apply. This issue is not Key because the protection of bald eagle and osprey nests are already required by law and regulation. Mitigation will be used to avoid disturbance of nesting raptors and the effects will be minimized. Also, Survey and Manage mollusks are located in some the project sites proposed and these sites are protected by Forest Plan standards and guidelines. Sites with Survey and Manage mollusks will be protected through avoidance of the site.

Indicator: Protection of known eagle, osprey, owl, and rare mollusk sites

Recreation: The Metolius River is a popular destination for many types of recreational pursuits. The river is popular for camping, hiking, sightseeing, wildlife viewing and fishing. There are 10 campgrounds and 108 special use recreation residences permitted along the upper river. The project will need to protect these opportunities and work around the busy recreation season to avoid conflicts with the public.

Indicator: Number of temporary site closures needed.

Scenic quality: Many public comments emphasized the need to maintain the natural appearance of the river corridor. Comments called for the placements of logs to appear natural and some thought that more wood would improve the scenic quality by adding more island vegetation. Protection of the river banks was also mentioned to make sure the riparian area was not damaged or does not appear to be disturbed. This issue is not Key because the protection of Scenery is required in Forest Plan standards and guidelines and the Wild and Scenic River Plan. Scenic quality of the clear water, diverse islands, and the tall orange-barked ponderosa pines are Outstandingly Remarkable Values.

Indicator: Added wood is natural appearing in the river.

Wild and Scenic River Values: The Metolius River has eight Outstanding Remarkable Values identified in the Management Plan. The plan calls for any project within the corridor to protect and maintain the ORVs. In addition, any water resources project proposed within the corridor will need a determination of consistency under Section 7(a) of the Wild and Scenic Rivers Act.

Specifically, the project is evaluated on the effects to the rivers free-flowing conditions, effects on the rivers water quality, and any effects on the ORVs for which the river was designated.

Indicator: Outstanding Remarkable Values are protected and maintained.

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the Alternatives considered for the Metolius River Wood Restoration Project. It includes a description and map of each Alternative considered. This section presents the Alternatives in comparative form, sharply defining the differences between each Alternative and providing a clear basis for choice among options by the Decision Maker and the public. Some of the information used to compare the Alternatives is based upon the design of the Alternative (i.e., helicopter versus the use of ground based mechanical equipment) and some of the information is based upon the environmental, social and economic effects of implementing each Alternative (i.e., the amount of erosion or cost of helicopter use versus excavator).

Alternatives

Alternative 1 - No Action

Under the No Action Alternative, current plans would continue to guide the management of the project area. No program of placing trees in the Metolius River would occur outside of natural recruitment and the ongoing felling of hazard trees into the river from recreation facilities, roads, and recreational residences. The current ongoing management of hazard trees results in an average of 5 trees placed in the river per year over the entire 11 miles of the upper river.

The No Action Alternative would result in the maintenance of boat passage in segments that are identified in the Wild and Scenic Plan, which is generally upstream of Bridge 99. Any wood added to the river through the felling of hazard trees would not span the river. This alternative best addresses the Key Issue of Recovery through Natural Process.

Alternative 2 - The Proposed Action

The Proposed Action would restore fish habitat in the Upper Metolius River by providing in-stream wood that will act as rearing and resting habitat. Structures will be placed in critical areas over a span of 11 miles of river (Figure 2, 3 and 4, Table 2). In this Alternative 206 structures with approximately 930 logs would be added to the Metolius River between the headwaters and Jefferson Creek. This would increase in-stream large woody debris (LWD) densities by up to11 times the existing levels in some reaches. LWD densities would not change in reach 4 and would only increase by 1.5 times in reach 6 because these reaches are within narrow, fast canyons and it would be difficult to access the sites and secure the logs so as not to impact boater safety. All

structures will be placed in river segments where the management of wood is allowed for boating safety or hazard tree management under the Metolius Wild and Scenic River Plan or are located where in-stream wood recruitment has been impacted by development along the river.

Wood will be added to the river by a variety of techniques including hand crews, excavator from the river bank, and helicopter (Table 3). In the Riverside Campground area, an excavator would be used in the river to place whole trees. Access points will be selected to reduce damage to the river bank and riparian vegetation. Sensitive areas such as steep banks and wet flood plain vegetation will be avoided.

Anchoring of placed wood will mimic natural placements that are secure from winter floods. These include digging a slot into the river bank, placing the log and covering it with the soil (keyed into the stream bank). Retaining the root wads on the logs and placing entire whole trees along the river edge will help to resist movement of the logs in high flows. Logs can be integrated together in groups to resist movement during high water. In some cases, wood can be wedged between standing trees and extend out into the river. In areas where cultural sites occur, keyed logs by digging one end into the bank may not be allowed and placing ends on the bank or wedged between trees will be the method of anchoring.

Source wood will be gathered from a variety of places. One source is hazard trees already felled and in excess of fire line restoration needs in the B&B, Black Crater and Lake George Fire areas. These trees are large and well suited for river wood and effects for collection are minimal given their roadside location. Other locations for collection of wood include B&B Fire Recovery Project cull decks and B&B Fire units not included in the salvage sales but covered under the B&B Fire Recovery EIS.

Since mostly whole trees with roots attached will be used, wood placements will be done to mimic natural in-fall and wood accumulations. Designs will include disguising cut log ends by burying into the bank, trimming the end or roughing the end with the excavator to mimic a broken log end.

Sensitive plant sites will be protected by using the method of least disturbance when possible. Staging sites will be selected to avoid known sensitive plant locations.

All restoration work will need to observe project design features such as seasonal restrictions for wildlife and fish. Weed prevention will be included in the contracts (avoid existing sites and wash equipment prior to moving to the river). The Survey and Manage mollusk sites will be avoided and cultural sites will be protected by not digging log ends into the bank.

River boating safety will be provided by not creating river wide structures. Log structures should not create difficult navigational hazards but it may create the need to navigate more frequently. All wood placements will be reviewed to ensure that Scenic Quality management standards are met.

Table 2. Number of proposed sites and pieces of wood along the Metolius River. Estimates are based on site availability and assume that 3 pieces per site will be placed in Headwaters to Lake Cr, 6 pieces per site will be placed in Lake Cr to Gorge and 6 to 9 pieces of wood per site will be placed in the lower reaches Jack Creek to Candle Creek (ie. lateral bank log jams). River segments follow those mapped in Figure 2. Logistics, site selection to protect special resources and log availability may change these estimates.

Reach	**Alternative 2**		**Alternative 3**	
	sites	logs	sites	logs
Headwaters to Lake Cr	38	108	38	108
Lake Cr to Gorge	63	183	61	183
Jack Cr to Canyon Cr	13	78	13	78
Wizard Bridge to Candle Cr	94	582	61	388
Total	206	930	173	757

Table 3. Number of sites by proposed method of placement in Alternative 2 and 3. The number of helicopter sites may increase if they become more cost effective.

Access type	**Alternative 2** number of sites	**Alternative 3** number of sites
Ground Based	183	161
Helicopter	23	12
total	206	173

Table 4. Other resource occurrence in proposed work sites in Alternative 2.

Resource Type	**Alternative 2** number of sites	**Alternative 3** number of sites
Pecks penstemon	41	41
Tall agoserous Agoserous elata	21	21
Cultural sites	23	23
Crater Lake Tightcoil mollusk Pristiloma sp.	16	1
Northern Bald Eagle	1	1

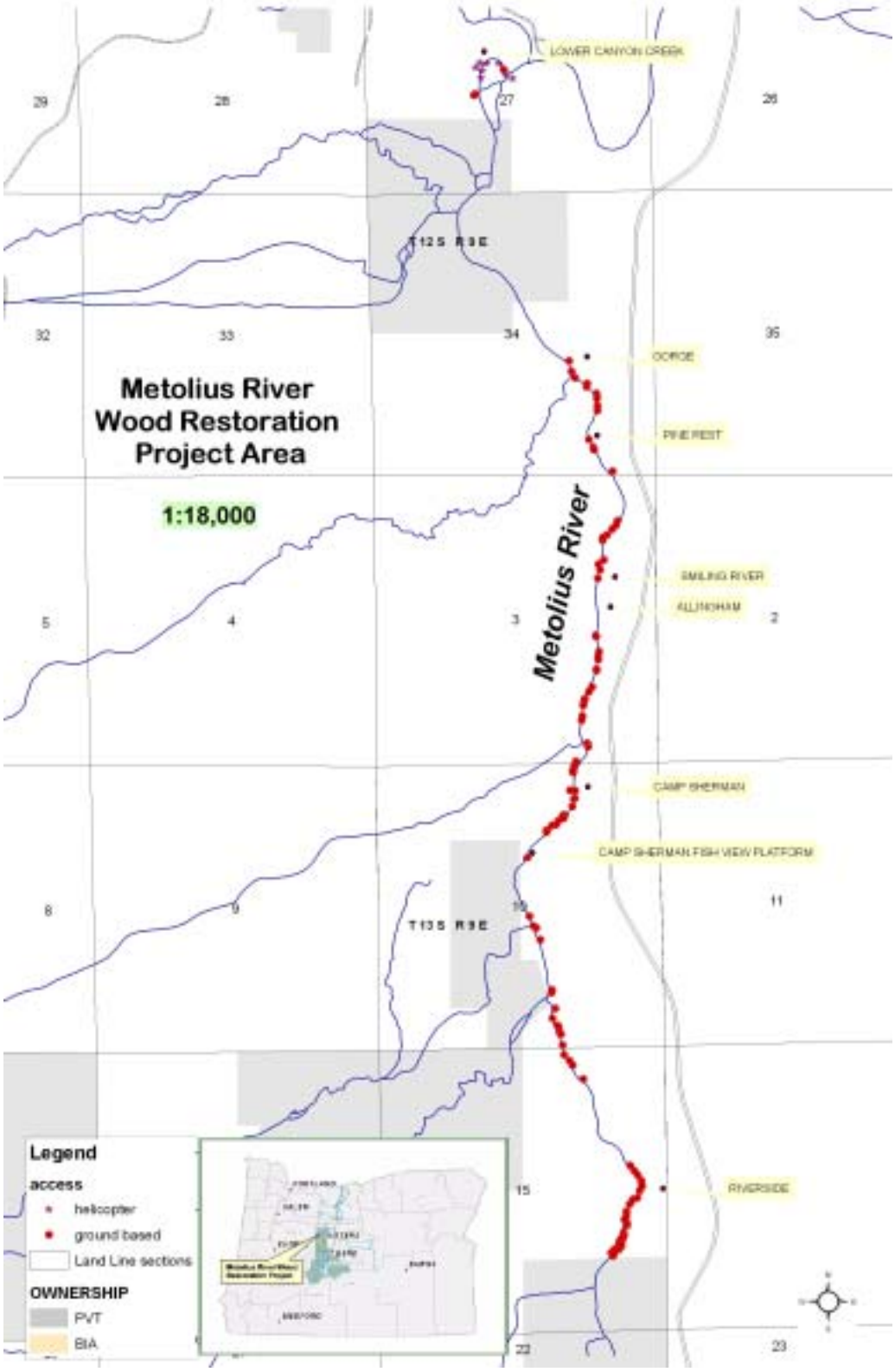

Figure 3. Site map of upper project area for Alternatives 2 and 3.

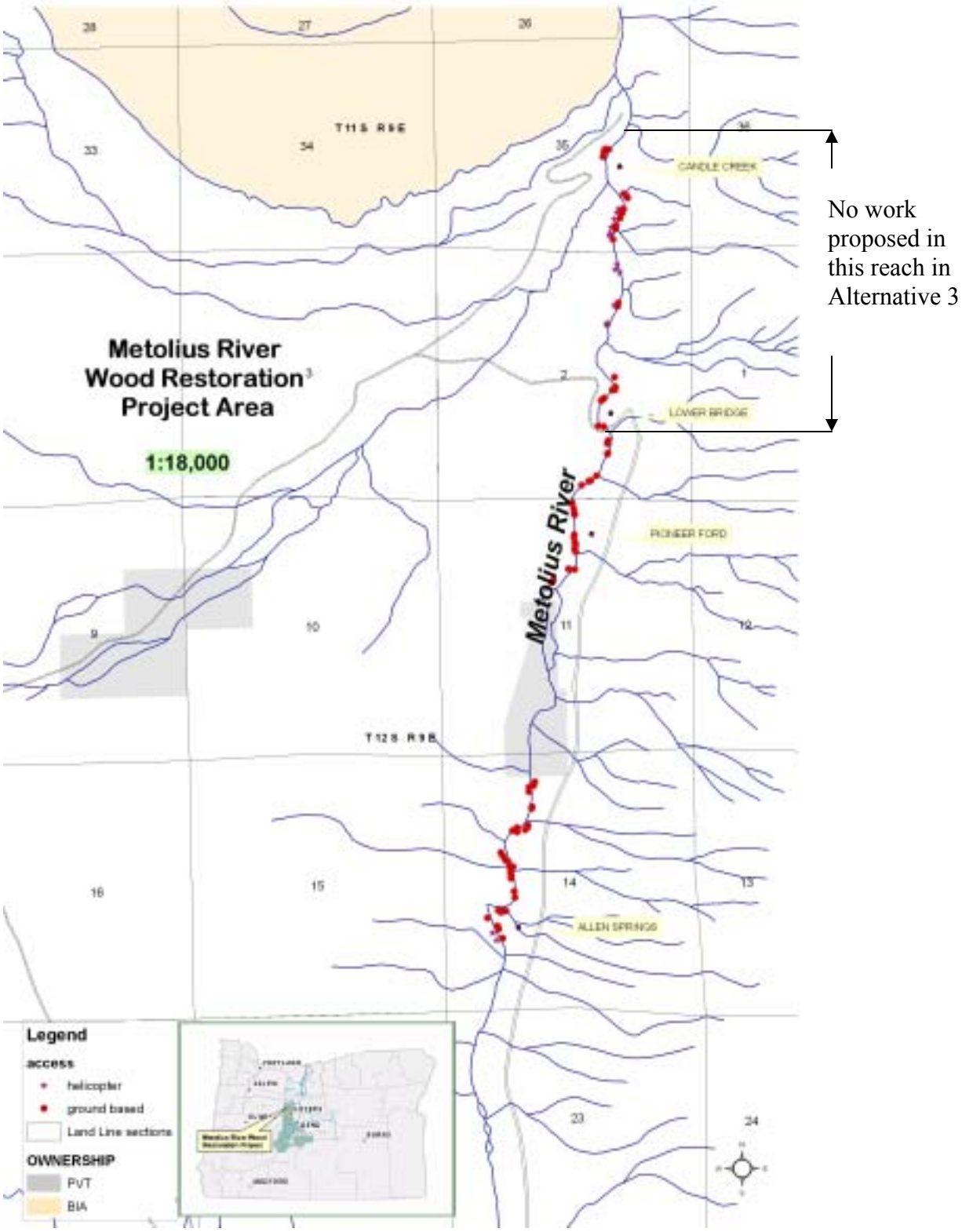

Figure 4. Site map of lower project area for Alternative 2 and 3. Alternative 3 would not include sites downstream of Bridge 99 (Lower Bridge Campground).

Alternative 3

Alternative 3 addresses the Key Issue of providing boating safety and the Key Issue of allowing recovery through natural processes downstream of Bridge 99 (Table 2 and 3). The segment downstream of Bridge 99 to Candle Creek will not have work proposed under this Alternative. This Alternative avoids conflicts with boaters by avoiding the reach that is most floated by rafts and larger boats. It also does not propose work in the Scenic river segment under the Metolius Wild and Scenic Plan (downstream of Bridge 99) (Figure 4). This Alternative addresses the reliance on wood restoration through natural processes in a segment that has less development.

The Alternative 3 would include 173 sites from Riverside to Bridge 99 and would exclude the reach between Bridge 99 and Candle Creek. Approximately 757 logs and whole trees would be placed into the Metolius River under Alternative 3 in approximately 9 miles of river (Table 2). The Project Design Criteria used for the Proposed Action apply to Alternative 3.

Alternatives Considered but not in Detail

Full Spanning Log Jam Alternative

This Alternative was considered in the process of developing the proposed action but was not considered in detail because of the potential conflicts with boating safely on the river. Current management of the river does not include placement of full spanning logs for fish habitat to minimize the safety risk to boating. In the reach of the river between Canyon Creek and Bridge 99, full spanner logs are moved but retained under the plan. Above Canyon Creek, each log is evaluated for safe boating and minor trimming or moving may be done. Although channel spanning log jams would meet the purpose and need and create high quality habitat, this Alternative would not address the key issue of boating safety. For that reason, the Alternative was dropped from further consideration.

Project Design Features

In response to public comments on the proposal and Forest Service internal review, project design features were developed to mitigate or avoid some of the potential effects the various Alternatives may cause. The project design features apply to each of the Action Alternatives.

Sensitive Plants

1. Avoid concentration of sensitive plants during transport of logs and equipment.
2. Do not stage equipment in areas with concentration of sensitive plants or invasive plants.
3. Use existing roads and skid trails as much as possible.
4. Minimize ground disturbance.

Invasive Plants

1. Provide early detection and control of invasive plants. Check wood installations for new ribbongrass starts and remove them for 5 years. After that time reevaluate and continue if needed.
2. Revegetate disturbed land as soon as practical following ground-disturbing activities. (Des/Och 4.1). Develop a Re-vegetation Plan.
3. Require all Forest Service employees to inspect, remove, and properly dispose of invasive plant seed and plant parts found on their clothing and personal equipment prior to leaving a project site (Des/Och 3.4).
4. Before construction equipment moves into a project area, treat seed-bearing invasive plants along existing Forest Service access roads leading to the project area. Pretreat existing weed infestations prior to creating new seed beds (Des/Och 5.3).
5. Minimize soil disturbance and conserve existing topsoil (A and B soil horizons) for replacement whenever possible in situations where ground disturbing activities are unavoidable (Des/Och 6.1).
6. Determine whether the trend of invasive plant infestations are increasing or decreasing. Accomplish this by revisiting treated sites annually for five years, or until project objectives are met, conducting a comparison of yearly records, and establishing photo monitoring stations at selected sites (Des/Och 8.4).
7. Require equipment to be clean before it enters National Forest lands. The following contract clause is required:

   > *Equipment Cleaning to Prevent the Spread of Non-native, Invasive Plants.* To prevent the introduction of seeds and non-native, invasive plants onto National Forest System lands, the holder/grantee shall ensure all equipment moved onto National Forest System land is free of soil, seeds, vegetative matter, or other debris that could contain, or hold, seeds. The holder/grantee shall employ whatever cleaning methods are necessary to ensure compliance with the terms of this provision. The holder/grantee shall notify the responsible Forest Service Officer prior to moving each piece of equipment onto National Forest System

land, unless otherwise agreed in writing. Notification shall include identification of the location of the equipment's most recent operation. Upon request by the Forest Service, arrangements shall be made for Forest Service inspection of each piece of equipment prior to entry upon National Forest System lands.

The holder/grantee shall certify compliance with the terms of this provision, in writing, prior to each entry of equipment onto National Forest System lands. For the purpose of this provision, "equipment" includes all construction and/or maintenance machinery, excluding pickup trucks, cars, and other passenger vehicles, used in the daily transport of personnel.

Wildlife

1. Protect northern bald eagle nest sites by restricting helicopter use within ½ mile and mechanical equipment within ¼ mile of the nest or ½ mile sight distance (for structures #119, 120, 121, 123, and 124) from January 1 through August 31.
2. Do not remove down wood from Riparian Reserves within 30 feet of the river bank.
3. A seasonal restriction of March 1 through September 30 needs to be implemented, or spotted owl surveys need to be conducted to keep the project area in R-6 protocol.
4. Restrict disturbance activities within ¼ mile of any newly discovered spotted owl nests from March 1 through September 30.
5. Avoid known mollusk sites. Structures 33, 99, 104, 105, 106, 107B, 108, 116, 116B, 117, 118, 118B, 155, 156, 157, and 167 have known sites in close proximity. Before work is started on these structures have the actual known mollusk site location identified on the ground to avoid known sites.
6. Restrict disturbance activities within ¼ mile of any known or newly discovered goshawk nests from April 15 through August 31. This condition may be waived in a particular year if nesting or reproductive success surveys reveal that the species indicated is non-nesting or that no young are present that year. Waivers are valid only until the start date of the restriction of the following year. Project sites included in the seasonal restriction include sites: 182 through 193. Helicopter use will be restricted within ¼ mile of the known goshawk nest site.
7. Restrict disturbance activities within ¼ mile of any known or newly discovered Osprey nests from April 15 through August 31. This condition may be waived in a particular year if nesting or reproductive success surveys reveal that the species indicated is non-nesting or that no young are present that year. Waivers are valid only until the start date of the restriction of the following year. Project sites included in the seasonal restriction include sites: 99 through 109, 167 through 186, and 198 through 201. Helicopter use will be restricted within ¼ mile of known osprey nest sites.

Cultural Resources

1. When proposed work is located in a known site, a)logs will be placed on the river bank and not dug into the bank, b) heavy equipment and skidding logs through sites

will minimize site disturbance by utilizing existing disturbed areas such as roads and trails in the site area and minimizing any new soil disturbance..

2. Monitor work to determine that mitigation avoidance measures were completed and effective.

Recreation

1. Full spanning wood log jams will not be created. Placements will be located to be visible to boaters approaching from upstream and will avoid creating extreme boating hazards.
2. Post signs at boat put-ins informing boaters that logs create natural boating hazards in all reaches of the river but are needed for the maintenance of the ecological values of the river. The Wild and Scenic Plan states that signs for managing boater safety in the various river segments should have an educational message.
3. Temporally close campsites near restoration activities, if needed, within a reasonable lead time prior to planned work.
4. Minimize stockpiling logs in developed campgrounds while open to the public.
5. Manage public access to avoid work site safety hazards.
6. Use temporarily closures to public traffic if logs will be flown over roads and campgrounds.

Scenic Quality

1. Disguise cut ends of logs.
2. Restore disturbed project work sites within one year.
3. Design placements of logs to mimic natural log accumulations.

Fisheries

1. Restrictions will apply to in-stream work that will disturb the substrate to protect spawning fish. Operating seasons will be specific to particular reaches as follows:

    a. Riverside to Spring Creek - July 1 to September 7th (option to Sept 15th with surveys finding no spawning kokanee or bull trout)
    b. Spring Creek to First Creek - July 1 to September 7th (option to Sept 15th with surveys of no spawning redband, kokanee salmon or bull trout)
    c. Jack Creek to Canyon Creek - May 15th to August 1st
    d. Wizard Falls Bridge to Candle Creek - April 1st to August 1st
    e. Exceptions to in-water work seasonal restrictions may be granted by the agencies on a case by case basis if surveys determine spawning habitat will not be affected or no spawning sites (redds) are found within close proximity of the work site.

2. Comply with Project Design Criteria from the Programmatic Biological Assessment for Stream Restoration Activities in Appendix B.
3. Comply with Terms and Conditions in the Biological Opinions issued for Stream Restoration activities by US Fish and Wildlife Service and National Marine Fisheries Service in Appendix C.
4. In reaches were machinery is used in-stream (Riverside), substrate will be left in a condition similar to pre-project condition and form.
5. A spill plan will be part of the contract, with contact information for emergency services.
6. Refueling of machines will be done a minimum of 300ft from streams.
7. Access trails will be restored after use by water barring, placing debris and/or subsoiling if needed to prevent runoff.
8. Planting and scattering forest litter will be conducted at disturbed sites near the stream to minimize bare soil that is open to erosion.

Comparison of Alternatives

This section provides a summary of the effects of implementing each Alternative. Information in Table 5 is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among Alternatives. This table is intended as a summary of the effects to be used to guide the reader. The details of the analysis and the rationale can be found in the text in the Environmental Consequences section of this Environmental Assessment.

In summary, the Action Alternatives would add an estimated 800 to 1000 logs to the river. This action will increase the amount of pool habitat in the river by 40 to 50 times the existing level. The number of sites to receive work ranges between 173 and 206 sites. The most noted change to boating will be to increase the whitewater class rating from Class I to Class II in the reach between Wizard Falls and Bridge 99. Some members of the recreating public will be asked to not enter the area during the work operations but the effect will be temporary and will be minimized by working in low visitation seasons when possible. The No Action Alternative may take up to 280 years to recover the wood to the densities proposed in Alternative 2.

No adverse impacts are predicted for northern bald eagle because no activities are planned near nest sites during nesting. No effects will occur to spotted owl, goshawk, osprey and harlequin duck. The Crater Lake Tightcoil mollusk will be protected when sites are found. No adverse effects are expected to Chinook salmon or sockeye salmon. There will be a short term disturbance to bull trout during the project. Redband trout may be disturbed during the project but it will not lead toward a trend in federal listing. Stray steelhead may be disturbed during the project but no adverse effects are expected.

The sensitive plant Pecks penstemon may be impacted but mitigations will be implemented to protect the populations. Ribbongrass, an invasive species, has a high risk rating for this project and spread will be controlled through monitoring of the log structures and removal when found. Cultural sites have been located and will be protected.

The scenery along the river will be protected by restoring diversity to the river and island formation but there will be some temporary disturbance apparent in the short term following the work at the specific work sites. The Metolius Wild and Scenic River ORVs will be protected with the appropriate mitigations applied and the free flow character of the river will be maintained.

Table 5. Comparison of the outcomes of the Alternatives proposed.

Topic	Alternative 1	Alternative 2	Alternative 3
Estimated number of logs added to the river	5 per year	1000	800
Estimated area of pool - like habitat added	830 yd^2	46,220 yd^2	38,440 yd^2
Estimated number of sites with added wood	5 per year	206	173
Boating skill level or 'Class' -Head springs to Gorge CG -Wizard Falls Bridge to Bridge 99 -Bridge 99 to Candle Creek Rapid	 Class II Class I Class II	 Class II Class II Class II	 Class II Class II Class II
Rate of recovery- years	280 years	3 years	3 years (excluding Br 99 to Candle Cr)
Wildlife* -Northern Bald Eagle -Northern Spotted Owl -Osprey -Goshawk -Harlequin duck -Crater Lake Tighcoil		 -MIIH -NE -NE -NE -NE -MIIH	 -MIIH -NE -NE -NE -NE -MIIH
Fish* -chinook salmon -bull trout -redband trout/steelhead trout -sockeye salmon/kokanee	 Low wood and pool densities	 -NAE -LAA -MIIH -NAE	 -NAE -LAA -MIIH -NAE
Sensitive plants*– Pecks penstemon Invasive plants– ribbon grass	2 sensitive 1 invasive	-MIIH -mitigated risk	-MIIH - mitigated risk
Cultural Resources	12 sites elidgible	12 sites protected	12 sites protected
Recreation- non-boating	High summer use	Temporary displacement during operations	Temporary displacement during operations
Scenery	Highly valued	Short term disturbance, long term added diversity instream	Short term disturbance, long term added diversity instream
Wild and Scenic Outstandingly Remarkable Values - ORVs	Eight ORVs in plan	ORVs protected or maintained, fish, wildlife and scenery enhanced	ORVs protected or maintained, fish, wildlife and scenery enhanced, fish habitat limited downstream of Bridge 99

* NLAA- not likely to adversely affect, LAA- likely to adversely effect, MIIH- may impact individuals or habitat, NEA- no adverse effects, NE- no effect

ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, and social environments of the affected project area and the potential changes to those environments due to implementation of the Alternatives. It also presents the scientific and analytical basis for comparison of Alternatives presented in the chart above. The following list of past present and reasonably foreseeable actions was used to varying degrees by resource specialists to identify any cumulative effects for the various key issues and analysis issues.

Past, Present and Reasonably Foreseeable Actions

Wildfires
B&B Fire 2003- 94,000 acre wildfire, 76,000ac within the upper and lower Metolius Watershed
Link Fire 2003- 3000ac within the upper Metolius Watershed
Cache Mountain Fire 2002- 4000ac within the upper Metolius Watershed
Eyerly Fire 2002- 24,000ac within the lower Metolius Watershed
Black Crater Fire 2006- 6000ac within the Whychus Watershed
Lake George Fire 2006- 6000ac within the Whychus Watershed

Vegetation Management
Metolius Basin Forest Management 2004-present- Thinning of understory trees near Camp Sherman.
Jack Canyon Timber Sale and Jack Canyon Salvage 2000-2004- Thinning/Salvage in Metolius Basin.
Santiam Restoration and related timber sales 1997-2007-Coil Fiber, Springtail and Leftover TS.
Road 14 Thinning- small diameter thinning between Hwy 20 and Camp Sherman.
Hwy 20 Fuels Reduction- small diameter fuels treatments within the Whychus Watershed
Sisters Area Fuels Reduction 2007- proposed fuels treatments in Whychus Creek watershed
B&B Fire Recovery 2005-present- salvage of dead trees on 6000ac
Eyerly Fire Salvage 2004-2007- salvage of dead trees on ~2000ac

Restoration Projects
Lake Creek Restoration at Lake Creek Lodge 2006 – removal of pond and meander creation
Bull Trout Streamside Protection 2002-2005, set-backs for dispersed camping in Metolius Basin
Roaring Creek Culvert Replacement- Proposed replacement of undersized culverts
Metolius Hazard Tree In-stream Placement- annual hazard tree program in developed sites
Whychus Creek Riparian Protection 2006-2007- stream set backs for dispersed camping.
Opal Springs Fish Passage in the lower Crooked River Watershed, near future
Camp Polk Meadow Restoration in the Whychus Watershed, 2009
Pelton Round Butte Fish Passage on Lower Deschutes River, 2009
B&B Baer road culvert/bridge and road maintenance, 2004
B&B Road decommissioning and closure work (50 miles), 2007-2008

Recreation Projects
Instream Wood Modification in Metolius River for Boater Safety –trimming/topping of full spanners
Road maintenance – annual grading, drainage, brushing and minor culvert maintenance
Sisters District Hazard/Danger Tree Program- removal of dead trees along roads or developed sites.

Private Land Use
Jefferson County Land Use Plan 2006- Revised land use plan and subsequent private land development under the revised plan.
Private land salvage logging post B&B Fire- Abbot Creek

Zone of Influence

The scope of the analysis includes site specific effects to the Metolius River and the Riparian Reserves. The analysis also includes effects to the Metolius River that could occur at the fifth field watershed level and are generally considered in the cumulative effects analysis in this report. The fifth field watershed is generally that which drains directly to the river considered in the Metolius Watershed Analysis. The area that drains to Metolius Arm of Lake Billy Chinook is less relevant because of the lack of influence on the Metolius River and related fisheries.

For some species, their range may include adjacent 5th field watersheds such as Whychus Creek. These species include northern bald eagle, bull trout, osprey, goshawk, and Pecks penstemon.

KEY ISSUES

Boating Safety

Indicator: Change in boating skill level needed to safely boat the river (as measured by whitewater Class ratings) downstream of Wizard Falls Bridge.

Existing Condition

Excellent kayaking and rafting opportunities exist along the Metolius River. The best known opportunity for whitewater floating is on the scenic river segment downstream of Bridge 99. This segment is floatable year-round due to the relatively constant flow levels. The relatively long float (17 miles) is typically run as a day trip. The lower reach provides a remote feeling with undeveloped streambanks, challenging Class II-III rapids (particularly downstream of the project), hydrology that makes the river floatable year-round, scenic views, and abundant wildlife combine to create a truly primitive boating opportunity.

The international scale of rapids is a rating system of the difficulty of rapids for boating. Class I water is very easy, with small regular waves and riffles. With few or no obstacles, little maneuvering is required. Class II is easy, with small waves, some eddies, low ledges and slow rock gardens. These rapids have moderate difficulty and require some

maneuvering. Class III is medium difficulty, with high and irregular waves, strong eddies, and narrow, but clear passages that require expertise in maneuvering. Scouting is recommended. Class IV is difficult, with long rapids with powerful, irregular waves, dangerous rocks and boiling eddies. Precise maneuvering and scouting is required. Class V is very difficult with long rapids with wild turbulence and extremely congested routes that require complex maneuvering. These rapids present a danger and are near the limits of navigation.

Upstream of Gorge Campground, the river is generally floated with small rafts, kayaks and inner tubes, with the shallow water, logs, islands, private property and low bridges being the main challenges to boating. Boaters with small rafts and kayaks float the reach from Gorge Campground to Wizard Falls Bridge. This reach has challenging Class III rapids and bedrock chutes. Boating in the reach from Wizard Falls to Bridge 99 is Class I and is generally regarded as a family floating opportunity. From Bridge 99 to the lower project boundary, the river is rated as Class II. The rapids just downstream of the project are rated as Class III, with much of the river downstream being considered Class II.

These ratings generally underestimate the hazards to boaters on the lower Metolius River because they don't take in account the unpredictable nature of newly fallen trees, the lack of scouting opportunities due to the overhanging brush and the hazard of the swift, cold water making swimming more difficult and possibly impairing judgment. In the spring of 2007, 3 full spanning logs were reported downstream of Bridge 99.

Effects to Boating Safety

Alternative 1
Boating opportunities will remain largely unchanged. Boating will continue at low use levels and there will be an occasional full spanning log that will block boat passage downstream of Bridge 99. If the past decade is an indicator of future conditions, full spanning logs will not likely prevent boating in the river downstream of Bridge 99. Some wood will be cut illegally by boaters.

Alternative 2
Direct and Indirect Effects
Boating use may change as people become more aware of the increase in wood along the river bank and more of the boaters may have a higher skill level. The amount of wood along the stream bank would increase to 6 times that of the existing condition downstream of Wizard Falls Bridge to Candle Creek (Table 10). Boating in the reach between Wizard Falls Bridge and Bridge 99 may increase in difficulty to a Class II river, where some maneuvering may be required more often than is needed in the present condition. Class II is considered to have easy rapids, with a clear and obvious channel (Kulsaas 1994). Although wood will be added to the stream margins downstream of Bridge 99, the level of difficulty downstream of Bridge 99 is not expected to change as a result of the project. Currently this reach is rated class II and already requires some maneuvering and the addition of wood near the banks will not increase the difficulty of avoiding already existing obstacles. Interpretive signs describing

the management of wood in the river and the project goals will help increase the understanding of the management of the upper river. Signs will inform floaters of the change in the amount of wood in the river and mitigate the risk to boaters.

Cumulative Effects

Alternative 2 is not likely to combine with the effects of other projects to impact boat safety along the Metolius River. No other new projects are planned along the river that would impact boating activities. A few logs will be placed in the river generally upstream of Bridge 99 under the annual hazard tree program but this work would be designed to avoid boating hazards in relation to sites already planned in this project. Natural recruitment of wood will continue at a slow pace and not combine to increase boating hazards over the current condition. Current management under the Wild and Scenic Plan allows for managing natural full spanner logs in specific reaches above Bridge 99. Below Bridge 99, full spanning logs may occur but are expected to be at a similar rate as occurs prior to the project because, in most cases, the key pieces creating the full spanning jam is one that falls into the river from the river bank. In the next few decades, there will not be a cumulative effect from past or future foreseeable projects and the Metolius River Wood Restoration Project because this project will not create full spanning log jams, and it will avoid any added hazard to boating already occurring on the river.

Alternative 3

Direct and Indirect Effects

Effects to boating safety are similar to Alternative 2 but the reach between Bridge 99 and Candle Creek will not receive added wood. This reach currently has wood in-channel but at levels below the desired future condition. Boating in this reach downstream of Bridge 99 will remain relatively unchanged under Alternative 3. Interpretive signs describing the management of wood in all river segments will be added and the project goals will be stated to help increase safety and the understanding of the management of the river under the Plan. Signs will inform floaters of the change in the amount of wood in the river and mitigate the risk to boaters.

Cumulative Effects

Alternative 3 would have no wood added downstream of Bridge 99 and therefore no change to boating is expected in that reach. It is uncertain that illegal cutting of wood on the lower river downstream of Bridge 99 will change. A few logs will be placed in the river generally upstream of Bridge 99 under the annual hazard tree program but this work would be designed to avoid boating hazards in relation to sites already planned in this project. Natural recruitment of wood will continue at a slow pace and not combine to increase boating hazards over the current condition. No other new projects are planned along the river that would impact boating activities. In the next few decades, there will not be a cumulative effect from past or foreseeable projects because this project will not create full spanning log jams, because in most cases, the key pieces creating the naturally occurring full spanning jams is a tree that falls into the river from the river bank. The project will avoid locating new wood in areas of already existing hazards to boating. No wood will be placed downstream of Bridge 99 and therefore no changes to boating are expected in that reach.

Recovery through Natural Process

Indicator: Are the amounts of pool habitat and large wood in the river meeting the desired future condition.

Indicator: Length of time needed in each Alternative to meet the habitat goals and desired future condition.

Existing Condition

The 1999 stream survey shows that between 65% and 94% of each of the reaches between the headwaters and Candle Creek are riffle habitat (USDA Forest Service 1999) (Table 6). Therefore, the water is relatively shallow and fast. The headwaters reach, which is one of the coldest reaches and was historically prime spring chinook spawning habitat, has the least amount of slow water habitat.

Channel-spanning pools/mile are significantly less than the desired future condition in all reaches and still below it in most reaches even when pocket pool, alcove, and backwater pools are included in the total. When including all types of pools, both reach 2 and 8 are slightly less than the INFISH value and reach 6 is significantly less. Studies have closely linked in-stream wood with pool formation (Bisson et al. 1987, Bilby and Ward. 1989), and therefore, the low LWD densities in the Metolius River are contributing to the low density of pool habitat.

In general, in-stream large wood accumulation and distribution varies by reach based on flow regime. In the spring-influenced reaches near the headwaters individual pieces of in-stream wood are present including smaller sizes (>12" dbh). Downstream of Canyon Creek, the flows are influenced by tributary inputs and smaller in-stream wood or individual pieces of in-stream wood not anchored in a log jam periodically move or are transported downstream during high flows.

Effects to Recovery through Natural Processes

Alternative 1

No wood would be added to the river; therefore, pool habitat would continue to recover at the slow rate of natural wood recruitment. In addition, large wood densities would remain below the desired future condition levels until natural wood recruitment can increase the density. Between 1986 and 2003 (17 years), 85% of the wood recruited has been from habitat improvement projects. If natural wood recruitment continues at this rate it could take approximately 280 years before large wood densities would reach the desired amount (Alternative 2), assuming there is no loss of existing wood. Likewise, habitat associated with LWD, such as pools, islands and cover habitat, would develop at the same rate. More than

65% of the upper Metolius River between the headwaters and Jefferson Creek would remain fast and shallow.

Alternative 2
Direct and Indirect Effects
In this Alternative 206 structures with approximately 930 logs would be added to the Metolius River between the headwaters and Jefferson Creek (Table 9). This would increase in-stream large wood densities by up to11 times the existing levels in some reaches. Large wood densities would not change in reach 4 and would only increase by 1.5 times in reach 6 because these reaches are within narrow, fast canyons and it would be difficult to access the sites and secure the logs so as not to impact boater safety. These reaches would predominately rely on natural in-fall to provide in-stream habitat. Increasing large wood to densities more closely related to desired future condition will improve in-stream habitat by creating slow water areas, pocket pools, lateral scour pools, and stream complexity. Therefore, the Alternative 2 would have a beneficial effect on channel condition and fish habitat recovery and would meet the purpose and need of the project.

Cumulative Effects

The contribution of large wood to the Metolius River is primarily from river bank areas in the upper reaches and generally gets more influence of wood from the western tributaries and steep drainages off of Green Ridge in the middle and lower reaches. The project will not have a cumulative impact on natural wood recruitment because nature recruitment will remain the same. After a review at the rate of recruitment over 17 years, large wood recruitment was found to be slow, even when combined with hazard tree placements. Alternative 2 will recover the large wood to the Metolius River at a faster pace and will meet the desired future condition within the first 5 years. The project allows for retention of naturally recruited wood as it enters the river, but the project will not change the rate in which natural wood enters the river from side tributaries or the river bank. Other projects in the watershed will not contribute effects to this alternative because of the small amount of instream work and the distance from the Metolius River. Effects from other projects are not expected to combine with this project and no cumulative effects will result.

Alternative 3
Direct and Indirect Effects
Effects to the recovery of wood in the Metolius River would be the same as Alternative 2 in all reaches except reach 2. In Alternative 3, 167 structures would be installed with approximately 708 pieces of wood in reaches 3 through 9. Under Alternative 3, no wood would be placed below Bridge 99; therefore, in-stream wood densities in this reach would remain the same as Alternative 1, 39.3 logs/mi. In-stream wood densities would be 78% less than Alternative 2 and below the desired future condition for this reach. In addition, pools and slow water habitat associated with wood would not increase. This reach has some of the fastest stream flow in the project area because stream flow increases and the channel becomes steeper and narrower, making slow water habitat more important. However, since the implementation of the Wild and Scenic River Plan (1997), this reach is behind a locked gate and can only be accessed for administrative purposes; therefore, there is less developed along this reach and natural wood recruitment is higher. Also, turbidity and ground

disturbance would be less in Alternative 3 because 25 ground-based structure sites below Bridge 99 would not be implemented.

Cumulative Effects

Based on the same rationale as in Alternative 2, effects of Alternative 3 will not combine with those of other projects in the watershed to result in cumulative effects to the natural processes of recovery of wood in the river. The project allow for retention of naturally recruited wood as it enters the river, but the project will not change the rate in which natural wood enters the river from side tributaries or the river bank.

ANALYSIS ISSUES

Hydrology

Indicator: Comply with the turbidity management called for under Oregon Department of Environmental Quality regulations.

Existing Condition

Streamflow

The Metolius River is a spring-dominated system with a very stable flow (USDA Forest Service 2004). Average daily flow at the gage near the mouth ranges from 1337 cfs in October to 1667 cfs in June. The highest recorded peak flow was 8430 cfs and it occurred during the 1996 rain-on-snow event on February 7, 1996. Stream flow was predicted to increase in the upper Metolius River as a result of the recent fires, B&B Complex (2003), Link Fire (2003), and Cache Mountain Fire (2002), which burned approximately 56% of the Upper Metolius 5th field watershed.

The Metolius River near the mouth (#1409500) was above 3400 cfs (RI > 5) on January 11, 2006, and stayed above 2000 cfs for approximately 15 days during a rain-on-snow event. Then again on November 7, 2006, the Metolius River reached 3000 cfs (RI = 3.7) during a 3 day rain storm. These flows are equivalent to approximately 5 year events.

Flows were also high during the January 2006 event in some nearby unburned streams (i.e. Shitike Ck near Warm Springs (RI ≈ 2.5), Warm Springs River near Kahneeta (RI ≈ 3), Trout Ck (ungaged, estimated a 5 yr event)), but did not even reach bankfull flows at another nearby unburned stream, Whychus Creek. However, the November event affected the two other streams on Sisters Ranger District differently. Trout Creek, an intermittent stream in Sisters, OR, did not flow but the flow in Whychus Creek at Sisters, OR, was at a 10 year event. In addition, flow in the Warm Springs River was approximately a 4 year event. No data was available for Shitike Creek. Based on this data and the stable hydrograph for the Metolius River, it is likely that the flows in the Metolius River have been slightly elevated by the recent fires. As vegetation continues to reestablish they should recede to normal levels.

The total allotted legal water rights to the Metolius River and adjacent springs is approximately 26 cfs (USDA 1997). The largest diversion is at the Wizard Falls fish hatchery, which diverts 20 cfs from the Metolius River. In addition to water rights, there are several summer home residences within the project area that pump water out of the river for domestic use.

There are three types of flow regimes in the Metolius River within the project area: spring-fed, spring-fed and lake controlled, and spring-fed and snow-melt. The spring-fed segment (reach 8) extends from the headwater springs to the confluence with the south fork of Lake Creek. Stream flow is very stable and is approximately 150 to 200 cfs (USDA 1999). The spring-fed and lake controlled segment (reaches 7, 6, 5) extends from the confluence with the south fork of Lake Creek to the confluence with Canyon Creek. Stream flow remains relatively stable in this reach but increases to approximately 500-700 cfs with the addition of the south fork of Lake Creek, Spring Creek, Davis Creek (intermittent), First Creek (intermittent), and Heising Spring, and Jack Creek. Stream flow is relatively stable in Lake Creek, Spring Creek, Jack Creek, and Heising Spring because it is either lake controlled, spring controlled, or both. Although Davis Creek and First Creek are relatively flashy streams they are small and intermittent and do not significantly affect the flow regime of the Metolius River. The spring-fed and snow-melt segment (reaches 4, 3, 2) extends from Canyon Creek to Candle Creek. Within this segment in the project area a number of larger, perennial tributaries enter the Metolius: Canyon Creek, Abbot Creek, and Candle Creek. Stream flow is approximately 700-900 cfs and can get high enough to float logs, as was seen in the 1996 flood at the Wizard Falls bridge.

Water Quality

The Metolius River, throughout its length, is a source of high quality water and as a result is designated as a Wild and Scenic River (USDA 1997; USDA 2004). Since the completion of the Metolius Wild and Scenic River plan in 1996, water quality parameters have been monitored to establish baseline conditions. All the water quality monitoring data for the Metolius River, including effects predicted from the recent fires are discussed in the Metolius Watershed Analysis Update (USDA 2004).

The State of Oregon is required by the Clean Water Act, Section 303(d), to identify waters that do not meet water quality standards. The Metolius River from river mile 8.5 to the headwaters has recently been listed for temperature exceedence above the State standard on the Oregon 2004 303(d) list (ODEQ 2003). In addition, two tributaries to the Metolius River within the project area, Lake Creek and First Creek, are also listed for temperature exceedences above the State standard. River reaches for the 2004 303(d) list are based on beneficial uses; therefore, there may be reaches that do not exceed the State water quality standards that are listed on the 303(d) list because they have the same beneficial use as an adjacent reach that does exceed the standard.

States are required to develop Total Maximum Daily Load (TMDL) allocations, which include Water Quality Management Plans (WQMP) for 303(d) listed waters. The Upper Deschutes River Subbasin TMDL and WQMP are scheduled for completion in 2007 and

cover all the subwatersheds in the project boundary. A Memorandum of Understanding (MOU), signed May 2002, between Oregon Department of Environmental Quality and the U. S. Forest Service, designated the Forest Service as the management agency for the State on National Forest Service lands. To meet CWA responsibilities defined in the MOU, the Forest Service is responsible for developing a Water Quality Restoration Plan (WQRP), which is now in draft form (U. S. Forest Service 2004). Activities proposed in the SAFR Fire Recovery Project are in compliance with the draft WQRP.

Although most of the Metolius River is listed on the 2004 303(d) list for temperature exceedence, only a small segment between Lake Creek and Jack Creek exceeds the State temperature standard of 12º C for bull trout spawning and rearing (Table 6). Within this segment two tributaries with average summer water temperatures that exceed the State standard enter the Metolius River. Downstream of this segment Jack Creek and other cold water streams enter the Metolius River and bring the water temperature below 12º C. Through much of its length, average summer temperatures in the Metolius River rarely exceed 12° C.

Table 6. Water temperature monitoring in the Metolius Wood Project Area.

Stream	Period of record	Max 7-day ave. max. temperature	2003 Water Temperature standard
Metolius @ headwaters	1995, 1997-2001	10.7º C	12º C
Metolius @ Camp Sherman bridge	1996	12.2º C	12º C
Metolius @ Gorge Campground	1996-2002, 2004-2005	13.6º C	12º C
Metolius @ Bridge 99	1988-1991, 1993-2002, 2004-2005	10.2º C	12º C
Metolius @ mouth	2001	11.8º C	12º C
First Creek*	1997-1999	>12.8º C	12.8º C
Lake Creek	1997-2002	13.2º C	12º C

* Data is from LASAR (ODEQ 2003).

The only water quality parameter that could potentially be affected by the proposed project is turbidity and sedimentation. In general, turbidity is very low (< 1 NTU), as is seen in its exceptional water clarity (USDA Forest Service 1997). This is primarily due to its remarkably stable stream flow and stream banks. Effects to water quality from sedimentation have been monitored in spawning habitat since 1997 at 2 sites in the Metolius River (at Lake Creek and at Gorge Campground) using a modified McNeil core sampling technique. Data post-1996 may underestimate the percent fines because the 1996 flood most likely flushed fine sediment out of the gravel and over time the level of fines will increase until it reaches equilibrium or another high flow event. The sedimentation results from 1997 and 2002 are

discussed in detail in the Metolius Watershed Analysis Update and represent pre-fire conditions (USDA 2004). Average fine sediment (< 6.4 mm) in riffles is approximately 28%. Fine sediment has significantly increased in the Metolius River upstream of Lake Creek between 1997 and 2002, but it is difficult to determine if it has reached pre-1996 flood flush levels because no pre-flood data is available for the Metolius River sites. Overall, the Metolius Watershed (5^{th} field) does not appear to contribute a substantial amount of sediment, as was shown in a recent study (O'Connor et al., 2003). The study evaluated sediments accumulated in the Metolius Arm of Lake Billy Chinook reservoir from 1964 to 1998. The report states that there is no detectable delta (using that survey method) and that sediment yields for the 34-year period between 1964 and 1998 are remarkably low and possibly the lowest in the region. This is especially notable because the 34-year period includes the two largest flow events in the last 140 years.

Numerous projects have been implemented in the upper Metolius watershed mostly in the tributary subwatersheds of the upper Metolius River, to reduce sedimentation. These projects include trail and road maintenance, road decommissioning projects, culvert replacements with larger sized culverts or bridges, soil erosion control projects and planting vegetation along streams.

Channel Condition

Due to the remarkably stable streamflow, channel pattern over time is relatively unchanged in the Metolius River. Riparian vegetation along most of the Metolius River is relatively similar to historic condition, except in developed areas or heavy recreational-use areas (Minear 1999). The Riparian Reserves along the Metolius River were not impacted by the 2003 B&B Complex Fire. In addition, less than 2% of the banks of the Metolius River within the project area were considered unstable in 2000 (USDA 1999). Unstable bank areas are primarily associated with high-use areas in campgrounds and popular fishing holes.

The 1999 stream survey shows that between 65% and 94% of each of the reaches between the headwaters and Candle Creek are riffle habitat (USDA 1999) (Table 7). Therefore, the water is relatively shallow and fast. The headwaters reach, which is one of the coldest reaches and was historically prime spring chinook spawning habitat, now has the least amount of slow water habitat.

Although the Metolius River is very stable (i.e. not moving laterally or aggrading or degrading), channel shape and complexity have changed as a result of the reduction of in-stream large woody debris (LWD). Pools and vegetated islands are channel features associated with LWD in the Metolius River that are reduced in number from the reduction of LWD. In general, vegetation forms quickly on wood in the Metolius River, due to the stable stream flow, and creates vegetated, permeable islands. Both pools and islands are important for fish habitat in the Metolius River (see Fish Species and Habitat section).

Table 7. Percent riffle habitat in the Metolius River by reach, from the headwaters to Candle Creek.

Reach	% riffles
2 – Candle Creek to Bridge 99	67.7
3 – Bridge 99 to Wizard Falls	66.0
4 – Wizard to Canyon Cr	73.6
5 – Canyon Cr to Private Land	68.6
6 – Private Land to First Cr	86.8
7 – First Cr to Lake Ck	76.7
8 – Lake Cr to Headwaters	93.8

Historically in-stream large woody debris densities in the Metolius River were much higher than they are today. In the early 1930s the Metolius River was cleaned by the Civilian Conservation Corps (CCC) and for log drives (USDA 1996). In addition, development along the river has reduced in-stream wood recruitment. A historic report in 1938 stated that boaters had to portage 20 times from Canyon Creek to the confluence with the Deschutes River (Bulletin 1938), resulting in approximately one full spanning log jam per mile. The river above Jefferson Creek is currently managed for boating and in 1995 there were no full spanning log jams below Canyon Creek and just the occasional single spanning log. Historic in-stream large woody debris (LWD) densities in the upper Metolius River were estimated based on aerial photos from 1944 (Minear 1999), historic reports (Bulletin 1938), studies of wood densities in managed and unmanaged watersheds (McKinney et al, 1996, USDA 1995, Cordova 1995), and from reference reaches (i.e. Head of Jack Ck and the meadow reach of the Warm Springs River) (Table 8).

The 1944 photo analysis of LWD densities are an underestimate for the historic values since much of the in-stream wood had already been cleared by 1944. In addition, only LWD > 50' in length was counted. In addition, the densities estimated for the Upper Deschutes Basin in ICEMP and INFISH may also be an underestimation of historic Metolius River densities because their estimates were based on other rivers and there are few rivers with the same spring-fed flow regime as the Metolius River. In addition, averaging wood densities for unmanaged streams across stream type and stream size can significantly alter the correct value for any given stream. Likewise densities for large wood in unmanaged areas may be under-estimated because they tend to be at higher elevations in the wilderness where tree diameters are less. Estimates from unmanaged reaches of the John Day and Malheur Rivers, other east-side streams, are probably closer to historic Metolius River values because they have not been as muted from averaging and are within the similar vegetation types.

Historic wood densities in the Metolius probably more closely resembled those of one of its spring-fed tributaries, Jack Creek, and another nearby east-side spring influenced stream, the upper Warm Springs River. Although the upper Metolius River is relatively large, it does not get many flushing flows because it and many of its tributaries are spring controlled. As a result, much of the wood that falls in stays. In-stream wood densities in both of the streams

are probably over-estimates for the desired levels in the the Metolius River since adjacent vegetation type is different than the Metolius River. The amount of large wood in-stream is shown to be positively correlated to streamside tree densities (Bilby and Wasserman 1989). Stands adjacent to the river in Jack Creek, the upper John Day River, and the upper Malheur River are more mixed-conifer (higher density), in contrast to stands next to the Upper Metolius River are predominately ponderosa pine (lower density) with portion of mixed conifer zones on the lower reaches. In addition, Jack Creek is a much smaller stream with a bankfull flow of approximately 80 cfs; therefore, retains more wood than larger streams. The Warm Springs River is a larger river (approx. 300 cfs) but has a spring-fed/snow-melt flow regime and is flashier than the Metolius River. Based on the available data the desired future condition for large woody debris (> 12" dbh, > 35' length) is between 46 and 155 log/mile.

In general, in-stream large wood accumulation and distribution varies by reach based on flow regime. In the spring-influenced reaches near the headwaters individual pieces of in-stream wood are present including smaller sizes (>12" dbh). Downstream of Canyon Creek, the flows are influenced by tributary inputs and smaller in-stream wood or individual pieces of in-stream wood not anchored in a log jam periodically move or are transported downstream during high flows.

Since 1986 the Forest Service has been adding wood to the river, especially in areas where recruitment is reduced by development. Placed wood comprised 85% of 173 pieces of wood recruited in the project area since 1986 (Houslet 2004). The 1999 stream survey shows that LWD/mi is less than the INFISH minimum recommended value from the headwaters to Wizard Falls, and significantly less than the desired future condition (Table 8 and Table 9). INFISH recommended values are used for comparison for the eastside Cascade streams but the project does not fall within the area under INFISH management direction. Downstream of Wizard Falls Bridge, large wood densities within the project area is less than the lower limit of the desired future condition.

Although there is no data for the number of vegetated islands historically or presently, it can be assumed that the number of islands has declined as the LWD has declined. Likewise, channel-spanning pools/mi are significantly less than the INFISH minimum recommended value in all reaches (Table 9) and still below it in most reaches even when pocket pool, alcove, and backwater pools are included in the total (Table 12). When including all types of pools, both reach 2 and 8 are slightly less than the INFISH value and reach 6 is significantly less. Studies have closely linked in-stream wood with pool formation (Bisson et al. 1987, Bilby and Ward 1989), and therefore, it is likely that the low LWD densities in the Metolius River are contributing to the low density of pool habitat.

Table 8. Estimated historic in-stream large woody debris (LWD) density for the Metolius River.

Source	LWD/mi > 12" dbh	LWD/mi > 20" dbh	Pools/mi (for the Metolius R)
INFISH (USDA Forest Service 1995)	20		Reach 2,4,5 = 23 Reach 3 = 18 Reach 6,7,8 = 26
ICEMP (Deschutes Basin – unmanaged, McKinney et al, 1996)		7.1	
John Day and Malheur in unaltered C stream type reaches (Grand Fir climax, Cordova 1995)	46	42	
1944 photos (Minear 1999)		4.7a	
Head of Jack Ck (USDA Forest Service 2001)	154.9	27.2	
Warm Springs River – meadow reach		6.4	

a – large wood length is greater than or equal to 50 ft.

Table 9. Large woody debris (LWD) density and pool density in the Metolius River (USDA Forest Service 2000).

Reach	LWD/mi > 12" dbh	LWD/mi > 20" dbh	Channel-spanning Pools/mi
2 – Jefferson to Bridge 99	39.3	12.3	3.4
3 – Bridge 99 to Wizard Falls	23.8	6.3	4.8
4 – Wizard to Canyon Ck	13.34	8.5	4.5
5 – Private Land	5.9	0.9	4.2
6 - Gorge	11.4	8.5	5.7
7 – First Ck to Lake Ck	8.3	2.0	7.6
8 – Lake Ck to Headwaters	6.8	0.7	4.0

Hydrology Effects

Alternative 1 (No Action)
Direct and Indirect
No activities would occur under this Alternative; therefore, hydrology conditions would continue as described in the Existing Condition section of this report. Water quality would remain exceptional and there would be no short-term spikes in turbidity or temporary ground disturbance from the proposed activities. Peak streamflow effects from the recent fires would remain slightly elevated until vegetation reestablishes in the drainages to the Metolius River.

No wood would be added to the river, other than the wood occasionally added under the hazard tree program; therefore, slow water habitat would continue to occur at the natural wood recruitment rate. In addition, large wood densities would remain below the desired future condition levels until natural wood recruitment can increase the density. Between 1986 and 2003 (17 years), 85% of the wood recruited has been from habitat improvement projects. If natural wood recruitment continues at this rate then it will take approximately 280 years before large wood densities would reach the amount proposed in Alternative 2, assuming there is no loss of existing wood. Likewise, habitat associated with large wood, such as pools and slow water habitat, would develop at the same rate. More than 65% of the Metolius River between the headwaters and Jefferson Creek would remain fast and shallow.

Alternative 2 (Headwaters to Candle Ck)
Direct and Indirect
In this Alternative 206 structures with approximately 930 logs would be added to the Metolius River between the headwaters and Candle Creek (Table 10). This would increase in-stream large wood densities by up to11 times the existing levels in some reaches. Large wood densities would not change in reach 4 and would only increase by 1.5 times in reach 6 because these reaches are within narrow, fast canyons and it would be difficult to access the sites and secure the logs so as not to impact boater safety. These reaches would predominately rely on natural in-fall to provide in-stream habitat. Increasing large wood to densities more closely related to desired future condition will improve in-stream habitat by creating slow water areas, pocket pools, lateral scour pools, and stream complexity. Therefore, the Action Alternatives would have a beneficial effect on channel condition.

Table 10. Comparison of large wood densities among Alternatives.

Reach	LWD > 12” dbh and 35’ long/mi		
	Alt. 1	Alt 2	Alt 3
2 – Jefferson to Bridge 99	39.3	182.6	39.3
3 – Bridge 99 to Wizard Falls	23.8	151.5	151.5
4 – Wizard to Canyon Ck	13.3	13.4	13.4
5 – Canyon Ck to House of the Metolius	5.9	61.9	61.9
6 –House of the Metolius to First Ck	11.4	28.5	28.5
7 – First Ck to Lake Ck	8.3	81.0	81.0
8 – Lake Ck to Headwaters	6.8	81.8	81.8
Total logs	200	930	708

The quantity of stream flow within the Metolius would not be affected by the Action Alternatives; however, more slow water habitat would be created. In reach 8, the spring-fed reach, wood placements would be single log or multiple log and would be arranged randomly creating numerous pocket pools and slow water habitat across the stream (i.e. margin and main channel). Not all wood in this reach would need to be anchored into the banks to be stable because stream flow is very stable. Wood in the other reaches would provide lateral scour pools, pocket pools and slow water habitat on the margins of the river. The structures would not impede boater safety or the free-flow character of the Metolius River (Section 7 requirement under the Wild and Scenic Rivers Act) because they would not be channel-spanning. The higher flows in these reaches will help create deeper pools and a sharper contrast in flows (strong eddy lines). As a result of higher flows, all structures in these reaches would be multi-log structures (6-9 pieces) and would be anchored into the banks either by keying in a few pieces or, at structures placed by helicopter, by interlocking bigger logs with a few ends on the bank (Table 11).

Table 11. Comparison of structure placement type by Alternative. The symbol 'G' denotes ground based and the symbol 'H' denotes the use of helicopter.

Reach	Alt 1	Alt 2	Alt 3	Alt. 2	Alt. 3
	G	G	G	H	H
2 – Jefferson to Bridge 99	0	25	0	12	0
3 – Bridge 99 to Wizard Falls	0	55	55	2	2
4 – Wizard to Jack Ck	0	11	11	8	8
5 – Private Land	0	0	0	0	0
6 – Private land to Gorge CG	0	1	1	0	0
7 – First Ck to Gorge CG	0	61	61	0	0
8 – Lake Ck to Headwaters	0	37	38	0	0
Total	0	190	165	22	10

Water quality in the Metolius River in the long-term would be either unaffected by this Alternative or would be slightly improved. Stream shade-producing vegetation would not be removed to install wood structures; therefore, temperature would not be affected. Likewise, streambank stability would not be compromised by the structures because they would be designed so that they would not float away and leave an exposed bank. Bank structures in the higher flow areas (i.e. outside of meander bends in reaches 2-7) would be securely keyed into the bank with logs placed on top to provide stability and to deflect flows from the bank. In addition, structures would be strategically placed in high-use areas to limit the number of trails to the river, provide bank stability, and to allow riparian vegetation to reestablish. Although 4-6 miles would be needed to access the structure sites, approximately 80% of these will be on existing trails. In addition, all trails would be rehabilitated by adding brush and logs to the disturbed surface and, where possible compacted areas would be broken up by the excavator or subsoiler (i.e. areas that would not disturb tree roots or vegetation and that were not too rocky). New compaction and associated erosion would not be created at

helicopter or truck landings because existing landings or road-beds would be used to stockpile wood used in the structures.

Sedimentation from the proposed project would be minimal because most of the equipment work would be done from the banks. However, in the short-term, turbidity could increase above the State standard of 10% of background levels. The process of keying in structures into the bank (reaches 2-7) and driving into the stream bed to place logs (reach 8) will cause a short term increase in turbidity. This standard is currently under revision and may change before or during the implementation of this project. Regardless of a rule change, limited duration activities are allowed to exceed the standard if a permit has been authorized under terms of Section 401 or 404 of the Clean Water Act (CWA) or OAR 14I-085-0100 et seq., with limitation and conditions governing the activity set forth in the permit. A permit would be secured prior to implementation of this project. Turbidity may be increased immediately downstream of structure sites, but should dissipate quickly because disturbance would be kept to a minimum and the soils do not have a high clay content. In reaches adjacent to summer residences this could affect domestic use during implementation. Residents would be notified of this work prior to implementation so that they can avoid drawing water during the in-stream work period. Turbidity would decrease to background levels within 30 minutes upon removal of equipment from the stream channel. The equipment would take temporary breaks (15-30 minutes) every 2-3 hours. In addition, the project would be implemented in phases; therefore, turbidity would not be high throughout the project reach nor would it last the entire in-stream work period.

In summary, under Alternative 2, the project would have a long-term beneficial effect on channel condition and a slight short-term increase in turbidity that would be allowable with the CWA, Section 404 Permit.

Alternative 3 (Headwaters to Bridge 99)
Direct and Indirect
Effects to stream flow, channel condition, and water quality would be the same as Alternative 2 in all reaches except reach 2. In Alternative 3, 167 structures would be installed with approximately 708 pieces of wood in reaches 3 through 9. Under Alternative 3, no wood would be placed below the Bridge 99; therefore, in-stream wood densities in this reach would remain the same as Alternative 1, 39.3 logs/mi. In-stream wood densities would be 78% less than Alternative 2 and below the desired future condition for this reach. In addition, pools and slow water habitat associated with wood would not increase. This reach has some of the fastest stream flow in the project area because stream flow increases and the channel becomes steeper and narrower, making slow water habitat more important. However, since the Wild and Scenic River Plan (1997) this reach is behind a locked gate and can only be accessed for administrative purposes; therefore, there is very little development along this reach and natural wood recruitment is higher. Also, turbidity and ground disturbance would be less in Alternative 3 because 25 ground-based structure sites below Bridge 99 would not be implemented.

In summary, under Alternative 3, the project upstream of Bridge 99 would have a beneficial log-term effect on channel condition and will have slight, short-term increase in turbidity that

would be allowable under the CWA permit. Downstream of Bridge 99 the project would not recovery large wood to historic levels and would rely on a slow recovery process that would not meet the desired future condition for more than two centuries.

Cumulative Effects

Hydrology effects from the activities proposed in the Metolius River Wood Restoration Project would not incrementally add to cumulative effects because no long-term effects to any hydrology parameters are predicted. Although turbidity may increase in the short-term from the proposed project, past activities in the watershed are not affecting turbidity, as evidenced by the exceptional water quality (USDA Forest Service 1996) and no other activities in the watershed that affect turbidity would be occurring at the same time. In addition, a permit would be obtained and conditions set forth in the permit would be met, such as the allowable exceedance and amount of time permitted to exceed the standard.

Cumulative hydrology effects from past activities would be the same as those discussed in the No Action Alternative and the existing condition. Although activities proposed in the Metolius River Wood Restoration Project could occur in areas that have had past activities within the past decade, the proposed activities are not predicted to cause any water quality or quantity effects (see Effects Analysis). No future foreseeable activities would occur within the Metolius Wood project area; however, some could occur within the hydrology analysis area. These are the same projects that would occur under the No Action Alternative and they would either not affect hydrology parameters or would beneficially affect sedimentation and stream flow.

In summary, the project will not combine with past, present or future projects to have cumulative effects on the water quality, quantity or channel condition of the Metolius River because no long term effects are predicted.

Fish Species and Habitat

Indicator: Miles of stream meeting the desired future condition for in-stream pieces of wood per mile and percent of channel area in pool habitat.

Fish species within the aquatic environment being analyzed under this environmental assessment include the native bull trout, redband trout, Mid-Columbia steelhead trout, Mid-Columbia spring chinook salmon, mountain whitefish, various sculpins, dace and chinook salmon Essential Fish Habitat. The redband trout of the Inland Columbia River drainage and Mid-Columbia spring chinook salmon are on the Forest Service Region 6 Sensitive species list, while the Columbia River bull trout and Mid-Columbia steelhead trout are listed as a threatened species by the U.S. Fish and Wildlife Service and National Marine Fisheries Service, respectively.

Introduced game fish species within the project area include, but are not limited to, brown trout, kokanee salmon (native only to Suttle lake), brook trout, and rainbow trout (non-native strains).

Exising Fish Habitat

Cover along the streambanks and islands are an important feature that needs to be maintained in the Metolius River. Complex habitat and cover provided by wood and the vegetation that grows on the wood is a desired feature of the river for chinook salmon, bull trout and redband trout rearing habitat.

Desired density of large wood is in the range of 46 to 155 pieces of large wood per mile, based densities of Jack Creek and unaltered streams in the John Day and Malhuer River watersheds (Table 8). Desired amount of pool habitat is 18 to 26 pools per mile. Good habitat for rearing chinook salmon includes pool habitat that ranges from 40 to 60%, based on a literature review by Burke and others (2003). With alcove pools, backwater pools and pocket pools added into the area of main channel pools, the Metolius River pool habitat totals between 5 and 34 % pools (Table 12). The project reaches of the upper Metolius River above Jefferson Creek are below desired condition for pool habitat for chinook salmon. Bull trout also require pool habitat and abundant overhead cover in the form of wood, undercut banks and vegetation (Goetz 1998). Redband trout adult habitat is tied to water depth and slow pools in the upper Metolius River. In the upper Metolius reaches, water depth to hold adults throughout the year is lacking.

Large wood is associated with slow water or pool like habitats in the Upper Metolius River that are used by juvenile chinook salmon and redband trout (Lovtang 2005, Houslet 2004). Any structure that breaks the velocity and provides water depth can increase the number of juvenile fish associated with the habitat. Wood is the primary agent of creating slow water in the Metolius River because boulders are infrequent along the river corridor.

Kokanee salmon are native to Suttle Lake and Link Creek. Sockeye salmon historically spawned in Link Creek, but with renewed fish passage at Pelton Round Butte Dams, sockeye salmon may begin to spawn in more dispersed areas of the Metolius River and its tributaries. Protection of spawning habitat for kokanee and sockeye in the Metolius River is an important objective. Gravel beds with 1ft per second velocity are important spawning sites for these fish. Maintenance of spawning habitat, primarily in the upper 4 miles of river, is a primary objective for the protection of the kokanee/sockeye salmon and redband trout population.

Summary of ESA and MSA Consultation with US Fish and Wildlife Service and National Marine Fisheries Service

Consultation under the Endangered Species Act (ESA) on the effects of this project on listed fish was conducted under the programmatic biological opinion for Stream Restoration Activies on lands within Oregon and Washington managed by the US Forest Service and Bureau of Land Management. By following the Project Design Criteria in the Biological Assessment (Appendix B), and compling with the Terms and Conditions issued by the agencies (Appendix C), the following effects determinations were reached:

- Bull trout- **Likely to Adversely Affect**
- Chinook salmon Essential Fish Habitat- **No Adverse Effects**
- Mid Columbia steelhead trout– **May Affect, Not Likely to Adversely Affect**

The following effects determinations were made in the Biological Evaluation for sensitive fish species in the Metolius River:

- Redband Trout- **May Impact Individuals or habitat but will not lead to a trend in Federal Listing**.

CHINOOK SALMON - *Oncorhynchus tshawytscha*
MSA STATUS – Essential Fish Habitat

Spring chinook salmon (*Oncorhynchus tshawytscha*) historically spawned in the Warm Springs River system, Shitike Creek, the main stem Deschutes River upstream from the location of the Pelton Round Butte hydroelectric complex, Squaw Creek, and the Metolius River. Historic use of the Crooked River by spring chinook salmon is documented but conflicting reports exist on when this population was lost (Nehlsen 1995).

Construction of Pelton and Round Butte dams, completed in 1958 and 1964, respectively, included upstream passage facilities for adult chinook salmon and steelhead and downstream facilities for migrating juveniles. By the late 1960's, it became apparent that the upriver runs could not be sustained naturally with these facilities due primarily to inadequate downstream passage of juveniles through the project. As a result, in 1968, PGE agreed to build and finance the operation of an anadromous fish hatchery at the base of Round Butte Dam to mitigate for losses above the dams.

The number of adult spring chinook that spawned above the hydroelectric complex is unknown. The Metolius River was thought to be the major spring chinook spawning and rearing area of the upper Deschutes subbasin. Up to 580 adult spring chinook were captured at a hatchery rack in the Metolius River during the years 1948 to 1958 and this number of fish was thought to be considerably less than what was historically present (Nehlsen 1995). Regardless of the true production potential upstream of the hydroelectric complex, loss of

these areas currently constrains natural production in the subbasin. This constraint would be reduced if passage for spring chinook was reestablished over the hydroelectric complex.

Chinook salmon and sockeye salmon have been released on an experimental basis into the Metolius River and selected tributaries. The upper Deschutes and Crooked River basins have been identified as Essential Fish Habitat under the Magnuson-Stevens Act. This act protects habitat important to commercial ocean fisheries. The Listing included the Upper Deschutes Subbasin with the likelihood future passage of anadromous fish will be passed through Deschutes River dams. Under the proposed new hydropower operating license for Pelton Round Butte Dams, fish passage will be a part of the new operation at the dam complex on the Deschutes River. This proposed reintroduction marks a return to anadromy to the watershed. Chinook salmon may be released for reintroduction as early as 2008 under the fish passage plan for Pelton Round Butte Dams. Returns of adult salmon to the Metolius River are not expected until at least 2012.

Habitat for chinook salmon was documented in historic reports in a review by Nehlsen (1995). She described chinook salmon spawning in the Metolius River and collections were made in the Camp Sherman area to supply the hatchery with eggs. Spawning would occur in September and October. Historic reports of salmon being caught in traps in Lake Creek were given as evidence of use in that stream. The upper 3 miles of the Metolius River is thought to be the primary spawning habitat for historic Chinook salmon populations. Recent growth rates examined of age 1 chinook were fastest in the experimental fry released in the springs at the Head of the Metolius River and condition factors were good in lower Lake Creek. (Jens Lovtang, OSU, personnel communication). Although rearing could occur in other tributaries and lower in the Metolius River, the springs may be important for early rearing and spawning habitat.

Rearing habitat is thought to be within the optimum temperature range for Chinook salmon in limited reaches of the Metolius River and in most of the year in Lake Creek. Juvenile chinook salmon caught in juvenile trap in the mouth of the Metolius River were found to be small on average. It is unknown if additional rearing and growth would occur after the juvenile chinook migrate out of the Metolius River system. Larger smolts would have better survival to the ocean.

Effects to Chinook Salmon

Alternative 1 – No Action

Changes to chinook salmon habitat or juveniles will not occur because in-stream work will not occur. There will be a slow recovery with Alternative 1 because of the maintenance of low quality habitat and low amount of pool habitat that is important to chinook salmon rearing, growth and survival. Slow pool habitat is important for rearing chinook and the lack of slow water may cause the fish to grow at slower rates and be smaller at time of smolt. Density of chinook will remain low and the capacity of the river to produce an adequate number of smolts to sustain a population will be low under existing conditions. Pool habitat

is below that needed for good chinook rearing habitat (Burke et al 2003) and will remain below INFISH Riparian Management Objectives (RMO), which are used for comparison for eastside Cascade streams. Large wood will remain below the desired future condition for the upper reaches and below that estimated to be the historic and desired wood densities for the upper Metolius River. Recovery by natural rates will remain slow and may not meet the management objectives for fish habitat for several decades. The initial phases of chinook salmon reintroduction will be conducted and tested under conditions of poor to fair habitat quality for chinook salmon and may provide a slow establishment of the population above the dams.

Alternative 2 – Proposed Action
Direct/Indirect Effects
Alternative 2 may cause local turbidity and temporary disturbance of feeding juvenile Chinook while the project is operating in-stream. Juvenile chinook will be present at the time of the implementation, and may be displaced temporarily over a small area around the project work sites. This disturbance is considered minor and temporary and will not lead to a measurable increase in mortality. The number of affected individuals will be small and the area will be limited to the immediate vicinity of the project site being worked at one time (within 100-200ft). Adult fish could be affected because they might be released above the dams before the wood project is completed. Spawning and migration times could be avoided if they were released within the overlapping years of the project.

Indirect effects of the project to habitat of chinook salmon will be a short term localized disturbance of the substrate and river bank during the placement of wood. Generally, the substrate is not large enough in the Metolius for intergravel rearing of juvenile salmonids outside of the incubation period. Sediment runoff from the disturbed area is not expected to contribute to sedimentation because of the flat land selected for access to the sites and the rapid recovery of the disturbed area through active restoration and planting of native grasses and shrubs.

Chinook salmon and incubation periods will be avoided by seasonal restrictions once adults are present. Other short term habitat effects include the disturbance of the bank in the immediate vicinity of log structures that are dug into the streambank. This loss of cover is minor (1ft by 10ft) at each site and will recover within one year as existing vegetation grows and the planted shrubs become established.

The long term benefits of the project to chinook rearing habitat will be an increase in pool habitat and cover of 50% to over 100% in the project reaches (Table 12). The project will increase the large wood, pools, and cover and restore habitat for Chinook salmon. Habitat quality for Chinook juveniles will allow for better growth and survival for smolts. Capacity of the upper Metolius River to produce smolts and sustain a population of chinook salmon above the dams will greatly increase by as much as one third to one half more than the existing conditions, (based on area of pool habitat increased). This recovery of pool habitat is expected to be long term because placed wood is expected to remain in channel for decades due to the stable flow regime of the river and the stable designs being proposed.

Table 12. Estimates of pool habitat and increases of pool area with proposed addition of large wood into the upper Metolius River. Estimates of added pool area were made assuming an area of 150ft by 30ft of added pool habitat per site. Under Alternative 3, total pool habitat would not change from existing condition downstream of Bridge 99.

Reach name	reach	existing % pool main channel	total existing % pool with margin pools	total % pool alt 2
Candle Cr to Br 99	2	32	34	55
Br 99 to Wizard Falls	3	29	31	45
Wizard to Canyon Cr	4	23	27	27
Canyon Cr to the Gorge	5	13	22	31
Gorge	6	13	14	14
Gorge to Lake Creek	7	15	19	49
Lake Cr to Met Spring	8	2	5	23

Cumulative Effects

The combined effects to Chinook salmon from Alternative 2 with other projects in the Metolius watershed would be beneficial. The largest current projects in the area include Metolius Basin Forest Management thinning project and the B&B Fire Recovery salvage sales but the effects from these projects are considered low. Most of the B&B salvage units have been harvested. Approximately four units remain uncut on Booth Timber Sale in the First Creek subwatershed. Metolius Basin thinning projects are approximately 1/3 completed. Both of these projects had little expected effects projected to occur to the Metolius River because of the riparian buffers, road maintenance/closures or minimal impact thinning techniques. The Roaring Creek culvert will be replaced in the next few years but the effects of that project will be short term and localized to Roaring Creek and Canyon Creek. There are no more salvage projects proposed at this time within the watershed and no other proposed projects are anticipated that could impact the river. A district wide hazard tree project has been proposed in the watershed but would not impact the river or wood recruitment to the river. Monitoring to date has shown this to be true.

Due to the flat ground in the Metolius Basin projects and the various project design criteria implemented on the B&B Fire Recovery units and haul routes, the sedimentation effects to the Metolius River from these projects is negligible. The Metolius Wood Restoration Project may disturb sediments in the river bed during implementation but no measurable amount of sediment will be added to the system from this project (See Hydrology Section).

The effect of increased habitat quality for chinook salmon will combine with fish passage efforts at Pelton Round Butte Dams and may make reintroduction of chinook salmon more successful at maintaining a sustainable population of salmon upstream of the dams. Increased pool habitat will increase smolt production and average smolt size and increase survival of chinook smolts. Other future projects that will restore chinook habitat quality in the range of Essential Fish Habitat above Pelton Round Butte Dams include Camp Polk

Meadow Restoration and Opal Springs Fish Passage. Combined with these other restoration projects, the Metolius River Wood Restoration project will have beneficial cumulative effect on chinook habitat above Pelton Round Butte dams.

The effects from this project and any past and foreseeable projects will not become a measurable cumulative effect that would negatively impact habitat quality of chinook salmon because the effects from disturbance and sediment are local and minor. The project may combine with other restoration efforts in the watershed and the upper Deschutes Basin to benefit chinook habitat in the next 5 to 10 years.

Alternative 3
Direct/Indirect Effects

Alternative 3 will be similar to Alternative 2 and may cause local short term turbidity and temporary disturbance of feeding juvenile Chinook while the project is operating in-stream. Juvenile Chinook will be present at the time of the implementation, and may be displaced temporarily. This disturbance is considered minor and will not lead to increased mortality. The number of affected individuals will be small and the area will be limited to the immediate vicinity of the project site being worked at one time (within 100-200ft). Adult fish would not be affected because they may not be released above the dams before the project is completed. Migration times will be avoided if they were released within the same years of the project.

Indirect effects of the project to habitat of Chinook salmon will be a short term localized disturbance of the substrate and river bank during the placement of wood. Generally, the substrate is not large enough in the Metolius for intergravel rearing of juvenile salmonids outside of the incubation period. Sediment runoff from the disturbed area is not expected to contribute to sedimentation because of the flat land selected for access to the sites and the rapid recovery of the disturbed area through active restoration and planting of native grasses and shrubs (see Hydrology section).

Chinook salmon spawning and incubation periods will be avoided by seasonal restrictions once adults are present. Other short term habitat effects include the disturbance of the bank in the immediate vicinity of log structures that are dug into the streambank. This loss of cover is minor (2ft by 10ft) at each site and will recover within one year as existing vegetation grows and the planted shrubs become established.

The long term benefits of the project to Chinook rearing habitat will be an increase of 50 to 100% more pool habitat and cover in the project reaches (Table 12). Reach 2 would result in the largest proportion of pool habitat under Alternative 2 (55%), but will not be treated under this Alternative and will remain below the desired pool habitat goals (40-60%) for good Chinook rearing habitat (34%).

The project will increase the large wood, pools, and cover and restore habitat for Chinook salmon upstream of Bridge 99. Habitat quality for Chinook juveniles will allow for better growth and survival for smolts. Capacity of the upper Metolius River to produce smolts and

sustain a population of Chinook salmon above the dams will greatly increase by as much as a third more than the existing conditions, (based on area of pool habitat increased, but without recovery of reach 2). Improved habitat would not occur on 1.6 miles of the river downstream of Bridge 99 and habitat recovery is expected to be slow in that reach. On the remaining reaches of the project, recovery of pool habitat is expected to be long term because placed wood is expected to remain in channel for decades due to the stable flow regime of the river and the stable designs being proposed.

Cumulative Effects

The combined effects of Alternative 3 with other projects in the watershed will be similar to that of Alternative 2. There will be short term sediment disturbance effects with this project but they will not contribute to cumulative effects because other projects in the basin are not expected to have measurable impacts to sediment. The Metolius Wood Restoration Project may disturb sediments in the river bed during implementation but no measurable amount of sediment will be added to the system from this project. The effects from this project and any past and foreseeable projects will not become a measurable cumulative effect that would impact the substrate quality for chinook salmon.

The effect of increased habitat quality for chinook salmon will combine with fish passage efforts at Pelton Round Butte Dams and may make reintroduction of chinook salmon more successful at maintaining a sustainable population of salmon upstream of the dams. This effect is similar to alternative 2 but in the reach below Bridge 99, where habitat will remain below optimum for Chinook pool habitat. Increased pool habitat upstream of Bridge 99 will increase smolt production and average smolt size and increase survival of chinook smolts. Other future projects that will restore chinook habitat quality in the range of Essential Fish Habitat above Pelton Round Butte Dams include Camp Polk Meadow Restoration and Opal Springs Fish Passage. Combined with these other restoration projects, the Metolius River Wood Restoration project will have beneficial cumulative effect on chinook habitat above Pelton Round Butte Dams.

The effects from this project and any past and foreseeable projects will not become a measurable cumulative effect that would negatively impact habitat quality of chinook salmon because the effects from disturbance and sediment are local and minor. The project may combine with other restoration efforts in the watershed and the upper Deschutes Basin to benefit chinook habitat in the next 5 to 10 years.

BULL TROUT - *Salvelinus confluentus*
ESA STATUS – THREATENED

Bull trout characteristically occupy high quality habitat, often in less disturbed portions of a drainage. Necessary key habitat features include high channel stability, spawning substrate with a very low percentage of fine sediment, abundant and complex habitat, deep pools, cold water temperatures, and no barriers inhibiting connectivity (Reiman and McIntyre 1993).

Bull trout require minimally embedded substrates for successful spawning and rearing. Input of fine sediment into spring-fed streams is serious because these systems lack flushing flows that are more common to other systems. Springs are also important in the maintenance of low water temperatures during summer. Average temperatures of approximately 7^{o} Celsius are common in occupied habitat. Healthy riparian vegetation along stream banks is important for maintaining the cold water required for bull trout. Robust populations of aquatic insects are critical for the survival of juveniles and maintaining a forage fish population for adult bull trout. Most adult bull trout migrate to smaller stream habitats to spawn and are susceptible to Effects if their migration routes are adversely affected by channel blockages, low water levels, and/or high water temperatures.

Resident bull trout are found in small, headwater streams and are thought to generally confine their migrations to and within their natal stream (Goetz 1989, Jakober 1992, Mullan et al. 1992). Fluvial populations generally migrate between smaller streams used for spawning and early juvenile rearing and larger rivers as adults (Shepard et al. 1984). Resident and fluvial (river dwelling) bull trout live together, but may be separate populations. Adfluvial (lake dwelling) bull trout populations generally reside in lakes or reservoirs as adults, but spawning and some juvenile rearing occurs in the tributary streams.

Bull trout spawn from August through November, when water temperatures drop between 5^{o} and 9^{o} Celsius. Embryo incubation period ranges from 100-145 days through the winter months (McPhail and Murray 1979; Pratt 1992). Bull trout alevins require at least 65-90 days after hatching to absorb their yolk sacs (Pratt 1992). The alevins may stay within the gravel, feeding and growing for an extended period after the yolk is absorbed (McPhail and Murray 1979). The extended stay within the gravel may be a strategy that allows the young bull trout to be larger and more likely to survive when they emerge (McPhail and Murray 1979).

Metolius Bull Trout Status and Distribution

The Metolius bull trout population continues to recover since listing in 1988, with redd counts peaking in 2004 at over 1,000 redds. Continued protection of the spawning population through restrictive angling regulations in the entire watershed has resulted in this recovery. Bull trout spawn in most perennial tributaries of the Metolius River. Recent surveys have found bull trout are expanding spawning habitat to include Spring Creek, and the Metolius River upstream of Lake Creek. Additional rearing only habitat includes Brush Creek, Abbot Creek and recently Lower Lake Creek.

The Metolius River bull trout population contains a mixture of both river dwelling (fluvial) and lake dwelling fish (adfluvial). Some resident fish may exist in the upper Jefferson Creek tributaries. All life strategies use tributaries to the Metolius River for spawning. Spawning occurs in spring-fed reaches of Jack Creek, Heising Spring, Canyon Creek, Roaring Creek, Candle Creek, Jefferson Creek and Whitewater River. Main stem river spawning has been documented in only a 0.5 mile reach of the upper Metolius River near the mouth of Jack Creek. Rearing habitat is known in all spawning streams plus Brush Creek, Spring Creek near Lake Creek, and the Metolius River. Abbot Creek is dominated by redband trout but an occasional bull trout is reported during annual surveys. Lake Billy Chinook (Round Butte

Dam) provides additional rearing habitat. Street and Spring Creeks, tributaries to the Metolius Arm of Lake Billy Chinook, are suspected to provide additional secondary rearing habitat for the Metolius bull trout population. Fish surveys of these two streams found only one juvenile in Street Creek but not in Spring Creek.

The Metolius River/Lake Billy Chinook bull trout is a sub-population of the Deschutes Recovery Unit and is healthy as stated by Ratliff and Howell (1992) and Buchanan et al. (1997). Trends in spawning population size have increased since 1986 from 27 redds to over 1000 redds by 2004. The increase is attributed to protection from harvest by more restrictive angling regulations (Riehle et al. 1997). The Metolius bull trout population is the only population with an allowable angler harvest in the state of Oregon. Oregon Department of Fish and Wildlife regulations allow one bull trout over 24 inches to be harvested daily on Lake Billy Chinook.

The known spawning areas in the Metolius River are confined to a ½ mile reach near the mouth of Jack Creek, where there is significant groundwater upwelling in the channel and from various springs along the riverbank. Spawning habitat has expanded with the increased numbers of adults in the system. Newly documented spawning areas have been found in Spring Creek and the Metolius upstream of Lake Creek. Juvenile bull trout have been found in Lower Lake Creek, near the springs. The Blue Lake/Link Creek/Suttle Lake bull trout group in the Metolius Basin has not been observed since 1961.

Bull trout habitat in the Metolius River drainage and Upper Deschutes below Steelhead Falls are generally in good condition. Water temperature in most spawning and rearing streams are below 10° C during spawning and rarely exceed 12° C during the peak of the summer. Juvenile habitat in the form of undercut banks, overhanging vegetation, aquatic vegetation and wood is abundant in many of the rearing streams tributary to the Metolius River. Wood density is high compared to other basins. Due to the stability of the streams, little wood is transported out during normal spring flows. Fine sediment in spawning areas is a concern and may have increased from past road construction and riparian logging. The low gradient, spring-fed reaches are particularly sensitive to fine sediment loading due to their low sediment transport rates. The percentage of fine sediment in spawning gravel monitored is moderate to low and has declined as a result of the 1996 flood (Houslet and Riehle 1998).

Metolius Bull Trout Critical Habitat

Responding to a court order, the U.S. Fish and Wildlife Service announced in September of 2005 that it had revised its designation of critical habitat for the bull trout under the Endangered Species Act in the Columbia and Klamath River basins of Oregon, Washington, and Idaho. Critical habitat was only designated on private lands. The Service also recognized conservation and management efforts by states, tribes and agencies.

Critical habitat refers to specific geographic areas that are essential for the conservation of a threatened or endangered species and which may require special management considerations. A designation does not set up a preserve or refuge and only applies to situations where

Federal funding, permits, or projects are involved. It does not affect citizens engaged in activities on private land that do not involve a federal agency.

In the Metolius Basin, critical habitat was designated near the mouth of Lake Creek, Abbot Creek, Heising Spring and along the Metolius River on a ½ mile reach between Wizard Falls and Bridge 99. The Heising Spring area, including Jack Creek and the Metolius River is an important spawning habitat for bull trout. The Metolius River reach downstream of Wizard Falls has good island and side channel habitat for rearing bull trout but no spawning has been documented in that segment.

Effects to Bull Trout

Alternative 1 – No Action
There will be no effects to bull trout under no action because no work will be done in-stream. Bull trout adults hold in pools in winter and during spawning migrations. The upper Metolius reaches have bull trout rearing and some limited spawning. These reaches will continue to have limited rearing and holding areas. Recovery of pool habitat and in-stream cover for bull trout in the upper reaches will be slow under the no action Alternative.

Alternatives 2 and 3
Direct/Indirect Effects

The effects of Alternative 2 and 3 are similar and may cause local short term turbidity and temporary disturbance of feeding juvenile bull trout while the project is operating in-stream. Juvenile bull trout will be present at the time of the implementation, and may be displaced temporarily. This disturbance is considered minor and will not lead to increased mortality. The number of affected individuals will be small and the area will be limited to the immediate vicinity of the project site being worked at one time (within 100-200ft). Adult fish would not be affected because they may not present in the shallow, fast water which is targeted for placement of in-stream wood. Migration times can be avoided with seasonal restrictions.

Indirect effects to bull trout of the project to habitat of bull trout will be a short term localized disturbance of the substrate and river bank during the placement of wood. Generally, the substrate is not large enough in the Metolius for intergravel rearing of juvenile salmonids outside of the incubation period. Sediment runoff from the disturbed area is not expected to contribute to sedimentation because of the flat land selected for access to the sites and the rapid recovery of the disturbed area through active restoration and planting of native grasses and shrubs (see Hydrology section).

Bull trout spawning and incubation periods will be avoided by seasonal restrictions. Other short term habitat effects include the disturbance of the bank in the immediate vicinity of log structures that are dug into the streambank. This loss of cover is minor (1ft by 10ft) at each site and will recover within one year as existing vegetation grows and the planted shrubs become established.

The long term benefits of the project to bull trout rearing habitat will be an increase of 18 to 30% more pool habitat and cover in the project reaches (Table 12). Reach 2 had the largest proportion of pool habitat under Alternative 2 (55%) and will not be treated under Alternative 3 and will remain below the desired pool habitat goals in Alternative 3.

The project will increase the large wood, pools, and cover and restore habitat for bull trout in the project area of both alternatives. Habitat quality for bull trout juveniles will allow for better growth and survival. Under Alternative 3, habitat would not recover in the near term on 1.6 miles of the river downstream of Bridge 99 and habitat recovery is expected to be slow. On the remaining reaches of the project, recovery of pool habitat is expected to be long term because placed wood is expected to remain in channel for decades due to the stable flow regime of the river and the stable designs being proposed.

Cumulative Effects

The combined effects of Alternative 2 and 3 with other projects in the watershed will not contribute to negative cumulative effects. The Metolius River itself comprises rearing habitat within the entire project length and represents about one fifth of the rearing habitat in the watershed. Spawning habitat in the Metolius River is approximately 3 miles, approximately one eighth of that in the watershed. One mile of spawning habitat that receives 80 percent of the spawning that occurs in the Metolius River proper, is on private land, and will not be affected by this project.

The largest current projects in the area include Metolius Basin Forest Management thinning project and the B&B Fire Recovery salvage sales but these projects will not have a combined negative effect for substrate quality in bull trout habitat because of riparian buffers, road maintenance and minimal impact thinning techniques.. Roaring Creek culvert will be replaced in the next few years but the effects of that project will be short term and localized to Roaring Creek and Canyon Creek. There are no more salvage projects proposed at this time and no other proposed projects are anticipated that could impact the river. Most of the B&B salvage units have been logged and hauled and Metolius Basin thinning projects are approximately 1/3 completed. Both of these projects had little expected effects projected to occur to the Metolius River. Monitoring to date has shown this to be true. Due to the flat ground in the Metolius Basin projects and the various project design criteria implemented on the B&B Fire Recovery units and haul routes, the sedimentation effects to the Metolius River from these projects is negligible. The Metolius Wood Restoration Project may disturb sediments in the river bed during implementation but no measurable amount of sediment will be added to the system from this project. The effects from this project and any past and foreseeable projects will not become a measurable cumulative effect that would impact substrate quality for bull trout.

The addition of logs combined with other habitat restoration in bull trout habitat will combine to improve bull trout habitat in the watershed. Hazard tree placements in the river will add to a small degree to habitat for bull trout and combine with the Metolius River Wood Restoration Project to restore cover and pool habitat in the Upper Metolius River. This effect will last decades as long as the wood remains in the river. Fish passage at Round

Butte Dam will expand the range of bull trout into the lower Deschutes River and may combine with the habitat restoration to help the population to be more resilient to changes in habitat quality and forage availability.

The Metolius Wood Restoration Project will not combine with other projects in the watershed to have negative cumulative effects to bull trout habitat because the effects to sediment are short term and site specific and will not add measurable amounts of sediment inputs. The may be some combined beneficial cumulative effects from hazard tree placement and fish passage restoration in the Metolius and on the Deschutes River downstream. These effects are expected to be long term as long as wood is retained in the system and the fish passage program is operational.

MID-COLUMBIA ESU STEELHEAD TROUT – *Oncorhynchus mykyss*
ESA STATUS – THREATENED

All steelhead in the Columbia River Basin upstream from The Dalles Dam are summer-run steelhead (Schreck et al. 1986, Reisenbichler et al. 1992, and Chapman et al. 1994). Life history information for steelhead of this Ecologically Significant Unit (ESU) indicates that most Middle Columbia River steelhead smolts at 2 years and spend 1 to 2 years in salt water prior to re-entering fresh water, where they remain up to 1 year prior to spawning (Howell et al. 1985).

Summer steelhead occur throughout the main stem lower Deschutes River below Pelton Reregulating Dam (RM 100) and in most tributaries below the dam. Before construction of the Pelton Round Butte hydroelectric complex, summer steelhead were also found in the Deschutes River upstream to Big Falls (RM 128), in Whychus Creek, and in the Crooked River (Nehlsen 1995). Historic summer steelhead presence in the Metolius River is uncertain (Nehlsen 1995).

Construction of Pelton and Round Butte dams, completed in 1958 and 1964, respectively, included upstream passage facilities for adult chinook salmon and steelhead and downstream facilities for migrating juveniles. By the late 1960's, it became apparent that the upriver runs could not be sustained naturally with these facilities, due primarily to inadequate downstream passage of juveniles through the complex, and summer steelhead production upstream of the dam complex was lost.

Spawning in the lower Deschutes River and westside tributaries usually begins in March and continues through June. Spawning in eastside tributaries occurs from January through mid-April, and may have evolved to an earlier time than westside tributaries or the main stem because stream flow tends to decrease earlier in the more arid eastside streams (Olsen et al. 1993).

Fry emerge in spring or early summer depending on time of spawning and water temperature during incubation. Zimmerman and Reeves (1996) documented summer steelhead

emergence in late May through June. Juvenile steelhead emigrate from the tributaries in spring at age 0 to age 3. Many of the juveniles that migrate from the tributaries continue to rear in the main stem lower Deschutes River before smolting.

The Pelton Round Butte hydroelectric complex at RM 100 is currently a complete upstream passage barrier to anadromous and resident fish and does not have functional downstream juvenile passage. Although much historic summer steelhead habitat and production in the Crooked River has been lost due to dams on that river, historic and current production potential in the main stem Deschutes River below Steelhead Falls, Whychus Creek, and the Metolius River has been lost because of the Pelton Round Butte hydroelectric complex (Nehlsen 1995). Renewed fish passage at Pelton Round Butte Dams will open habitats in these watersheds to steelhead trout production starting in 2009. Whychus Creek was perhaps 60% of the steelhead production in the upper watershed before Round Butte Dam was constructed (Nehlsen 1995).

Effects to Steelhead Trout

Alternative 1 – No Action
There will be no effect to steelhead trout since no management actions would take place. . No in-stream work will be done and the habitat in the Metolius River is not historic habitat for steelhead trout.

Alternatives 2 and 3
Direct and Indirect Effects
The proposed in-stream work is not likely to impact steelhead trout because the Metolius River is not historic habitat for the species. Fry and smolts will not be outplanted into the Metolius River and adults will not likely be released above the dams prior to the completion of this project. Once adults are released above the dams, there is a chance that adults could naturally stay into the Metolius River. Seasonal restrictions that are to protect redband trout will most likely protect migrating steelhead adults. It is unlikely that steelhead will spawn in the Metolius River but strays may spawn in warmer tributaries like Lake Creek and Abbot Creek. In that event, juvenile steelhead may rear in these tributaries and in the Metolius River.

In the unlikely event that steelhead would be present during implementation of this project, individuals could be disturbed by the in-stream work. The effect is not significant and will be short term.

Short term disturbance of the streambed may occur but it is limited in the size of the area disturbed and will be short term while the work is performed. Habitat for juvenile steelhead might be improved in the long-term, especially in the upper river were shallow water depth limits redband trout use.

Cumulative Effects

The combined effects of Alternative 2 and 3 with other projects in the watershed on steelhead trout habitat quality is negligible. The largest current projects in the area include Metolius Basin Forest Management thinning project and the B&B Fire Recovery salvage sales. Roaring Creek culvert will be replaced in the next few years but the effects of that project will be short term and localized to Roaring Creek. There are no more salvage projects proposed at this time and no other proposed projects are anticipated that could impact the river. Due to the flat ground in the Metolius Basin projects and the various project design criteria implemented on the B&B Fire Recovery units and haul routes, the sedimentation effects to the Metolius River from these projects is negligible. The Metolius Wood Restoration Project may disturb sediments in the river bed during implementation but no measurable amount of sediment will be added to the system from this project. The effects from this project and any past and foreseeable projects will not become a measurable cumulative effect that would impact habitat quality of steelhead trout.

Steelhead trout use of the Metolius watershed is expected to be incidental since they were not historically found there. Lake Creek or Abbot Creek are potential habitat but there are no reports that steelhead trout used these streams historically. In the event that stray steelhead trout enter the Metolius River, there may be a small change of disturbance of individuals but this risk will not combine with that of other activities to have a negative cumulative effect on steelhead trout. No other projects other than hazard tree placement could disturb steelhead trout and seasonal restriction will protect any incidental spawning that might occur.

There are no expected negative cumulative effects from the Metolius River Wood Restoration Project because no other projects will contribute measurable amounts of sediment and this project will only have small site specific disturbance to the substrate and will not add fine sediment to the river. No cumulative disturbance effects are expected because of the lack of use of the Metolius River and the seasonally restrictions used to protect spawning redband trout.

INTERIOR COLUMBIA BASIN REDBAND TROUT- *Oncorhynchus mykyss*
ESA STATUS – Forest Service Region 6 Sensitive Species

Redband trout (*Oncorhynchus mykiss gairdneri*) are found in Lake Creek, Link Creek, Canyon Creek, First Creek, Abbot Creek, Suttle Lake and the Metolius River. The Metolius River population has been increasing in recent years and the adult spawning population has more than tripled in the last five years. The cause of the increase is unknown, but may be the result of recovery after drought, lack of hatchery fish and/or increased large wood in the upper river (Mike Riehle, Sisters R.D. Fisheries Biologist, personal communication). Lake Creek is a spawning stream for redband trout although the spawning timing is slightly later than for the Metolius River. Hatchery rainbow trout from Wizard Falls Trout Hatchery were stocked in the Metolius River until 1995 when the program was discontinued to protect wild fish.

Numbers of adult spawning fish have increased since 1995 by three fold in the upper river and has stabilized in recent years (USFS/ODFW data on file). Spawning occurs generally from December through June, but every month has some spawning occurring. Over 80% of the spawning of redband trout occurs upstream of Camp Sherman, with increasing density moving upstream to the springs.

Effects to Redband Trout

Alternative 1 – No Action

There are no expected changes to redband trout from current conditions. No in-stream work will be done and no individuals will be disturbed. Redband trout habitat will recover slowly in the Metolius River, especially in the upper two reaches of the Metolius River, from natural recruitment without the historic log jams to retain wood. Water depth is limiting adult holding habitat for redband trout in the current condition. Natural recovery of in-stream wood and pools is slow and is not within the historic range of habitat conditions for redband trout based on the Watershed Analysis.

Alternatives 2 and 3

Direct/Indirect Effects

Individuals may be disturbed by the in-stream work. The effect is not significant because of the limited scale of the disturbance and short term duration. Seasonal restrictions that are designed to protect redband trout spawning will most likely protect migrating adults and redds.

Short term disturbance of the streambed may occur but is limited size and is short term while the work is performed. The disturbance to the river bed will be greatest in the primary spawning area of Riverside Campground, where equipment use in the river is proposed for wood placement. Seasonal restrictions will protect active spawning and incubating fish but some temporary disturbance to the gravel will occur outside of spawning seasons. The productivity of this reach is high and the effects of this disturbance on trout food and algae production will be short term (several weeks to a couple of months and magnitude of impact to fish growth is considered to negligible).

Habitat for redband trout would be improved in the long term, especially in the upper river where shallow water depth limits redband trout use. Long term recovery of pool habitat for adult redband trout will be slow in reach 2 under Alternative 3. With no wood added under this Alternative, redband trout habitat will not recover as rapidly in this reach. This reach is a stronghold for redband trout because of its proximity to the mouth of Abbot Creek, a significant spawning stream for redband trout in the Metolius watershed.

Cumulative Effects

The combined effects of Alternative 2 and 3 with other projects in the watershed are beneficial. Due to the flat ground in the Metolius Basin projects and the various project design criteria implemented on the B&B Fire Recovery units and haul routes, the sedimentation effects to the Metolius River from these projects is negligible. Other projects

in the Metolius watershed will not combine to increase fine sediment and combine with this project because this project with not increase fine sediment to the river. The disturbance of the streambed in the Riverside area will occur outside of spawning and incubation and will not combine with other projects to result in any cumulative effects on the spawning habitat. Some disturbance of individuals will occur but the effects will be minor, short term (hours) and site specific. Other projects will not contribute to this disturbance to become a negative cumulative effect due to their limited scale.

The Metolius Wood Restoration Project may disturb sediments in the river bed during implementation but no measurable amount of sediment will be added to the system from this project. The effects from this project and any past and foreseeable projects will not become a measurable negative cumulative effect but would be a beneficial impact to habitat quality of redband trout in the long term.

SOCKEYE SALMON/KOKANEE SALMON- *Oncorhynchus nerka*

Kokanee salmon are native to the Suttle Lake and Link Creek system. After Round Butte Dam was constructed and filled in 1964, a kokanee population became established in Lake Billy Chinook. That population now spawns in the Metolius River and the lower reaches of the tributaries. It is estimated that the population of kokanee that now spawns in the Metolius River is derived from the native stock from Suttle Lake, although several sockeye and kokanee strains were introduced to Lake Billy Chinook and the upper Deschutes reservoirs draining into Lake Billy Chinook. Populations of kokanee in Suttle Lake can become numerous at times and results in small sized fish. Populations of kokanee salmon in Lake Billy Chinook are considered at a low cycle currently based on population estimates of spawners and rearing fish in the reservoir. Spawning occurs throughout the Metolius River in September through October.

Historically sockeye salmon were native to Suttle Lake and spawned in Link Creek. The population was considered extinct as early as the 1940's as a result of migration barriers and over fishing. Several hatchery programs in the Metolius watershed for sockeye maintained hatchery origin fish in the system into the 1950s. Today, a few sockeye return to the Deschutes River downstream of Pelton Round Butte Dams. The origin of these fish may be from strays from upper Columbia basin populations from Wenatchee or Osyous Lakes. A small percentage (8%) of the returning sockeye salmon may be of kokanee maternal origin (Zimmerman and Reeves 1999). The fish passage program at Pelton Round Butte Dams will first use the outmigrating kokanee smolts to establish a run upstream of the dams and in the Metolius River. Returning sockeye salmon may be passed above the dams and spawn in the Metolius River if successful.

Effects to Sockeye/Kokanee Salmon

Alternative 1 – No Action

There are no changes to sockeye/kokanee salmon expected from Alternative 1. No in-stream work will be done and no individuals will be disturbed. Sockeye/kokanee salmon habitat will not change and existing rates of wood recruitment will be slow and not expected to change spawning habitat area that would impact fish in the next few decades. Water depth is limiting spawning habitat area and there is no expected change to this condition under no action.

Alternatives 2 and 3
Direct/Indirect Effects
Seasonal restrictions that are to protect sockeye/kokanee salmon spawning and incubation will most likely protect migrating adults and redds from disturbance in the Metolius River.

Short term disturbance of the streambed may occur but it is limited in the size of the area disturbed and will be short term while the work is performed. The disturbance to the river bed will be the most in the spawning area of Riverside Campground, where equipment use in the river is proposed for wood placement. Seasonal restrictions will protect active spawning and incubating fish but some temporary disturbance to the gravel will occur outside of spawning seasons. The productivity of this reach is high and the effects of this disturbance on spawning habitat quality will be short term (weeks to a couple of months) and not impact fish growth measurably because of the limited area impacted. No additional sediment will be added to the river and the area of available spawning habitat will not be diminished. Increased water depth may improve spawning habitat in this reach to some small degree for the larger sockeye salmon that may eventually spawn in this reach.

Habitat for sockeye/kokanee salmon might be improved in the long-term, especially in the upper river were shallow water depth limits sockeye/kokanee salmon use. Long term recovery of pool habitat for adult sockeye salmon will be slower in reach 2 under Alternative 3. With no wood added in reach 2 under this Alternative, sockeye holding habitat, pools, will not increase. Increasing holding habitat for sockeye salmon is not a target of this project nor is it considered limiting for sockeye salmon.

Cumulative Effects
The combined effects of Alternative 2 and 3 with other projects in the watershed on kokanee and sockeye salmon habitat is beneficial. Habitat for spawning sockeye/kokanee is abundant in the Metolius River and tributaries and supports tens of thousands of spawning kokanee. The project would add wood to spawning reaches during non-spawning seasons and spawning would not be interrupted by this or other past, current or future projects proposed in the watershed. Spawning habitat would be protected and the effects for this project and others in the watershed are not expected to combine in measurable changes to spawning habitat quality. Due to the flat ground in the Metolius Basin projects and the various project design criteria implemented on the B&B Fire Recovery units and haul routes, the sedimentation effects to the Metolius River from these projects is negligible. The Metolius Wood Restoration Project may disturb sediments in the river bed during implementation but no measurable amount of sediment will be added to the system from this project.

Spawning fish will not be disturbed because work on this project and the hazard tree placements will avoid spawning seasons. No cumulative effects from disturbance of fish are expected.

Spawning gravel will be protected and the area of suitable spawning habitat for sockeye may be increased by increasing water depth with this project and the hazard tree placements. The hazard tree placements are few result in slow recovery of wood but will add a minor amount of improved spawning habitat for sockeye salmon over the coming decades.

The effects from this project and any past and foreseeable projects will not become a measurable cumulative effect to sediment, spawning habitat or disturbance that would negatively impact habitat quality of sockeye/kokanee salmon. There may be a slight positive beneficial cumulative effect from increase spawning habitat quality in the long term when combined with the hazard tree placement in the Metolius River over the next few decades.

Sensitive Plants and Invasive Plants

Indicator: Number of sites with protection measures implemented for Pecks penstemon and Agoseris elata sites.

Indicator: Number of sites with prevention measures to prevent the spread of invasive plants.

Threatened, Endangered and Sensitive Plant Species

Affected Environment

A pre-field review found that known occurrences and potential habitat for several sensitive plant species occurred in the project area. These included: Tall Agoseris (*Agoseris elata)* and Peck's penstemon *(Penstemon peckii).* Surveys of the river corridor were completed in the summer of 2006. Table 13 summarizes the populations found within or adjacent to the project area.

Alternative 1 – No Action

Under the Alternative 1, the major change to sensitive plant habitat will be the ecological trend of habitat loss caused by fire suppression and succession. The expansion of invasive plants or noxious weed populations will also continue to reduce sensitive plant habitats unless controlled.

Table 13 Sensitive plant populations found within or adjacent to the project area.

TES_NO	Species	Location
0500053	Peck's penstemon	SMILING RIVER
0500054	Peck's penstemon	RIVERSIDE
0500057	Peck's penstemon	ADJ TO RIVERSIDE
0500082	Peck's penstemon	METOLIUS REHAB
0500084	Peck's penstemon	ALLEN SPRING CG
0500121	Peck's penstemon	CAMP SHERMAN
0500126	Peck's penstemon	DAVIS CREEK EAST
0500163	Peck's penstemon	SOUTH OF ALLINGHAM
0500164	Peck's penstemon	PIONEER FORD
0500111	Tall Agoseris	METOLIUS BEND
0500115	Tall Agoseris	ALLINGHAM MEADOWS
0500165	Tall Agoseris	WEST OF SMILING RIVER
0500166	Tall Agoseris	NORTH OF ALLEN SPRINGS
0500167	Tall Agoseris	1217-825 LOOP
0500168	Tall Agoseris	TRACT C BRIDGE
0500169	Tall Agoseris	RIVERSIDE
0500170	Tall Agoseris	PIONEER FORD
0500171	Tall Agoseris	FISH HATCHERY

Alternative 2 and 3

Direct and Indirect Effects

Project surveys found very few Peck's penstemon or Tall Agoseris plants located in streamside areas which will be disturbed by log installation. These areas are not generally habitat for either plant because they are too wet. However, populations exist nearby or in upland areas that may serve as entry points for equipment.

The direct effect of the project to Peck's penstemon or Tall Agoseris plants could come from crushing or uprooting plants with vehicles used to transport wood to the river. Alternative 3 has a slightly lower risk of impacting plants than Alternative 2 because 35 fewer sites are used and fewer acres are affected. This effect can be mitigated by avoiding concentrations of plants during transport, not staging equipment in areas with concentrations of plants, using existing roads and skid trails, and minimizing soil impacts. Both plants are tolerant of light disturbance and are likely to recolonize disturbed areas.

An indirect effect of the project could be introduction of noxious weeds such as spotted or diffuse knapweed into TES habitats. Disturbed areas could be colonized by noxious weed seeds introduced on equipment. Alternative 3 has a slightly lower risk of disturbing ground and introducing noxious weeds than Alternative 2 because 35 fewer sites are used and fewer acres are affected. This effect will be mitigated by project design features requiring all

equipment and vehicles used in the project to be clean of dirt and seeds, avoiding staging in known sensitive plant or invasive plant populations, minimizing soil disturbance, and revegetating areas if necessary with native plants.

Cumulative Effects

The boundary for the cumulative effects (zone of influence) considered for this analysis is the Metolius River corridor, approximately concurrent with the Wild and Scenic River Boundary (generally ½ mile from the river). The time period considered for the analysis is from the 1980's when information first became more available on these plants to approximately 10 years in the future.

Cumulatively, Peck's penstemon and Tall Agoseris have been most affected in the Metolius River corridor by ecological trends of plant succession due to fire suppression which have reduced availability and quality of habitat for these fire stimulated plant species. Both species are believed to benefit from frequent fire equivalent to the historic frequencies of every 0-35 years in the Metolius River area. Monitoring of populations outside the project area such as the Glaze Meadow Pecks penstemon population have shown numbers of plants and flowering rates decline only 14 years after prescribed fire was used in a habitat area (Pajutee, 2006). Conversely, observations of recently burned populations show Peck's penstemon and Tall Agoseris respond well to both wildfires and prescribed fires, often increasing greatly in size by producing multiple stems, and plants are often larger in burned area from increased available moisture and nutrient release. Increased sun may also stimulate flowering and pollinators have been seen to be prolific in burned, densely flowering populations. Both plants recover quickly from fire, sprouting within weeks (USDA Forest Service Metolius Watershed Analysis Update 2004). Because areas adjacent to the Metolius River have experienced little reintroduction of fire and habitats for both species are certainly in decline.

Other management related impacts with the time period considered include: loss of both species of plants due to ground disturbance, septic installations, lawn improvements, and the increase of invasive plants or noxious weeds in localized high use areas such as recreation residence/summer homes and campgrounds. Management of recreational facilities including trail reroutes and obliteration of excess trails, campsite rehabilitation, ongoing weed control, and road closures have conversely improved habitat conditions in other areas.

It is not anticipated that these cumulative effects will overlap with project effects to exceed guidelines of the Species Conservation Strategy for Peck's penstemon the zone of influence for this analysis (the Metolius River Corridor) or cause a trend to federal listing. Tall Agoseris does not have a Conservation Strategy but using similar protective guidelines it is also not anticipated that these cumulative effects will overlap with project effects to cause a trend to federal listing. This is because with project mitigation very few plants of either species will be harmed, and ongoing efforts such as reintroduction of fire, restoration of recreation residence/summer homes lots to more native habitats, campground management, and ongoing weed control will provide improved habitat conditions.

If mitigation measures are followed the direct, indirect, and cumulative effects of this project to TES plants are within acceptable limits outlined by conservation strategy. The proposed

project may impact individual Peck's penstemon or Tall Agoseris plants but will not contribute to a trend towards federal listing or loss of viability to the overall populations or species.

Effects to Survey & Manage Plant Species

A prefield review found that potential habitat for several Survey and Manage plant species occurred in the project area. These included: *Leptogium cyanescens* (Category A lichen), *Schistostega pennata* (Category A moss), *Marsupella emarginata v. aquatica (*Category B Liverwort, Equivalent Effort Surveys required), *Tritomaria exsectiformis* (Category B Liverwort, Equivalent Effort Surveys required) and *Cypripediium montanum* (Category C Vascular Plant). Surveys were completed in the summer of 2006.

Alternative 1 – No Action
No Survey and Manage species or their habitats were found within the project area therefore, the no action alternative will have no effect on Survey and Manage species.

All action Alternatives
Direct, Indirect and Cumulative Effects
No Survey and Manage species or their habitats were found within the project area therefore, the Metolius River Wood Restoration Project will have no direct, indirect or cumulative effect on Survey and Manage species.

Effects to Invasive Plants (Noxious Weeds)

The project area including the entire river corridor from Riverside Campground to Candle Creek was surveyed for noxious weeds in the summer of 2006.

Populations of noxious weeds, including diffuse and spotted knapweed, Dalmation Toadflax and St. Johns Wort are known to occur adjacent to the project area along major roads, particularly Road 14. The effects of the project on these weeds and the Project Design Features discussed above. Using mitigation it is not anticipated that the project will spread or introduce invasive plants in upland streamside areas.

Of greater concern is the effect of the project in creating habitat for invasive aquatic/riparian plants, particularly Ribbongrass. Ribbongrass is an invasive ornamental grass, believed to have been introduced by homeowners along the Metolius summer homes over 50 years ago. Surveys found the Metolius River to have 246 polygons (or discreet infestation sites) of Ribbongrass (*Phalaris arundinacea var. picta*), a subspecies of Reed Canary Grass. Some areas include small infestations of Reed canary grass as well. The total area infested by Ribbongrass is about 1 acre.

A recognized unique ecological feature of the Metolius River is it's riparian wildflower islands which form due to stable stream flows allowing seeds to accumulate and grow on

instream wood (USDA Forest Service 1996 Metolius Wild and Scenic River FEIS). These islands provide wildlife habitats and support a diversity of plants and are one of the identified "Outstandingly Remarkable" ecological values of the Metolius.

Ribbongrass has been increasing in abundance and in some areas it has completely replaced native vegetation on these river islands and streambanks banks. The plant also colonizes wood which falls into the river, so new in-stream wood placed by this project is likely to serve as new habitats for both native riparian plants and Ribbongrass invasion.

Alternative 1 – No Action
Under the no action alternative the major change to invasive species will be the continued expansion of invasive plant populations unless they are controlled.

Alternative 2 and 3
Direct and Indirect Effects
Ribbongrass colonizes wood which falls into the river, so new in-stream wood placed by this project is likely to serve as new habitats for both native riparian plants and Ribbongrass invasion. The direct effect of the project will be to increase potential habitat for Ribbongrass colonization. An indirect effect is that eventually more seeds may be produced and spread in the river system and increase the severity of the infestation in the Metolius.

The direct and indirect effects of this potential increased habitat and future spread would be highest in Alternative 2 since the most log structures would be introduced, less for Alternative 3 where fewer log structures would be placed and least for Alternative 1 where in falling logs would be occasional natural in-falls or hazard trees dropped in the river.

Several project design features will help reduce this effect. Monitoring wood installations for 5 years after the project and removing any Ribbongrass plants that colonize logs is required. After 5 years, the results of the monitoring will be evaluated and removal will be continued if needed. Natural recolonization of the trees by native plants as they become riparian wildflower islands will also reduce habitat for Ribbongrass.

Cumulative Effects
The boundary for the cumulative effects (zone of influence) considered for this analysis is the Metolius River Corridor, approximately concurrent with the Wild and Scenic River Boundary (generally ½ mile from the river). The time period considered for the analysis is

from the 1930's when river managers began removing in-stream wood and developments began introducing aquatic invasive plants to approximately 10 years in the future.

In the 1930's logs were removed from the river which meant a loss of important riparian island habitats. This practice continued at some level until the 1980's when the role of in-stream wood was recognized and removal efforts slowed and reintroduction of wood began. Concomitant with the decrease and eventual recovery of in-stream wood was the increase of new habitat for riparian plants including Ribbongrass. Ribbongrass was first detected in the river in the 1990's when organized surveys began but has visibly increased in the past 5 years. Public concern about the species has led to demonstration projects for its removal on private land in the past year and some public support for an integrated management approach, including herbicides and manual removal.

This project will cumulatively increase colonizable habitat for Ribbongrass along with future hazard trees which are felled into the river and natural in-falls. Assuming an average of 5-10 natural in-falls per year and another 5 hazard tree in-falls, approximately 15 trees per year fall in the river under Alternative 1. The project will greatly increase the number of trees in the river. Sixty five times more trees will be put in the river under alternative 2 than under no action and fifty times more under Alternative 3. This means more potential colonizable habitat for Ribbongrass.

However, under either alternative, more trees will be added to the river below Wizard falls and much of the length of these trees will be submerged in the deeper river and inaccessible for colonization. Little Ribbongrass is currently found in this section probably due the faster, deeper water scours logs and provides less suitable Ribbongrass sites.

A future foreseeable project is the Deschutes/Ochoco National Forests Invasive Plant EIS which will address an integrated strategy of control efforts to reduce Ribbongrass in the Metolius and its implementation will overall reduce the seed available to colonize wood installations.

Therefore, with required mitigation and monitoring the project complies with Regional and Forest level Invasive Plant Prevention Practices.

Cultural Resources

Indicator: Protection of 12 known sites and with monitoring of project activity in the vicinity of these sites.

Affected Environment

Between 1984 and 2004, 12 projects been inventoried the current project analysis area for cultural resources. These previous surveys covered all areas of potential effect in the project analysis area.

Through these past surveys, 12 heritage sites has been located and recorded in the current project area (Table 14). Sites are defined by having 10 or more artifacts or the presence of features such as a cave, rock art, fire pit remains, structure, etc. Isolates are defined as not having any features and locating less than 10 artifacts. The sites consist of nine prehistoric sites and three sites with both historic and prehistoric components. Four of these sites have been evaluated as significant and eligible for inclusion on the National Register of Historic Places. The other eight sites remain unevaluated for National Register eligibility.

The site evaluations were completed by applying the criteria for eligibility in 36 CFR 60.4. For prehistoric sites, information potential was determined by assessing research value or potential as addressed in research topics presented in the Deschutes County Prehistoric Context Statement (Houser, 1996) and Management Strategy for Treatment of Lithic Scatter Sites (Keyser et al, 1988).

No areas of specific tribal interest resources are identified in the project area. No significant populations of tribal use plants or locations of tribal traditional use are known. The Warm Springs, Paiute, and Wasco Tribes from The Confederated Tribes of the Warm Springs Reservation of Oregon are the known tribes with historic associations to this area. In past discussions, the tribes of the Warm Springs Reservation have expressed strong interest in the water quality of the Metolius River as well as the quality of the fish habitat in the river. The project area is within lands ceded to the Federal Government by The Confederated Tribes of the Warm Springs Reservation of Oregon under treaty in 1855 and ratified by Congress in 1859.

Table 14 – Resources in the project analysis area.

Site Number	Historic (H) or Prehistoric (P)	Eligibility
0601050036SI	P/H	Elgible
0601050065SI	P	Unknown
0601050067SI	P/H	Eligible
0601050088SI	P/H	Eligible
0601050145SI	P	Unknown
0601050191Si	P	Unknown
0601050456SI	P	Unknown
0601050500SI	P	Unknown
0601050590SI	P	Eligible
0601050603SI	P	Unknown
0601050650SI	P	Unknown
0601050665SI	P	Unknown

Alternative 1

Under the no action alternative, the 12 eligible and unevaluated sites will not be impacted and will remain unchanged in their condition. No change will occur to heritage resources.

Alternative 2 and 3
Direct and Indirect Effects
The 12 sites present are all significant or unevaluated and require protective measures. Potential effects to these sites consists of skidding through site areas and changing the artifact distribution due to 90 feet of trenching to install trees in the streambank for in stream structures and the related impact from backhoe operations in the site area. Project design criteria or mitigation measures would avoid effects to these sites. If not, data recovery will need to be developed in consultation with the Oregon State Historic Preservation Office (SHPO) and the Confederated Tribes of the Warm Springs Agency of Oregon.

Cumulative Effects

Many effects have occurred to the sites in this project area through the years. Past effects range from insect and small mammal burrows, tree falls, fires, road building, buried utilities, and building construction. If disturbance to sites are not avoided, this project could add to the site disturbance that has occurred in the past. It is unlikely that the amount of impact would change the overall eligibility of any of the sites present but there is a small potential since the sites have all had limited or no testing in them previously, and little is known about the subsurface artifact distribution of the sites, and no intact features have been documented other than one biface cache in one of the sites.

There is a low risk of cumulative effects of disturbance to the known sites because of protection measures provided for in the Project Design Features, known sites will be avoided for digging in key logs, and minimizing activity is site areas and monitor for any changed site conditions.

Wildlife

Indicator: Protection of known eagle, osprey, owl and rare mollusk sites

Occurrence of Listed Wildlife Species

Those species thought to occur presently or historically on the Deschutes National Forest and analyzed in this document include the Canada Lynx (*Lynx canadensis*), the northern spotted owl (*Strix occidentalis*), Oregon spotted frog (*Rana pretiosa*), and the western sage grouse (*Centrocercus urophasianus phaeios*) (Table 15).

Table 15. Threatened and Endangered Species though to occur on the Deschutes N.F.

Species	Status	Habitat	Presence
Birds			
Northern Spotted Owl	Federal Threatened, Management Indicator Species	Old Growth Mixed Conifer Forests	Habitat Present
Western Sage Grouse	Federal Candidate, Regional Forester Sensitive	Sagebrush Flats	No habitat
Mammals			
Canada Lynx	Federal Threatened	Subalpine fir with Lodgepole pine	No Habitat
Amphibians			
Oregon Spotted Frog (*Rana pretiosa*)	Federal Candidate, Regional Forester Sensitive	Stream, Marsh	No Habitat

Species classified as sensitive by the Forest Service are to be considered through the National Environmental Policy Act process by conducting biological evaluations (BE) to determine potential effects of all programs and activities on these species (FSM 2670.32). The BE is a documented review of Forest Service activities in sufficient detail to determine how a proposed action may affect sensitive wildlife species, and to comply with the requirements of the Endangered Species Act. If the determination concluded that no habitat exists in the project area for a particular species, no further analysis is required. The rationale for these determinations is presented in the Wildlife Biological Evaluation in the project file.

The Regional Forester's Sensitive Species List was updated in July of 2004 to include species for which population viability was a concern. Species that are identified to occur or potentially occur on the Deschutes National Forest are located in Table 16. After a review of records, habitat requirements, and existing habitat components, it was determined that the following sensitive animal species have potential habitat in the project area and will be included in this analysis: 1) Harlequin Duck (*Histrionicus histrionicus*), 2) Crater Lake Tightcoil (*Pristiloma articum crateris*).

Table 16. Sensitive Species Summary.

Species	Status	Habitat	Presence
Birds			
Northern Bald Eagle	Regional Forester Sensitive, Management Indicator Species	Lakeside with Large Trees	Documented
American Peregrine Falcon (*Falco peregrinus anatum*)	Regional Forester Sensitive, MIS	Riparian, Cliffs	No habitat
Bufflehead (*Bucephala albeola*)	Regional Forester Sensitive	Lakes, Snags	No habitat
Harlequin Duck (*Histrionicus histrionicus*)	Regional Forester Sensitive	Rapid Streams, Large Trees	Potential Habitat
Horned Grebe (*Podiceps auritus*)	Regional Forester Sensitive	Lake	No Habitat
Red-necked Grebe (*Podiceps gisegena*)	Regional Forester Sensitive	Lake	No habitat
Tricolored Blackbird (*Agelaius tricolor*)	Regional Forester Sensitive	Lakeside, Bullrush	No habitat
Yellow Rail (*Coturnicops noveboracensis*)	Regional Forester Sensitive	Marsh	No habitat
Mammals			
California Wolverine (*Gulo gulo*)	Regional Forester Sensitive, MIS, SOC	Mix, High Elevation	No Habitat
Pacific Fisher (*Martes pennanti*)	Regional Forester Sensitive	Mixed, Complex	No Habitat
Pygmy Rabbit (*Brachylagus idahoensis*)	Regional Forester Sensitive, SOC	Sagebrush Flats	No habitat
Mollusks			
Crater Lake Tightcoil (*Pristiloma articum crateris*)	Regional Forester Sensitive, Survey and Manage	Perennial Wet Areas	Documented

Affected Environment and Effects to Wildlife

Summary of Consultation with USFWS

The project is consistent with Deschutes National Forest LRMP and the Project Design Criteria (PDC) Compliance Checklist from the Joint Aquatic and Terrestrial Programmatic Biological Assessment for Federal Lands within the Deschutes Basin (USDA 2006). Informal consultation requirements have been met because all Alternatives are consistent with the PDC's in the Programmatic BA and no further consultation is recommended for the Northern Spotted Owl.

Northern Bald Eagle- Region 6 Sensitive, MIS

On August 8, 2007 the bald eagle was removed from the U.S. Fish and Wildlife threatened and endangered list (USDI, 2007). The bald eagle was moved to the Region 6 Sensitive Species List as required by USDA (1999) document.

Bald eagles are permanent residents of Oregon. Essential habitat elements for the recovery and eventual delisting of the northern bald eagle are nest sites, communal night roosts, foraging areas, and perch sites. On the Deschutes National Forest, ponderosa pine and Douglas-fir trees averaging 32 inch+ dbh with large open limb structure are preferred for nesting. Nests consist of bulky stick platforms built in the super-canopy of such trees, or less frequently on cliffs. They are typically constructed within one mile of appropriate foraging habitat, which includes rivers and large (typically 90 surface acres or greater) lakes and reservoirs. Bald eagles are sit-and-wait predators, which predominantly capture prey from perches over water; ideal perches are large trees and snags within 330 ft. (100 m) of water (Anthony et al. 1995). Prey items include fish, waterfowl and other birds, small mammals, and carrion (Stalmaster, 1987). Most of the large lakes, reservoirs, and rivers on the Sisters Ranger District provide suitable habitat for bald eagles.

The Pacific Bald Eagle Recovery Plan (USDI 1986) designated recovery zones for each state and the Sisters Ranger District of the Deschutes National Forest is within the High Cascades Zone. The Recovery Plan population goal for the High Cascades is 33 territories and the Habitat Management goal is 47 territories. Surveys conducted in 2003 confirmed the presence of 61 occupied territories of 65 territories located in the High Cascades Zone (Isaacs and Anthony 2003). Bald eagle use has been documented within the planning area (district files).

The project area is near the Wizard Falls bald eagle nest. The pair uses Wizard Falls Fish Hatchery holding pond as their primary foraging area. The Wizard Falls bald eagle nest site was discovered in 1995 and has produced young every year since; Table 17 shows the nest history of the pair.

The project area also occurs within essential eagle habitat along the Metolius River. Essential eagle habitat along the Metolius is identified as downstream of where Canyon Creek enters the Metolius to Lake Billy Chinook.

Table 17 History of the Wizard Falls Eagle Pair.

Year	Nesting Success	Year	Nesting Success
1995	1 Young	2001	2 Young
1996	2 Young	2002	2 Young
1997	1 Young	2003	2 Young
1998	2 Young	2004	2 Young
1999	2 Young	2005	2 Young
2000	2 Young	2006	1 Young

Effects to Northern Bald Eagle

Alternative 1 – No Action
There are no known changes associated with the no action Alternative. The Wizard Falls home range will remain unchanged. In addition there will be no change in the condition of essential eagle habitat along the Metolius River with the no action Alternative. The no action Alternative will have **"No Effect "** to bald eagles or their habitat.

Alternatives 2 and 3
Direct/Indirect Effects

There will be no direct effects to the Wizard Falls eagle pair with mitgation measures in place. There may be incidental disturbance to eagles utilizing the Metolius River during the project, as ground based equipment and helicopters will be working within essential eagle habitat. The project will not remove any constituent elements of bald eagle habitat within the home range of the Wizard Falls eagle pair, or within identified essential eagle habitat. The project is expected to benefit eagle habitat along the Metolius River by the creation of pool habitat. It is expected that the pool creation will increase the number of foraging sites for eagles along the River. Alternative 2 will create 208 pools, while Alternative 3 will create 173 pools.

Alternatives 2 and 3 **"May Impact Habitat or Individuals but will not lead to a trend in federal listing"** for bald eagles or their habitat in the short term due ground based and helicopters operating within eagle habitat. Treatments within eagle habitat are expected to benefit eagles in the long term.

Cumulative Effects
Danger trees are routinely removed from recreation facilities (campgrounds, summer home tracts, etc.) and major travel routes. An estimated 3,450 acres of 31,325 acres (11%) of potential eagle habitat could potentially have danger tree removal around developed campgrounds and main roads, including Eyerly Fire Salvage danger tree removal. Continued loss of large snag habitat, from danger tree removal, in and immediately adjacent to

recreation facilities and major travel routes limits available nesting and perching sites along suitable water bodies (e.g., Suttle Lake, Metolius River, and Lake Billy Chinook). Most hazard trees removed do not occur directly on the shoreline in most cases but do occur within the riparian reserve. Large snag habitat outside designated recreation areas is important to retain since most, if not all, large snag habitat will eventually be lost in the recreation sites over time. Because of the high level of use these areas receive, it is unlikely they would be utilized for nesting.

Several sections of private land occur near potential habitat. These sections are not managed for eagle habitat. Therefore, it is assumed that any habitat provided by these parcels is incidental and may not be long term. Other private lands occurring along the Metolius River and Lake Billy Chinook consist of small communities or resort facilities. Large tree development may be consistent with their goals and objectives but retention of large snag habitat is not for safety reasons.

Past harvest activities and wildfires resulted in the removal of large trees and snags. This coupled with the loss of large snag habitat due to safety reasons has reduced the available nesting, roosting, and perching habitat for eagles (approximately 2,945 acres of harvest and 11,746 acres of wildfire).

However, recent vegetation management projects like the Metolius Basin Forest Vegetation Management project designed treatments along the Metolius River to facilitate the development of large tree structure and reduce the risk to existing large trees and snags. Some management activities primarily understory thinning within Bald Eagle Management Areas (BEMA's) and Bald Eagle Conservation Areas (BECA) had been completed (Coil Fiber timber sale) or are planned (Sisters Area Fuels Reduction) to help maintain existing bald eagle habitat and promote future suitable habitat within BEMA's.

Restoration projects on Brush Creek, Canyon Creek, and Jack Creek improved habitat for bull trout. In addition, many culverts were replaced under Burned Area Emergency Response to minimize Effects to important waterways. These projects have the potential to increase fish production, providing the bald eagle with a more abundant food source.

Road decommissioning has been proposed within potential eagle habitat across the district, reducing the potential disturbance to existing nests, enhancing habitat connectivity and increasing the potential to develop more suitable habitat.

Overall, nesting, roosting, and perching habitat across the Sisters Ranger District has declined or has been impacted in some way (approximately 69%) but existing and potential habitat still remains outside of managed facilities and away from major travel routes. The quality of habitat has changed due to the wildfires and will continue to change inside and out of the fire areas. The future of eagle use in burned nesting territories on Suttle Lake and Lake Billy Chinook will be determined with continued monitoring. Bald eagle populations are expected to remain stable across the district. Currently active nest sites are expected to remain active territories especially with associated road closures, stand density reduction activities, and associated healthy fisheries.

Northern Spotted Owl- Federal Threatened, MIS

The northern spotted owl is primarily an inhabitant of old growth and mature forests. Suitable spotted owl habitat contains adequate quantities of dead and down woody material, decadent trees, a medium to high crown closure, multiple layers in the overstory, and trees at least 200 years old or greater than 32 inches dbh (USDA 1990a). However, eastside forests contain habitat that may not typically fit the above definition. Suitable nesting, roosting, and foraging habitat (NRF) is described as having the following structural characteristics for the Deschutes National Forest: Forest stands, regardless of plant association, having a total canopy cover greater than or equal to 40% and a canopy cover of at least 5% among trees >21" dbh. This definition assumes that the stand is multi-storied and contains some large trees. This definition was refined in FY2006 to better define NRF habitat on the Forest since the insect and disease epidemics in the early 1990's. A more detailed description of the NRF definition can be found in the FY2006-2009 Biological Assessment, Appendix A (USDA 2006).

The Deschutes National Forest 2006 – 2009 Programmatic Biological Assessment established project design criteria (PDC's) to be used in project planning (2006).

There are no known spotted owl home ranges within the project area. The entire project occurs within the Metolius LSR. Project work sites #153 through 213 occur within Critical Habitat Unit OR-3.

The Metolius River Wood Restoration project occurs within the B&B Fire Recovery and Eyerly Fire Salvage project areas. The Metolius River Wood Restoration project area was surveyed to R-6 protocol for the spotted owl in 2003 and 2004 for the Eyerly Fire Salvage project and in 2004 and 2005 for the B&B Fire Recovery project. No owls were located within the Metolius River Wood Restoration project area.

Effects to Northern Spotted Owl

Alternative 1 – No Action
There are no effects associated with the no action Alternative for the northern spotted owl since no management action would take place.

Alternatives 2 and 3
Direct/Indirect Effects

There are no known direct or indirect effects associated with either of these Alternatives for the spotted owl or their habitat. The project does not occur within ¼ mile of any known spotted owl nest or activity center. Suitable habitat (NRF) was surveyed between 2003 and 2005. The project will not remove, downgrade, or degrade primary constituent elements of spotted owl habitat.

Cumulative Effects

Because there are no effects to spotted owls or their habitat on the Sisters Ranger District from this project, there will be no cumulative effects that would combine with effects of other projects or activities in the basin. No cumulative effects to spotted owls are expected.

Conclusion: Alternatives 1, 2, or 3 will have **"No Effect"** to spotted owls or their habitat. The Metolius Wood project is consistent with Deschutes LRMP and the Project Design Criteria Compliance Checklist from the Joint Aquatic and Terrestrial Programmatic Biological Assessment for Federal Lands within the Deschutes Basin (USDA 2006).

Harlequin Duck- Region 6 Sensitive

Harlequin ducks breed along relatively low-gradient, slower-flowing reaches of mountain streams in forested areas. It is easily disturbed and seeks out the most remote streams for breeding. It uses swift waters and rapids during other seasons. They feed primarily on aquatic insects and their larvae, which are found on stream bottoms (Cassirer and Groves 1989).

Portland General Electric (PGE) and district employees conducted surveys for harlequin ducks along the Metolius in 1998. The surveys began at Jack Creek and proceeded to Lake Billy Chinook. No harlequin ducks were detected during these surveys (Concannon 1998). Two harlequins were sighted near the Wizard Falls fish hatchery bridge during the fall of 2001 (district files).

Potential habitat exists along the Metolius River. The best potential habitat occurs along the Metolius downstream of Bridge 99, which consists of shrubby riparian vegetation and low human disturbance. There are numerous logjams and large rocks that would make for potential loafing sites. The lower stretch of the Metolius River has a large species richness of caddisflies, but abundance is low. The reason for the low abundance of caddisfly levels is due to lack of organic matter, which consists of deciduous leaf litter and algae (Riehle, personal communication, 02-24-03). The lower stretch of the Metolius also has few pools and water is moving at a high velocity. Pools are important to broods when first hatched and the lack of them, along with low caddisfly abundance on the Metolius, may limit harlequin use.

Effects to Harlequin Duck

Alternative 1 – No Action
There are no known changes expected with the no action Alternative. Habitat for the harlequin duck will remain constant because management actions or ecological processes are not expected to alter potential harlequin duck habitat.

Alternatives 2 and 3
Direct/Indirect Effects

No known nesting occurs within the project area, therefore there are no known direct effects. The project will have a beneficial impact to harlequin habitat. The log structures will create more loafing structures along the river. In addition, the pools created by the log structures could increase potential nesting habitat. Alternative 2 will create 206 loafing sites and pools, while Alternative 3 will create 173 loafing sites and pools.

Cumulative Effects
Several factors influence harlequin duck habitat within the Sisters Ranger District including campgrounds, summer home tracts, and private lands. Potential habitat occurs primarily along Whychus Creek and the Metolius River. In areas that receive large amount of recreation pressure, disturbance may limit use of potential habitat. However, hazard tree felling often recruits logs into the river. The wood in the river could increase habitat suitability by increasing loafing structures. Approximately 3 miles of Whychus Creek and approximately 2 miles of the Metolius River occur on private lands within the Sisters Ranger District boundary. These sections are not managed for harlequin duck habitat. Therefore, it is assumed that any habitat provided by these parcels is incidental and may not be long term.

Conclusion: The no action or the action alternatives will have **"No Negative Impact"** to harlequin ducks or their habitat. The project is expected to create loafing structures in the Metolius River, which can increase habitat suitability.

Crater Lake Tightcoil - Region 6 Sensitive, Survey and Manage

One terrestrial mollusk, the Crater Lake Tightcoil (*Pristiloma arcticum crateris*), a Survey and Manage species that has Sensitive Species status on the Deschutes National Forest and has potential habitat in the project area. The Crater Lake Tightcoil, has been identified as needing surveys under the Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (USDA, 2001). This species falls into Category B (Rare, Pre-disturbance Surveys not Practical). Within this category, strategic surveys are to be conducted and all known sites are to be managed until further notice. This species is considered to be rare and identification of specimens is difficult because of its small size and cryptic habits. Expert identification is required.

"The Crater Lake Tightcoil may be found in perennially wet situations in mature conifer forests, among rushes, mosses and other surface vegetation or under rocks and woody debris within 10 m. of open water in wetlands, springs, seeps and riparian areas, generally in areas which remain under snow for long periods during the winter. Riparian habitats in the Eastern Oregon Cascades may be limited to the extent of permanent surface moisture, which is often less than 10 m. from open water" (Duncan et al. 2003).

Threats to the species include activities that compact soils, reduce litter and/or vegetative cover, or impact potential food sources (i.e. livestock grazing, heavy equipment use, off-highway vehicles, and camping on occupied habitats). Fluctuations from removal of ground vegetation on ground temperature and humidity may be less extreme at higher elevations and on wetter sites, but no studies have been conducted to evaluate such a theory. These snails

appear to occur on wetter sites than general forest conditions, so activities that would lower the water table or reduce soil moisture would degrade habitat (Burke et. al 1999).

Management recommendations are to be applied to any perennial wet area were Crater Lake Tightcoil are located during equivalent effort surveys. The following objectives were designed to assist in maintaining the viability of the species:

1) Protect occupied habitats against activities that might injure more than a few individuals within a population.
2) Protect occupied habitats against natural and/or human caused degradation.
3) Maintain:
    - Natural temperature and humidity regimes;
    - Soil moisture (water table) of the sites;
    - Natural soil texture (avoid compacting soils);
    - A large woody debris component within the habitat areas;
    - Natural ground cover of low vegetation, litter and duff.

Specific management recommendations can be found for this species in "Management Recommendations for Survey and Manage Terrestrial Mollusks, Version 2.0", October 1999 in Section 13, *Pristiloma arcticum crateris*.

Surveys have been conducted for this species within the project area and there are 14 wood placement sites that are near known Crater Lake Tightcoil sites.

Effects to Crater Lake Tightcoil

Alternative 1 – No Action
There are no known effects associated with the no action Alternative.
Recreation use levels are expected to increase, which may result in increased compaction to potential habitat. With increased recreation to the area, habitat loss of ground vegetation due to disturbance is a concern.

Alternatives 2 and 3
Direct/Indirect Effects
There will be no direct Effects to known mollusk sites with mitigation measures in place. There will be some ground disturbing activities within potential habitat, with digging and equipment placing structures. However, the project will have beneficial Effects in the long term by creating more down wood habitat adjacent to the Metolius River. Alternative 2 will create down wood at 206 sites, while Alternative 3 will create down wood at 173 sites.

Cumulative Effects
Currently there are two projects on the Sisters Ranger District that are benefiting Crater Lake Tightcoil habitat. They are the Bull Trout Streamside Protection Project and Whychus Creek Riparian Protection Project. Both projects are limiting compaction within potential Crater Lake tightcoil habitat by boulder placements and road closures.

Conclusion: The Metolius River Wood Restoration project **"May Impact"** the Crater Lake tightcoil in the short term by some ground disturbance within suitable habitat. However, the project is expected to have beneficial effects to Crater Lake tightcoils in the long term by creating more down wood habitat.

Effects to Other Sensitive Wildlife

The American peregrine falcon, horned grebe, pygmy rabbit, red-necked grebe, tricolored blackbird, yellow rail, California wolverine, and Pacific fisher are all sensitive species that are known to occur or may potentially occur on the Deschutes National Forest. However, there is no suitable habitat for any of these species within the Metolius River Wood Restoration project area. Therefore, there will be "No Impact" to theses species.

Management Indicator Species

The Deschutes National Forest Land and Resource Management Plan (LRMP) (USDA 1990) identified a group of wildlife species as Management Indicator Species (MIS). These species were selected because they represent other species with similar habitat requirements. Management indicator species can be used to assess the effects of management activities for a wide range of wildlife species with similar habitat needs (FSM 2620.5). Those species selected for the Deschutes National Forest include the bald eagle, northern spotted owl, golden eagle, red-tail hawk, osprey, northern goshawk, Cooper's hawk, sharp-shinned hawk, great gray owl, great blue heron, woodpeckers (cavity nesters), peregrine falcon, California wolverine, elk, mule deer, American marten, Townsend's big-eared bat, and waterfowl. In addition, habitat and wildlife species that were identified in the Northwest Forest Plan are addressed.

The following MIS species have been discussed in the Threatened, Endangered, or Sensitive Species sections: northern bald eagle, northern spotted owl, peregrine falcon, and California wolverine. The list of MIS species that are not Threatened, Endangered, or Sensitive Species is located in Table 18.

The Cooper's hawk, great grey owl, golden eagle, red-tailed hawk, sharp-shinned hawk, woodpeckers, American marten, elk, mule deer, bats are management indicator species, that are known to occur on the Deschutes National Forest. However, the Metolius River Wood Restoration Project will not impact these species, as there are no known nest sites for any of these species within ¼ mile of the project area and the project will not alter their habitat needs. Cumulatively the project will not lead toward a trend of federal listing for any of species listed above.

Great Blue Heron

The great blue heron is one of the most wide-ranging waterbirds in Oregon (Marshall et al. 2003). Highly adaptable, it is found along estuaries, streams, marshes and lakes throughout

the state. Nest locations are determined by their proximity to suitable foraging habitat. Great blue herons nest in colonies within shrubs, trees and river channel markers where there is little disturbance (Marshall et al. 2003). Tree species they could utilize in the project area include ponderosa pine, Douglas fir, and black cottonwood. While the average diameter of nest trees is 54 inches and the average height is 79 feet, they use a wide range of sizes from 18 to 72 inches in diameter and 43 to 120 feet tall (Marshall et al. 2003). They hunt shallow waters of lakes and streams, wet or dry meadows feeding on fish, amphibians, aquatic invertebrates, reptiles, mammals and birds. They are very sensitive to disturbance, especially during the nesting season (Jackman and Scott 1975).

Nesting and foraging habitat occurs along the Metolius River. However, there are no known colonies/rookeries in the Metolius River Wood Restoration project area.

Effects to Great Blue Heron

Alternative 1 – No Action
There are no known nests, colonies, or rookeries within the project area. Habitat for the great blue heron will remain unchanged.

Alternatives 2 and 3
Direct/Indirect Effects

There are no known nests, colonies, or rookeries within the project area. The project could improve foraging habitat for great blue herons by improving fish habitat and creating pools along reaches of the river that have few pool habitat areas. Alternative 2 will create 206 pools, while Alternative 3 will create 173 pool areas.

Cumulative Effects
Trends are indicating increased recreation levels within our national forests. Much of this use is concentrated around waterbodies/waterways. Increased recreation use along waterways may deter use by herons for nesting. However, road closures proposed within Riparian Reserves (Jack Canyon, McCache, and Metolius Basin project areas) will aid in reducing disturbance potential for nesting great blue herons.

Table 18. Management Indicator Species Summary.

Species	Habitat
Birds	
Coopers Hawk (*Accipiter cooperi*)	Mature forests with high canopy closure/tree density
Great Blue Heron (*Ardea herodias*)	Riparian edge habitats including lakes, streams, marshes and estuaries
Great Gray Owl (*Strix nebulosa*)	Mature and old growth forests associated with openings and meadows
Golden Eagle (*Aquila chrysaetos*)	Open ponderosa pine or mixed conifer
Northern Goshawk (*Accipiter gentiles*)	Mature and old-growth forests; especially high canopy closure and large trees
Osprey (*Pandion haliaetus*)	Large snags associated with fish bearing water bodies
Red-tailed Hawk (*Buteo jamaicensis*)	Large snags, open country interspersed with forests
Sharp-shinned Hawk (*Accipiter striatus*)	Mature and old-growth forests; especially high canopy closure and large trees in addition to young, dense, even-aged stands
Waterfowl (See appendix A for species)	Lakes, ponds, streams
Woodpeckers (See appendix A for species)	***These species will be discussed in the Snag and Down Wood Section.***
Mammals	
American Marten (*Martes americana*)	Mixed Conifer or High Elevation late successional forests with abundant down woody material
Elk (*Cervus elephas*)	Mixed habitats
Mule Deer (*Odocoileus hemionus*)	Mixed habitats
Western (Townsend's) Big-eared Bat (*Corynorhinus townsendii*)	***This species will be discussed in the Bat section of the Species of Concern.***
Habitats	
Snags, Down Wood and Log Associated Species	Down woody material
Special or Unique Habitat Associated Species	Springs, Seeps, cliffs, and talus slopes

Fire suppression has resulted in degradation of some meadows across the district due to conifer encroachment and the accumulation of deep thatch layers, further reducing foraging habitat. Meadow enhancement has been implemented in two meadows within the past 5 years (Glaze Meadow and Trout Creek Swamp) and is planned for more areas in the future, which may enhance foraging habitat.

Implementation of fisheries projects (Canyon Creek crossing, adding down woody material to streams, etc.) will aid in promoting healthy Riparian Reserves, increasing prey species and foraging habitat.

Conclusion: Cumulatively the Metolius River Wood Restoration project will not lead toward a trend of federal listing for the great blue heron because no next sites are within the project area and no other projects are known to negatively impact great blue heron habitat.

Northern Goshawk

The northern goshawk is associated with mature and late-successional forests. All mature and late-successional habitats are considered potential nesting habitat and earlier forested seral stages are considered potential foraging habitat. Moist mixed conifer and moist ponderosa pine late-successional areas are preferred habitats, although forest structure appears to be the more limiting factor to goshawk habitat rather than stand composition (i.e. tree species). Preferred nest stands have a minimum of 40% canopy closure; and the nest sites within these stands have >60% canopy closure (Reynolds et al. 1991).

There is one known goshawk site within the project area.

Effects to Northern Goshawk

Alternative 1 – No Action
No changes will occur to goshawks or their habitat with the no action Alternative. Habitat for goshawks will remain unchanged because there are no management actions occurring near goshawk habitat or nest sites.

Alternative 2 and 3
Direct/Indirect Effects
No direct or indirect Effects will occur to goshawks or their habitat with mitigation measures in place. Habitat for goshawks will remain unchanged.

Cumulative Effects
No cumulative effects will occur to goshawks or their habitat with project design features in place.

Conclusion: Cumulatively, the action Alternatives will not lead to a trend toward Federal listing for the northern goshawk.

Osprey

Osprey are specialized at catching fish. They nest near lakes and rivers in the tops of large snags or they may use artificial platforms if available. Their main prey is live fish – slow-moving species that swim near the surface. However, they may also take other vertebrate species (birds, reptiles, and small mammals) but this represents only a very small proportion of their diet (Csuti et. al 1997). There are three known osprey sites within the project area.

Effects to Osprey

Alternative 1 – No Action

No changes will occur to osprey or their habitat with the no action Alternative. Habitat for osprey will remain unchanged.

Alternative 2 and 3

Direct/Indirect Effects

No direct or indirect effects will occur to osprey or their habitat with mitigation measures in place. The project should improve foraging habitat for osprey by improving fish habitat and creating pools along reaches of the river that have few pool habitat areas. Alternative 2 will create 206 pools, while Alternative 3 will create 173 pool areas.

Cumulative Effects

The fires over the past 5 years have created a large influx of snag habitat; however within the Riparian Reserves snag creation has not been as great (approximately 17% of the total Riparian Reserves have experienced stand replacement fire). Approximately 9% (3,804 acres) of the total Riparian Reserves (42,796 acres) are considered potential habitat for osprey. Not all Riparian Reserves are considered potential habitat for osprey because water bodies are small in size limiting foraging attempts or they lack fish. Of the potential osprey habitat, about 7% has experienced stand replacement fire, resulting in short term snag habitat and the direct loss of known nest sites, particularly in the Eyerly fire.

Habitat was enhanced under the Metolius Basin Forest Vegetation Management project. Measures were incorporated to retain suitable habitat as well as enhance habitat conditions. Overall, treatments proposed will improve osprey habitat conditions in the long term by promoting the development of large structure, protecting large snag habitat within Riparian Reserves, and reducing the risk of loss of existing habitat from other large-scale disturbances. Riparian Reserves had not been entered with past vegetation management projects except for site specific instances since 1994.

Danger trees are routinely removed from recreation facilities (campgrounds, summer home tracts, etc.) and major travel routes. Continued loss of large snag habitat in and adjacent to recreation facilities and major travel routes due to safety reasons limits available nesting sites

along suitable water bodies (e.g., Suttle Lake, Metolius River, Lake Billy Chinook). Most danger trees removed do not occur directly on the shoreline in most cases but do occur within the riparian reserve. Large snag habitat outside designated recreation areas is important to retain since most, if not all, large snag habitat will eventually be lost in the recreation sites over time.

Past thinning projects, BAER activities, and fuels treatments did not impact osprey nesting habitat. Thinning and fuels treatments generally occurred outside Riparian Reserves. The BAER activities did occur within Riparian Reserves but overall habitat will be enhanced by providing more stable habitat over time.

Private lands are not managed for osprey habitat. Therefore, it is assumed that any habitat provided by these parcels is incidental and may not be long term.

In summary, nesting habitat for osprey will be enhanced by various thinning project in the watershed and foraging habitat will be enhanced by the Metolius River Wood Restoration project and will result in a cumulative benefit to osprey habitat in the long term. No long term cumulative impacts to osprey are expected because of seasonal nest site restrictions in place on all projects in the watershed and district (see Project Design Features section).

Conclusion: Cumulatively, the action Alternatives will not lead to a trend toward Federal listing for the northern goshawk.

Waterfowl

Open lakes, ponds, streams, rivers, and wet/dry meadows provide foraging habitat for most waterfowl species. Some species utilize large snags for nesting, while others utilize open grassy areas near the water's edge. Most waterfowl diets consist primarily of vegetation although some aquatic invertebrates (caddisflies, crustaceans, and mollusks) may be consumed. (Csuti et. al 1997).

Effects to Waterfowl

Alternative 1 – No Action
There are no known changes associated with the no action Alternative. Habitat for the waterfowl will remain constant with this Alternative.

Alternatives 2 and 3
Direct/Indirect Effects
No known nesting occurs within the project area, therefore there are no known direct effects. The project will have a beneficial impact to waterfowl habitat. The log structures will create more loafing structures along the river. In addition, the pools created by the log structures could increase potential nesting and foraging habitat. Alternative 2 will create 208 loafing sites and pools, while Alternative 3 will only create 173 loafing sites and pools.

Cumulative Effects
Several factors influence waterfowl habitat within the Sisters Ranger District including campgrounds, summer home tracts, and private lands. Potential habitat occurs primarily around pond and lakes and along larger streams and rivers. In areas that receive large amount of recreation pressure, disturbance may limit use of potential habitat. However, hazard tree felling often recruits logs into the river. The wood placement of this project and other projects in the river could increase habitat suitability by increasing loafing structures. Approximately 3 miles of Whychus Creek and approximately 2 miles of the Metolius River occur on private lands within the Sisters Ranger District boundary. These sections are not managed for waterfowl habitat. Therefore, it is assumed that any habitat provided by these parcels is incidental and may not be long term.

Conclusion: The action Alternatives of the Metolius River Down Wood project will not lead toward a trend of Federal listing for waterfowl species and may combine with hazard tree placements to increase habitat for waterfowl along the Metolius River.

Habitat for MIS Species- Down Wood

Dead wood (standing or down) plays an important role in overall ecosystem health, soil productivity, and numerous species' habitat. This dead wood habitat is crucial in the continuation of species that depend on snags and logs for all or parts of their life cycle (Laudenslayer 2002). Bird and mammal species rely on dead wood for dens, nests, resting, roosting, and/or feeding on the animals and organisms that use dead wood for all or parts of their life cycle. Snags come in all sizes and go through breakdown and decay processes that change them from standing hard to soft, then on the ground to continue decaying into soil nutrients.

Logs are an important component on the landscape. They provide organic and inorganic nutrients in soil development, provide microhabitats for invertebrates, plants, amphibians, and other small vertebrates, and provide structure for riparian associated species in streams and ponds. It has been shown that size, distribution, and orientation may be more important than tonnage or volume. Small logs provide escape cover or shelter for small species. It is still unknown what levels of down woody material are needed to provide quality habitat for associated species (Bull et al. 1997).

Down wood abundance on the Deschutes National Forest is highly variable due to many factors. The Deschutes National Forest lies on the eastside of the Cascades where there is a limited availability of water and nutrients as compared to the west side of the Cascades. This, combined with overcrowded stand conditions due to fire suppression, has led to tree mortality above historic levels especially within smaller size classes. In particular, plant associations groups that tend to be drier (i.e. ponderosa pine and mixed conifer dry) may recruit a higher level of down wood today than did historically.

Effects to Down Wood

Alternative 1 – No Action

There are no known changes associated with the no action Alternative. Down wood will remain unchanged.

Alternatives 2 and 3
Direct/Indirect Effects: There will be no direct or indirect Effects to down wood that currently exists in the project area. The project will have beneficial Effects in the long term by creating more down wood habitat adjacent to the Metolius River. Alternative 2 will create down wood at 208 sites, while Alternative 3 will create down wood at 173 sites.

Conclusion
The Metolius River Wood Restoration project will not lead toward a trend of Federal listing for any species associated with down wood.

Recreation

Indicator: Number of temporary site closures needed.

Visitors that come to the Metolius River participate in a full spectrum of recreational opportunities. The rich mix of both dispersed and developed recreational opportunities that are available in the upper 8-10 miles of the river, combined with the change in character to the dispersed primitive setting in the lower portion of the river, is unique to the region.

The many outstanding natural resources in the Metolius River corridor have long attracted visitors from throughout the country. Spectacular views of river with the backdrop of Mt Jefferson and other mountains, the clean water, abundant fishery and chance to view a variety of wildlife add to the recreational experience.

The big ponderosa pines, remarkable wildflower displays, and rustic character of the recreation river segment provide scenic views along trails in the upper river. Although there is development in places, less-accessible canyons and undeveloped areas provide opportunities for hiking and biking both along and away from the river. Hikers along the scenic river segment may not see another person for much of the trek.

The Metolius is a special place not only for local residents but for people who return year after year. A 1990 Forest Service survey of visitors found that 45 percent of the respondents had been visiting the river for more than 10 years. That survey also found that fishing, hiking, sightseeing and viewing wildlife were the most favored activities of people visiting the river for the day. Other activities included bicycling, photography, picnicking, swimming and boating.

Camping is popular along the Metolius River in the 11 developed campgrounds. Camping in dispersed camp sites is most common on holiday weekends and occurs mostly in a limited number of sites near Bridge 99. The 1990 survey found that campers valued being able to

camp next to the river and said the ability to hear and see the river was important among the factors influencing their selection of a campsite.

Fly fishing on the Metolius River is popular particularly in the upper 10 miles of the river. Catch and release fishing for native redband trout and bull trout is an important value of the anglers who fish this segment. A variety of insect hatches are found at many times throughout the year. The river offers a rare opportunity to fish for large bull trout in a river setting. The segment of river downstream of Allingham Bridge is open to year round fishing, which is an important aspect to the Metolius River fishery. Few rivers are open and have good fishable conditions in winter and this opportunity is increasing in popularity.

Sightseeing is popular at the Head of the Metolius view point and is one of the most popular sites visited on the Metolius River. For visitors, viewing wildlife is second only to the natural setting as important factors influencing the quality of their visits.

Excellent kayaking and rafting opportunities exist along the Metolius River. The best known opportunity for whitewater floating is on the scenic river segment downstream of Bridge 99. This segment is floatable year-round due to the relatively constant flow levels. The relatively long float (17 miles) is typically run as a day trip. The lower reach provides a remote feeling with undeveloped streambanks, challenging Class II-III rapids (particularly downstream of the project), hydrology that makes the river floatable year-round, scenic views and abundant wildlife combine to create a truly primitive boating opportunity.

The international scale of rapids is a rating system of the difficulty of rapids for boating. Class I water is very easy, with small regular waves and riffles. With few or no obstacles, little maneuvering is required. Class II is easy, with small waves, some eddies, low ledges and slow rock gardens. These rapids have moderate difficulty and require some maneuvering. Class III is medium difficulty, with high and irregular waves, strong eddies, and narrow, but clear passages that require expertise in maneuvering. Scouting recommended. Class IV is difficult, with long rapids with powerful, irregular waves, dangerous rocks and boiling eddies. Precise maneuvering and scouting is required. Class V is very difficult with long rapids with wild turbulence and extremely congested routes that require complex maneuvering. These rapids present a danger to your life and boat and are near the limits of navigation.

Upstream of Gorge Campground, the river is generally floated with small rafts, kayaks and inner tubes, with the shallow water, logs, islands, private property and low bridges being the main challenges to boating. Boaters with small rafts and kayaks float the reach from Gorge Campground to Wizard Falls Bridge. This reach has challenging Class III rapids and bedrock chutes. Boating in the reach from Wizard Falls to Bridge 99 is Class I and is generally regarded as a family floating opportunity. From Bridge 99 to the lower project boundary, the river is rated as Class II. The rapids just downstream of the project are rated as Class III, with much of the river downstream being considered Class II.

These ratings generally underestimate the hazards to boaters on the lower Metolius River because they don't take in account the unpredictable nature of newly fallen trees, the lack of

scouting opportunities due to the overhanging brush and the hazard of the swift, cold water making swimming more difficult and possibly impairing judgment. In the spring of 2007, 3 full spanning logs were reported downstream of Bridge 99.

Hiking along the river trail by both hikers and anglers is popular along most of the upper 10 miles of river. Remote hikes, such as Canyon Creek to Wizard Falls allow for a chance to get away from the hustle and bustle of the Camp Sherman and Allingham areas. Downstream of bridge 99, the trail is remote and primitive.

Biking is increasing in popularity in the river corridor and opportunities for biking along dirt, gravel, or paved roads are abundant. Some trails are closed to biking upstream of Gorge but some unauthorized use occurs.

Effects to Recreation

Alternative 1- No action
Camping, sightseeing, boating, hiking and biking opportunities will remain largely unchanged. Boating will continue at low use levels and there will be an occasional full spanning log that will block boat passage downstream of Bridge 99. If the past decade is an indicator of future conditions, full spanning logs will not likely prevent boating in the river downstream of Bridge 99. Some wood will be cut illegally by boaters.

Fishing will likely remain a popular activity along the river. Without increased habitat provided, redband trout fishing will remain similar to existing conditions. Anglers will be concentrated in the few pools with deep water. The concentration of anglers will be less in the lower reaches of the river.

Alternative 2 and 3
Direct and Indirect Effects
Camping will not be affected by the addition of wood in the action Alternatives. Due to the added logs in the near stream area, there may be slight trail reroutes around logs. More logs will be apparent in the river trail vicinity and will be more noticeable for people on general hiking and sightseeing walks along the river. Access to the river will not be limited by the project structures because they will be placed at intervals and not in a continuous arrangement but some eroding areas will be blocked to protect the streambank. These eroding sites are very few in number.

Fishing will be enhanced because of the holding water created by the placement of wood in the river. The distribution of anglers may be more dispersed with added habitat in the lower reaches near Bridge 99. Upper reaches may become more popular with added pools for adult redband trout to hold in year round. It is expected that angler success, or catch, will increase with added habitat. However, traditional sites for fishing may change slightly and cause a change in use patterns on a site specific scale. High use fishing sites were avoided to avoid affected traditional fishing patterns.

Boating use may change as people become more aware of the increase in wood along the river bank. Interpretive signs describing the management of wood in the river and the project goals will help increase the understanding of the management of the upper river. Signs will inform floaters of the change in the amount of wood in the river. Boating in the reach between Wizard Falls Bridge and Bridge 99 may increase in difficulty to a Class II river, where some maneuvering may be required more often than is needed in the present condition. The level of difficulty downstream of Bridge 99 is not expected to change as a result of the project in Alternative 2 because some maneuvering is required in that reach now. Alternative 3 would have no wood added downstream of Bridge 99 and therefore no change is expected. It is unlikely that illegal cutting of wood on the lower river downstream of Bridge 99 will change (see Key Issue- Boating Safety Section)

Effects to other uses in the river corridor are not expected. Biking opportunities are not expected to change.

Cumulative Effects
The wood restoration project is not likely to combine with the effects of other projects to impact recreational opportunities along the Metolius River. No other new projects are planned along the river that would affect hiking, camping, sightseeing, boating, biking or other activities. Overall, there will not be a negative cumulative effect from past or foreseeable projects and the Metolius River Wood Restoration Project because the seasonal operations will try to avoid peak season for recreation, temporarily close sites to avoid conflict during operations and the project will enhance fishing and sightseeing opportunities over the long term.

Scenic Quality

Indicator: Added wood is natural appearing in the river.

The scenic beauty and aesthetic qualities of the Metolius River have attracted people to the area for centuries. The clear water and shade from the yellow-barked ponderosa pines offer visitors a reprieve from hot, dry summers of eastern Oregon. The Metolius River is one of the most visually sensitive rivers within the region, and was rated as one of the top 5 of 117 viewsheds analyzed for visual sensitivity on the Deschutes National Forest (USDA Forest Service, 1992).

The river area is primarily 'natural appearing', with enclaves of 'cultural' landscapes (i.e. recreational residences, recreational facilities and the Camp Sherman Store). The rustic, historic, 'cultural' landscape character of these settings relate well with the 'natural appearing' landscape.

The extent and context of the foreground landscape within a ponderosa pine forest is unique within the region and the state. The diversity of the views over the length of the river is unique when considered in the context of its relatively short length. The lack of significant

modifications of the view over the full length of the river also is unique. The visual prominence of the Metolius River is a well-known scene for many visitors throughout the State and the nation.

The Metolius River's landscape context has a high degree of integrity. It is visually perceived to be 'complete' relative to the description of the landscape character. No negative alternation is observed. The overall landform appears to be intact.

The spring fed nature of the Metolius results in a unique appearance compared to most streams. The springs provide relatively constant flows that are unsusceptible to seasonal weather patterns and therefore create relatively constant flows in the river throughout the year. Water quality is outstanding due to the springs. Because little surface water drains into the Metolius, the river is usually clear, even during storm events. The crystal clear water has a high degree of visual integrity throughout the entire river corridor and is not altered in quality.

The vegetation of the Metolius River corridor provides a diversity of habitat for wildlife and contributes to the contiguous habitat conditions of the Metolius Basin. Vegetation in the corridor consists of riparian plant communities, ponderosa pine forests along the upper reaches of the river, and mixed conifer forests in the lower sections of the river. The habitat created by this vegetation supports a diversity of wildlife to encounter, including some rare and endangered species such as northern bald eagle, northern spotted owl, and bull trout. Numerous other wildlife depend on the corridor such as grouse, quail, osprey, king fisher, owls, beaver, river otter, bobcat and black bear. The vegetation has a moderate degree of integrity with a general appearance consistent with the landscape character but there are areas of alteration due to concentrated human use along the riparian zone.

The visual appearance of the corridor is one of the many components which contribute to the aesthetic 'sense of place'. The Metolius River corridor is held in high reverence by many people from various perspectives such as historical, spiritual, cultural, traditional, and experiential. Such components contribute to the integrity of wholeness of the area. Special places such as the Head of the Metolius, the Camp Sherman Store complex, Tribal Lands, Wizard Falls Fish Hatchery, and Allingham have high scenic integrity which is intact.

The viewshed of most of the Metolius Wild and Scenic River corridor is confined primarily to the immediate foreground landscapes, although a few opportunities exist for expansive, distant views. Foreground views in the upper and middle stretches of the river are characterized by strips of riparian vegetation and flat open stands of ponderosa pine forests, interspersed with limited residential and recreational developments. The upper and middle sections of the Metolius are separated by the Gorge. This short stretch of river is fairly remote and seen primarily from the river where views are contained to the immediate foreground due to the confining rock walls of the narrow gorge. Expansive views of more distant, scenic landforms such as Green Ridge, Black Butte and the Cascade Range are also available from select locations within the corridor. Of particular interest is the spectacular view of Mt Jefferson which can be seen from the headwaters of the Metolius. This view is

renowned for its scenic quality and is one of the most photographed sites in the state of Oregon.

Effects to Scenic Quality

Alternative 1- No action
Scenery in the river corridor is designated an Outstandingly Remarkable Value. The scenic character of the existing condition includes a rural backdrop that includes rustic buildings and structures but other areas are more natural appearing. There are elements of natural character in the river from wood and islands and the associated wildflowers and shrubs that add to the visual diversity and scenic quality. These characteristic would remain unchanged. The scarcity of islands and in-stream wood in the Camp Sherman area is a result of the history of development along the river and for most visitors, may not be unusual or out of place. The character of the scenery is not likely to change in the next few years.

Alternative 2 and 3
Direct and Indirect Effects
In both Alternatives, wood will be placed in the Metolius River in the Camp Sherman area (Table 2), where most visitors first encounter the river. The number of logs and the frequency of logs in the view of the river will be a change to the scenic character of the river. In most cases, the added diversity and vegetation associated with logs in the river will add to the scenic quality in the project area. The logs will increase vegetated island development which is an unique, aesthetic feature of the Metolius River. The quality of the scenery will improve in the years following the project, but the immediate effect of the work will be a disturbed look and it will detract from the scenic quality of the river over the short term (1 year) and on a site specific scale. After 3 to 5 years the in-stream wood will become vegetated and add to the scenic quality of the river.

Not all reaches will be under implementation at the same time and the visitor will be able to escape the disturbance of the work by visiting a segment of the river that is not receiving work. The work will be phased over a three year period and the change will not all occur in one year.

There will be increased wildlife viewing opportunities under both action Alternatives. Waterfowl and songbird nesting will increase and other wildlife associated with wood and islands will increase with the added in-stream wood.

The character of middle ground and distant views from the river will not be impacted by the project because the project is limited to the immediate streamside areas.

The primitive character downstream of Bridge 99 will experience a short term effect from the project during the implementation of Alternative 2. This reach already has some road access on both sides of the river, with occasional dispersed campers and vehicles apparent in the river corridor. Because the logs will be placed in a natural appearing arrangement, the structures will mimic the natural wood that has accumulated in this reach. Because this upper portion Scenic river segment has open roads and has two developed campgrounds, the

habitat work will not detract from the moderately primitive character of the river corridor. Alternative 3 would not propose work downstream of Bridge 99 and there will be a similar lack of change in this reach as in Alternative 1.

Cumulative Effects

Cumulative effects of adding wood to the Metolius River will add to the wood already being placed in the river, but at a faster pace. The wood placed from recent hazard tree projects has developed vegetative diversity and has added to the scenic quality of the river, but add a slow pace. The additional wood will increase that visual diversity and will remain consistent with the character of the river. The timing of the in-stream work in the non-peak recreation seasons where possible will help reduce the impact to the majority of the visitors to the Metolius River. The combined effects of this project with ongoing recreation residences remodeling and hazard tree placement will not combine to degrade scenic quality because all projects on Federal land will be subject to meeting scenic quality objectives within the Metolius Wild and Scenic Corridor.

Wild and Scenic River Values

Indicator: Outstandingly Remarkable Values are protected and maintained.

The Outstandingly Remarkable Values (ORVs), associated with the Metolius Wild and Scenic River Corridor are ecological (including vegetation), water quality, fisheries, wildlife, scenery, recreation, cultural, and geology. Project activities must be consistent with the standards and guidelines identified in the Metolius Wild and Scenic River Plan (1996) for the ORVs. In addition, any in-stream water project needs to have a determination of the effects on the Wild and Scenic River under Section 7 of the Wild and Scenic Rivers Act.

Effects to Geology ORV

Alternative 1- No action
No change to geology or the public appreciation of the geology of the river corridor is expected under the no action Alternative. Groundwater springs, basalt cliffs and lava tube chutes will remain unchanged.

Alternative 2 and 3
Added wood will have no effect on the unique geology of the river or the public access to the river or its geologic wonders. The springs, basalt cliffs and chutes will not be impacted by the addition of wood. Generally, these features are not located where wood is proposed to be placed for fish habitat. Therefore no direct effects to geologic features will occur. No indirect effects are expected because the effects of the placement of wood are localized and wood is a natural occurring feature of the river and is already a part of some bedrock outcrops and boulder features. This proposed project will maintain the geologic values of the river.

Cumulative Effects

There are no anticipated cumulative effects for this project and other current, past or foreseeable projects because geologic features will not be affected. The entire length of the river will not have cumulative effects because wood is already present and not causing impacts to the geologic features. Wood will increase with the project but the effects will be localized and not combine with effects from other past, present or foreseeable projects in the watershed. A small addition of hazard tree placement will continue and not impact the geologic features of the river because of the small scale and small number and will not combine to cause cumulative effects to the geologic features of the river.

Effects to Water Quality ORV

Alternative 1- No action

No changes to the hydrology of the Metolius River or the tributaries are expected. No changes to water quality will result from no action. Water quality will remain excellent.

Alternative 2 and 3

The quality and quantity of water will not be adversely affected by the proposed addition of large wood. Large wood would create slow water, pocket pools, and stream complexity that will maintain and enhance stream channel condition and stability. Slow water will be created but will not impact water quality. Sedimentation will be minimal because most equipment will work from the stream bank and the banks will be vegetated soon after disturbance. Short-term pulses of low level turbidity will result but these effects are temporary and allowed under the Clean Water Act and are permitted by the State. The duration of this effect on water clarity would be 2-3 hr at one time during implementation and would not affect the entire project reach nor would it last the entire work period. Stream flow will not be affected and the stable flow regime will be maintained.

Cumulative Effects

The effects of on-going and future projects and those from this project will not incrementally add to cumulative effects because no long term effects to hydrology parameters are predicted. There may be some short term turbidity but past activities in the watershed are not affecting turbidity as evidenced by the exceptional water quality. No other activities in the watershed that would impact water quality will be occurring at the same time. Although the Metolius Wood Project occurs in areas that overlap, there are no predicted effects from those projects to combine with this project. The project will maintain water quality and hydrologic character of the Metolius River.

Effects to Ecology/Vegetation ORV

Alternative 1- No action

There are no changes to the vegetation of the river under no action because there is no work proposed. Islands will remain vegetated but few new island habitats will likely form in the

next few decades. Slow recovery of in-stream wood will slow the recovery of island formation and the diverse plant community they support. Habitat for Peck's penstemon and tall Agoseris is being reduced by the plant successional changes resulting from fire suppression and introduction of invasive plants.

Alternative 2 and 3
There will be some loss of sensitive plant individuals from using equipment in the habitat areas but the long-term habitat will be maintained by the restoration of access trails and the potential recolonization of disturbed ground by Peck's penstemom. The effect to Peck's penstemon will be mitigated by avoiding concentrations and minimizing soil disturbance.

There is a risk of spreading weeds from the action Alternatives because of the presence of weeds and the use of machinery. Mitigation measures will be used to reduce these effects and 5 years monitoring/control for reed canary/ribbon grass will reduce the effects.

Cumulative Effects
If mitigation measures are followed the cumulative effects of this project to TES plants are minor. The proposed project may impact individual Peck's penstemon or Tall Agoseris plants but will not contribute to a trend towards federal listing or loss of viability to the overall populations or species. Habitat will be protected through project design features and avoidance of concentrations of plants. Effects from other past, current and future projects include ground disturbance from past logging, septic tank replacements, lawn improvements and intensive recreation. It is not anticipated that these effects will overlap with project effects to exceed guidelines of the Species Conservation Strategy for Peck's penstemon in the Metolius River Corridor nor cause a trend in federal listing.

Adding wood may combine with hazard tree placement to increase potential ribbongrass colonization but the monitoring and control program will mitigate the potential cumulative effects. With the future Deschutes/Ochoco National Forest Invasive Plant EIS, these control measure will combine in an integrated strategy to control ribbongrass in the Metolius River and reduce the seed available to collect on the new wood and become established. Therefore, with project design features, including monitoring and control, invasive plants control strategy will comply with Regional and Forest level Invasive Plant Prevention Practices and maintain the ecological values of the corridor.

Effects to Fisheries ORV

Alternative 1- No action
The no action Alternative will not restore the Fisheries ORV because no actions are proposed in the river. Recovery of fish habitat would be slow under the current management of natural infall and small scale hazard tree placements. Many fish hold in pools in winter and during spawning migrations. The upper Metolius reaches have rearing and spawning habitat for redband trout, Chinook salmon, sockeye/koanee salmon and bull trout. These reaches will continue to have limited rearing and holding areas with low wood densities. Recovery of pool habitat and in-stream cover for bull trout, chinook salmon and redband trout in the upper reaches will be slow under the no action Alternative and may take up to 200 years.

Alternatives 2 and 3
Direct/Indirect Effects

These Alternatives will improve fish habitat in the long-term by creating pools and fish cover for the variety of native fish species including Chinook salmon, bull trout, redband trout and kokanee/sockeye salmon. Short term effects from the in-stream work will be minimized by restricting work to non-spawning seasons, restoring vegetation along the river bank, and constructing the majority of the log structures with the equipment on the river bank and not in the river (exception is along Riverside Campground).

The effects of Alternative 2 and 3 will be similar and may cause local short term turbidity and temporary disturbance of feeding juvenile fish while the project is operating in-stream. Juvenile salmon and trout will be present at the time of the implementation, and may be displaced temporarily. This disturbance is considered minor and will not lead to increased mortality. The number of affected individuals will be small and the area will be limited to the immediate vicinity of the project site being worked at one time (within 100-200ft). Adult fish would not be affected because they may not be present in the shallow, fast water which is targeted for placement of in-stream wood. Migration times can be avoided with seasonal restrictions.

Indirect effects of the project to habitat of salmon and trout will be a short term localized disturbance of the substrate and river bank during the placement of wood. Generally, the substrate is not large enough in the Metolius for intergravel rearing of juvenile salmonids outside of the incubation period and therefore this habitat will not be impacted. Sediment runoff from the disturbed area is not expected to contribute to sedimentation because of the flat land selected for access to the sites and the rapid recovery of the disturbed area through active restoration and planting of native grasses and shrubs (see Hydrology section).

Salmon and trout spawning/incubation periods will be avoided by seasonal restrictions. Other short term habitat effects include the disturbance of the bank in the immediate vicinity of log structures that are dug into the streambank. This loss of cover is minor (1ft by 10ft) at each site and will recover within one year as existing vegetation grows and the planted shrubs become established.

The long term benefits of the project to salmon and trout rearing habitat will be an increase of 50 to 100% more pool habitat and cover in the project reaches (Table 11). Reach 2 had the largest proportion of pool habitat under Alternative 2 (55%) and will not be treated under Alternative 3 and will remain below the desired pool habitat goals in Alternative 3.

The project will increase the large wood, pools, and cover and restore habitat for salmon and trout in the project area of both alternatives. Habitat quality for bull trout juveniles will allow for better growth and survival. Under Alternative 3, habitat would not recover in the near term on 1.6 miles of the river downstream of Bridge 99 and habitat recovery is expected to be slow. On the remaining reaches of the project, recovery of pool habitat is expected to be long term because placed wood is expected to remain in channel for decades due to the stable flow regime of the river and the stable designs being proposed.

With the action alternatives, the Fisheries ORV will be maintained and enhanced. Cover and pool habitat will be enhanced for key species such as bull trout, chinook salmon and redband trout. Adult redband trout habitat will be restored with the increase in deeper pools in the upper river. The fisheries values will be enhanced in both alternatives but to a lesser degree in alternative 3 in the reach downstream of Bridge 99. In that reach, no wood would be restored and pool habitat will remain less than desired for Chinook habitat for decades to come.

Cumulative Effects

The combined effects of Alternative 2 and 3 with other projects in the watershed will not contribute to negative cumulative effects. The largest current projects in the area include Metolius Basin Forest Management thinning project and the B&B Fire Recovery salvage sales but these projects will not have a combined negative effect for substrate quality in bull trout habitat. Roaring Creek culvert will be replaced in the next few years but the effects of that project will be short term and localized to Roaring Creek and Canyon Creek. There are no more salvage projects proposed at this time and no other proposed projects are anticipated that could impact the river. Most of the B&B salvage units have been logged and hauled and Metolius Basin thinning projects are approximately 1/3 completed. Due to the flat ground in the Metolius Basin projects and the various project design criteria implemented on the B&B Fire Recovery units and haul routes, the sedimentation effects to the Metolius River from these projects is negligible. The Metolius Wood Restoration Project may disturb sediments in the river bed during implementation but no measurable amount of sediment will be added to the system from this project. The effects from this project and any past and foreseeable projects will not become a measurable cumulative effect that would impact substrate quality for salmon and trout.

The addition of logs combined with other habitat restoration in salmon and trout habitat will combine to improve habitat in the watershed. Hazard tree placements in the river will add to a small degree to fish habitat and combine with the Metolius River Wood Restoration Project to restore cover and pool habitat in the Upper Metolius River. This effect will last decades as long as the wood remains in the river. Fish passage at Round Butte Dam will expand the range of bull trout, chinook salmon and sockeye salmon and may combine with the habitat

restoration to help the populations to be more resilient to changes in habitat quality and forage availability.

The Metolius Wood Restoration Project will not combine with other projects in the watershed to have negative cumulative effects to salmon and trout habitat because the effects to sediment are short term and site specific and will not add measurable amounts of sediment inputs. The may be some combined beneficial cumulative effects from hazard tree placement and fish passage restoration in the Metolius and on the Deschutes River downstream. These effects are expected to be long term as long as wood is retained in the system and the fish passage program is operational.

The cumulative effects of the minor and localized streambed disturbance from this project and other projects in the watershed will not be measurable. Large vegetation projects are not expected to have measurable effect on sedimentation and monitoring has confirmed this conclusion. The Fisheries ORV will be maintain and protected.

Effects to Wildlife ORV

Alternative 1- No action
There is no expected affects to wildlife from no action.

Alternative 2 and 3
The proposed project is not likely to have adverse effects to bald eagle, osprey, waterfowl, harlequin duck or the Crater Lake tightcoil. Other wildlife species will not be affected by the project because their habitat does not exist or project design features would be used to protect nesting habitat and individuals. Habitat may be increased for osprey, waterfowl and great blue heron because of increased prey, foraging sites, or nesting/loafing logs.

Cumulative Effects
Alternatives 2 and 3 **"May Impact"** bald eagles or their habitat in the short term due ground based and helicopters operating within eagle habitat. Treatments within eagle habitat are expected to benefit eagles in the long term. Currently active nest sites are expected to remain active territories especially with associated road closures, stand density reduction activities, and associated healthy fisheries. Site buffers or seasonal restrictions will minimize cumulative effects to tightcoil, osprey and goshawk within the river corridor. With protection measures in the place, wildlife values will be protected during the implementation of this project and other past, present and future projects in the river corridor.

Effects to Cultural Resources ORV

Alternative 1- No action
No impact to cultural sites will occur under this alternative.

Alternative 2 and 3
The 12 sites present are all significant or unevaluated and require protective measures. Potential Effects to these sites consists of skidding through site areas and changing the artifact distribution to 90 feet of trenching to install trees in the streambank for in stream structures and the related impact from backhoe operations in the site area. Project design criteria or mitigation measures may be able to avoid effects to these sites and maintain the cultural resources along the river corridor.

Cumulative Effects
Many effects have occurred to the sites in this project area through the years. Past effects range from insect and small mammal burrows, tree falls, fires, road building, buried utilities, and structure buildings. It is unlikely that the amount of impact would change the overall eligibility of any of the sites present but there is a small potential since the sites have all had limited or no testing in them previously and little is known about the subsurface artifact distribution of the sites and no intact features have been documented other than one biface cache in one of the sites.

There is a low risk of cumulative effects of disturbance to the known sites because of protection measures provided for in the Project Design Features, known sites will be avoided for digging in key logs, and minimizing activity is site areas and monitor for any changed site conditions.

Effects to Recreation ORV

Alternative 1- No action
There is no effect to the current recreational opportunities along the river from no action.

Alternative 2 and 3
The project may change the distribution of anglers and disperse them to areas that will have more habitat for fish with the added logs and created pool habitat. Boating may become slightly more challenging in the reach between Wizard Falls and Bridge 99 because of the low difficulty under the present conditions. The reach downstream of Bridge 99 may not change in difficulty because it is already Class II and the proposed wood will not span the river. Other activities such as camping, hiking and sightseeing will be little affected. Wildlife viewing may increase with the added habitat in the river. Also, the scenic quality may improve with the added wood and island formation adding to the visual diversity.

Cumulative Effects
There are few other projects that would combine with the wood restoration to result in cumulative effects to recreation. No other new projects are planned along the river that

would affect hiking, camping, sightseeing, boating, biking or other activities. Interpretive signs would add to existing signs and may replace some more temporary signs used for warning boaters. Ongoing hazard tree management will added a small amount of wood to the river but will not combine with this project to cause cumulative effects to the various recreational opportunities along the river Corridor. The design of the log placements will avoid conflicts with trails, and recreational uses along the river. Overall, there will not be a cumulative negative effect from past, present or foreseeable projects and the Metolius River Wood Restoration Project because of the design of the projects and the benefit to recreational activities from the project.

Effects to Scenic Quality ORV

Alternative 1- No action
There are no effects to scenic quality from this Alternative. The river will remain low in wood and visual diversity.

Alternative 2 and 3
In both Alternatives, wood will be placed in the Metolius River in the Camp Sherman area, where most visitors first encounter the river. The number of logs and the frequency of logs in the view of the river will be a change to the scenic character of the river. In most cases, the added diversity and vegetation associated with logs in the river will add to the scenic quality in the project area. The quality of the scenery will improve in the years following the project, but the immediate effect of the work will be a disturbed look and it will detract from the scenic quality of the river over the short term (1 year) and on a site specific scale.

Cumulative Effects
Cumulative effects of adding wood to the upper Metolius River will add to the wood already being placed in the river, but at a faster pace. The wood placed from recent hazard tree projects has developed vegetative diversity and added to the scenic quality of the river. The additional wood will increase that visual diversity and will remain with the natural character of the river. The timing of the in-stream work in the non-peak recreation seasons will help reduce the impact to the majority of the visitors to the Metolius River. By adding to the scenic character of the River Corridor, the project will maintain the scenic quality values that are outstanding along the Metolius River.

Wild and Scenic Rivers Act, Section 7 Determination

As the agency administering the Wild and Scenic River Plan, the US Forest Service is required to determine the consistency of any federally assisted water resources project that occurs in the Wild and Scenic Corridor with the Wild and Scenic Rivers Act under Section 7(a). Specifically, the project is evaluated on the effects on the rivers free-flowing conditions, effects on the rivers water quality and any effects on the ORVs for which the river was designated. The responsible official will make a determination as to whether the

project as proposed will result in "direct and adverse effects" to values for which the river was added to the National System.

As determined by the Section 7 analysis (see project file), Alternatives 2 and 3 will not have adverse effects to the values for which the river was designated. The additional wood will not impede the free-flow character because no full spanning wood is proposed and the log structures will not create dams or impede the flow across the channel. The effects of the wood will be local and site specific and not change the course of the river. Water quality will be maintained and only a small, short term increase in turbidity is expected from the project. Therefore, the clarity of the Metolius River will be maintained in the long term and no measurable additional sediment is expected to result from the project. The project will not have a long term adverse effect on the ORVs for which the river was designated a Wild and Scenic River.

Other Disclosures

Civil Rights and Environmental Justice

Government-to-government consultation with the Confederated Tribes of Warm Springs occurred in the form of a scoping letter describing the project area and proposed action. The Confederated Tribes of Warm Springs off Reservation Biologist was briefed on the project in the November 2006 agency field trip. No special concerns about Tribal resources were identified.

There are no known direct, indirect, or cumulative effects on Native Americans, minority groups, women, or civil rights beyond effects disclosed in the Deschutes National Forest LRMP.

Executive Order 12898 on environmental justice requires federal agencies to identify and address any disproportionately high and adverse human health or environmental effects on minority and low income populations. The action alternatives, there would be no disproportionately high or adverse effects to minority or disadvantaged groups qualifying under the environmental justice order.

Congressionally Designated Areas

No old growth stands, Wilderness Areas, Research Natural Areas or Wild and Scenic Rivers would be adversely affected by the Action alternatives.

Prime Farm Land and Forest Lands

The Secretary of Agriculture issued Memorandum 1827 which is intended to protect prime farm lands and range lands. The project area does not contain any prime farmlands or rangelands. Prime forestland is not applicable to lands within the National Forest System. National Forest System lands would be managed with consideration of the impacts on

adjacent private lands. Prime forestlands on adjacent private lands would benefit indirectly from a decreased risk of impacts from wildfire. There would be no direct, indirect, or cumulative adverse effects to these resources and thus are in compliance with the Farmland Protection Act and Departmental Regulation 9500-3, "Land Use Policy."

Compliance with Other Polices, Plans Jurisdictions

The alternatives are consistent with the goals, objectives and direction contained in the Deschutes National Forest Land and Resource Management Plan and accompanying Final Environmental Impact Statement and Record of Decision dated August 27, 1990 as amended by the Regional Forester's Forest Plan Amendment #2 (6/95) and Inland Native Fish Strategy, and as provided by the provisions of 36 CFR 219.35 (f) (2005), which address Management Indicator Species.

Implementation of Alternative 1 (No Action), Alternative 2 (Proposed Acton), or Alternative 3 would be consistent with relevant federal, state and local laws, regulations, and requirements designed for the protection of the environment including the Clean Air and Clean Water Act. Effects meet or exceed state water and air quality standards.

Irretrievable and Irreversible Commitment of Resources

NEPA requires that environmental analysis include identification of "…any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. No significant irreversible or irretrievable commitment of resources would occur under Alternative 2 (Proposed Action) or Alternative 3.

- Irreversible: Those resources that have been lost forever, such as the extinction of a species or the removal of mined ore. The proposed activities would result in a commitment of rock for road reconstruction.
- Irretrievable: Those resources that is lost for a period of time, such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of way or road.

Consultation and Coordination

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

ID TEAM MEMBERS:

Core Team
Kris Hennings- Wildlife Biologist
Maret Pajutee- Botanist/Ecologist
Cari McCown- Water Quality/Hydrologist
Mike Riehle- Team Leader/Fish Biologist

Consultant
Don Zettel- Heritage Resources
Jeff Sims- Recreation Residences/Trails
Bob Hennings/Les Mocoso- Developed Recreation and Scenery
Michael Keown- Environmental Coordinator
Terry Craigg- Soils

FEDERAL, STATE, AND LOCAL AGENCIES:

Jennifer O'Reilly- Fish and Wildlife Biologist, US Fish and Wildlife Service
Peter Lickwar – Fish and Wildlife Biologist, US Fish and Wildlife Service
Ted Wise- Fish Biologist, Oregon Department of Fish and Wildlife
Scott Hoefer, Fish Biologist, National Marine Fisheries Service
Dan Rife- Fish Program Manager, Deschutes National Forest
Paul Powers- Fish Biologist, Crescent Ranger District
Nate Dachtler- Fish Biologist, Sisters Ranger District
Bob Nichols- Fish Biologist, Umpqua National Forest
Paul Burns – Fish Biologist, Siuslaw National Forest
Kristine Senkier, Restoration Project Manager, Upper Deschutes Watershed Council

TRIBES:

Scott Turo- Fish Biologist, Confederated Tribes of the Warms Springs Reservation of Oregon

Jens Lovtang- Fish Biologist, Confederated Tribes of the Warms Springs Reservation of Oregon

OTHERS:

Don Ratliff- Portland General Electric
Bob Spateholts- Portland General Electric
John Judy- John Judy Flyfishing

REFERENCES

Anthony, R.G., R.J. Steidl, and K. McGarigal. 1995. Recreation and bald eagles in the Pacific Northwest. IN: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Island Press, Washington D.C. 372 pp.

Bilby, R. E., and J. W. Ward. 1989. Changes in characteristics and function of woody debris with increasing size of streams in western Washington. Transactions of the American Fisheries Society 118: 368-378.

Bilby and Wasserman 1989. Forest practices and riparian management in Wasington State: data based regulation development. In proceedings to Practical Approaches to Riparian Resource Management, An Educational Workshop. May 8-11, 1989. Billings, MT. p. 87-94.

Bisson, P. A., R. E. Bilby, M. D. Bryant, C. A. Dolloff, G. B. Grette, R. A. House, M. L. Murphy, K. V. Koski, and J. R. Sedell. 1987. Large woody debris in forested streams in the Pacific Northwest: past, present and future. Pages 143-190 in E.O. Salo and T.W. Cundy, editors. Streamside Management Forestry and Fishery Interactions. Univ. of Wash., Institute for Forest Resources, Contribution 57, Seattle, WA.

Buchanan, D.V., M.L. Hanson, and R.M. Hooton. 1997. Status of Oregon's Bull Trout. Oregon Department of Fish and Wildlife, Portland, Oregon

Bull, E.L., Parks, C.G., and Torgersen, T.R. 1997. Trees and logs important to wildlife in the interior Columbia River basin. Gen. Tech. Report PNW-GTR-391. Portland, OR. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 55pp.

Bulletin. 1938. Bend Bulletin Newspaper. Bend, Oregon.

Burke, T.A., Applegarth, J.S. and T.R. Weasma, N. Duncan ed. 1999. Management Recommendations for Survey and Manage Terrestrial Mollusks. Version 2.0.

Burke, J.L., K.K. Jones and J.M. Dambacher. 2003. A summary compilation and rating of channel habitat requirements of salmon and steelhead in the upper Deschutes River basin. Aquatic Inventories Project, Oregon Department of Fish and Wildlife, Portland Oregon.

Cassirer, E.F. and C.R. Groves. 1989. Breeding ecology of harlequin ducks (*Histrionicus histrionicus*). Idaho Department of Fish and Game.

Chapman, D., A. Giorgi, T. Hilman, D. Deppert, M. Erho, S. Hays, C. Peven, B. Suzumoto, and R. Klinge. 1994. Status of summer/fall chinook salmon in the Mid-Columbia region. Don Chapman Consultants Inc., Boise, Idaho.

Concannon, G. 1998. 1998 Harlequin duck surveys study plan. Pelton Round Butte Hydroelectric Project. Portland General Electric, Portland, Oergon.

Cordova, J. 1995. Stream side forests, channel constraint, large woody debris characteristics, and pool morphology in low order streams, Blue Mountains, Oregon. MS Thesis. Oregon State University, Corvallis.

Csuti, B.A., A.J. Kimerling, T.A. O'Neil, M.M. Shaughnessy, E.P. Gaines, and M.M. Huso. 1997. Atlas of Oregon Wildlife: Distribution, Habitat, and Natural History. Oregon State University Press, Corvallis, OR. 492 pp.

Duncan, N., T. Burke, S. Dowlan, and P. Hohenlohe. 2003. Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan V3.0. U.S. Department of Agriculture, Region 6, Portland, OR. 70pp.

Edelman, F. and J. Copeland. 1999. Wolverine distribution in the northwestern United States and a survey in the Seven Devils mountains of Idaho. Northwest Science, Vol. 73, No. 4.

Forest Service Manual 2670.44, Region 6 Interim Directive No. 6, August 15, 1989. (Region 6 Sensitive Species List).

Forest Service Manual 2630.3, WO Amendment 2600-90-1, June 1, 1990. (Policy).

Forest Service Manual 2670-2671, WO Amendment 2600-95-7, June 23, 1995. (Policy).

Forest Service Manual 2670.5[20], WO Amendment 2600-95-7, June 23, 1995. (Definitions).

Goetz, F.A. 1989. Biology of the bull trout, *Salvelinus confluentus:* a literature review. Willamette National Forest, Eugene, Oregon.

Hayes, M. P, , J. D. Engler, R. S. Haycock, D. H. Knopp, W. P. Leonard, K. R. McAllister, L. L. Todd. 1997. Status of the Oregon Spotted Frog (*Rana pretiosa*) across its Geographic Range. In: The Spotted Frogs of Oregon Workshop. Oregon Chapter of the Wildlife Society 9pp. unpubl.

Houser, M. 1996 Deschutes County Prehistoric Context Statement. Bend, OR. Deschutes County Community Development Department.

Houslet, B.S. 2004. Recruitment of large wood to the Metolius River, Oregon. Unpublished USFS Report. Deschutes National Forest, Sisters Ranger District, Sisters, OR.

Houslet, B.S. and M.D. Riehle. 1998. Inland redband trout spawning survey of the upper Metolius River subbasin. USDA Forest Service, Sisters Ranger District, Sisters, Oregon.

Howell, P.K., D.S. Jones, L. Lavoy, W. Kendra, and D. Ortmann. 1985. Stock assessment of anadromous salmonids, Volume II. Final report to Bonneville Power Administration, U.S. Department of Energy. Portland, Oregon.

Isaacs, F.B. and R.G. Anthony. 2003. Results of the 2003 bald eagle nest survey. Oregon Cooperative Wildlife Research Unit. Oregon State University. Corvallis, Oregon.

Jackman, S.M. and J.M. Scott. 1975. Literature Review of Twenty-three Selected Forest Birds of the Pacific Northwest. USDA Forest Service, Region 6. 382 pp.

Jakober, M. 1992. Influence of stream size and morphology on the seasonal distribution and habitat use of resident bull trout and west slope cutthroat trout in Western Montana. Progress Report, USDA Forest Service, Intermountain Research Station, Fort Collins, Colorado.

Keyser, J.D., Burge,T.L. and Fleming, D.M. eds. 1988. Management strategy for treatment of lithic scatter sites. Portland, OR: U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior, Bureau of Land Management, Pacific Northwest Research Station.

Kulsaas, K. 1994. Soggy Sneakers: a guide to Oregon Rivers. Willamette Kayak and Canoe Club. Third Edition. The Mountaineers, Seattle, WA.

Laudenslayer, W.F. 2002. Cavity-nesting bird use of snags in eastside pine forests of northeastern California. Pacific Southwest Research Station, Fresno, California. USDA Forest Service Gen. Tech. Rep. PSW-GTR-181.

Lovtang, J.C. 2005. Distribution, habitat use, and growth of juvenile spring Chinook salmon in the Metolius River Basin, Oregon. Masters Thesis, Department of Fisheries and Wildlife, Oregon State University. Corvallis, OR. Reprinted by permission by Portland General Electric. Portland, Oregon.

Marshall, D.B., M.G. Hunter, and A.L. Contreras, Eds. 2003. Birds of Oregon: A General Reference. Oregon State University Press, Corvallis, OR. 768 pp.

McKelvey, K.S. and K.B. Aubry 2001. Response to Management of Canada Lynx in the Cascades Geographic Areas of Oregon and Washington: A white paper prepared by the Offices of Region 1 of the Fish and Wildlife Service. 12pp.

McKinney, S.P., O'Connor, J., Overton, C.K., MacDonald, K., Tu, K., and S. Whitwell. 1996. A characterization of inventoried streams in the Columbia River Basin. In Aqua Talk. Sept. 1996. USDA Pacific Northwest Region. No. 11.

McPhail, J.D. and C.B. Murray. 1979. The early life-history and ecology of Dolly Varden, *Salvelinus malma,* in the Upper Arrow Lakes. Department of Zoology and Institute of Animal Resources, Vancouver.

Minear, P.J. 1999. Historical riparian conditions and large in-channel wood, Deschutes River, Oregon. Portland General Electric, Portland, OR.

Mullan, J.W., K. Williams, G. Rhodus, T. Hillman, and J. McIntyre. 1992. Production and habitat of salmonids in mid-Columbia River tributary streams. U. S. Fish and Wildlife Service. Monograph 1.

Nehlsen, W. 1995. Historical salmon and steelhead runs of the upper Deschutes River and their environments. Portland General Electric Company, Hydro Licensing Department. Portland, Oregon.

O'Connor, J.E., Grant, G.E.; Haluska, T.L. 2003. Overview of geology, hydrology, geomorphology, and sediment budget of the Deschutes River Basin, Oregon. In A Peculiar River: Geology, Geomorphology, and Hydrology of the Deschutes River, Oregon. 2003. *Eds*. O'Connor, J.E. and G.E. Grant. American Geophysical Union, Washington, DC.

ODEQ (Oregon Department of Environmental Quality). 2003. Final 2002 303(d) database. www.deq.state.or.us/wq/303dlist/303dpage/htm

Olsen E.A., P.M.P. Beamesderfer, M.L. McLean, and E.S. Tinus. 1992. Salmon and steelhead stock summaries for the Deschutes River Basin: an interim report. Columbia River

Coordination Program, Oregon Department of Fish and Wildlife, Portland, Oregon. Contract DE-FC79-89BP94402, Project 88-108. Prepared for Bonneville Power Administration, Portland, Oregon.

Pajutee, M. 2007. Botanical Evaluation for Metolius River Wood Restoration Project: Biological Evaluation for Sensitive Plant Species, Survey and Manage Plant Species, and Invasive Plant Risk Assessment. USDA Sisters Ranger District, Project File.

Powell, R.A. and W.J. Zielinski. 1994. Chapter authors on Fishers. IN: Ruggerio, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski, tech eds. 1994. The Scientific Basis for Conserving Carnivores: American Marten, Fisher, Lynx and Wolverine in the Western United States. Gen. Tech. Rep. RM-254. Ft. Collins, CO: U.S. Dept. of Ag, Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 pp.

Pratt, K.L. 1992. A review of bull trout life history. Pages 5-9 *in* P.J. Howell and D.V. Buchanan, eds., Proceedings of the Gearhart Mountain Bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.

Ratliff, D.E. and P.J. Howell. 1992. The status of bull trout population in Oregon. Pages 10-17 *in* P.J. Howell and D.V. Buchanan, eds., Proceedings of the Gearhart Mountain Bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.

Reisenbichler, R.R., J.D. McIntyre, M.F. Solazzi, and S.W. Landino. 1992. Genetic variation in steelhead of Oregon and Northern California. Trans. American Fish. Soc. 121:158-69.

Reynolds, R.T., R.T. Graham, M. Hildegard Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce Jr., G. Goodwin, R. Smith, and E.L. Fisher. 1991. Management Recommendations for the Northern Goshawk in the Southwestern United States. USDA Forest Service, Southwestern Region. 182 pp.

Riehle, M., W. Weber, A.M. Stuart, S.L. Thiesfeld, and D.E. Ratliff. 1997. Progress report of the multi-agency study of bull trout in the Metolius River System, Oregon. Pages 137-144 *in* W.D. Makay, M.K. Brewin, and M. Monita, eds., Friends of the bull trout conference proceedings, Bull Trout Task Force (Alberta), c/o Trout Unlimited Canada. Calgary, Alberta.

Rieman, B.E. and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. General Technical Report INT-302, USDA Forest Service, Intermountain Research Station, Boise, Idaho.

Ruediger, B., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada Lynx Conservation Assessment and Strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT. 142 pp.

Ruggerio, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski, tech eds. 1994. The Scientific Basis for Conserving Carnivores: American Marten, Fisher, Lynx and Wolverine in the Western United States. Gen. Tech. Rep. RM-254. Ft. Collins, CO: U.S. Dept. of Ag, Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 pp.

Schreck, C.B., H.L. Li, R.C. Hjort, and C.S. Sharpe. 1986. Identification of Columbia River chinook and steelhead trout. Bonneville Power Administration Project 83-451, Portland, Oregon.

Shepard, B., K.L. Pratt, and P. Graham. 1984. Life history of west slope cutthroat and bull trout in the upper Flathead River Basin, Montana. Department of Fish, Wildlife, and Parks, Montana.

Sisters Ranger District Project Surveys and Wildlife Sightings Records.

Stalmaster, M. 1987. The Bald Eagle. Universe Books, New York, NY. 227 pp.

USDA.Forest Service. 1990. Deschutes National Forest land and resource management plan. Deschutes National Forest. Bend, OR.

USDA Forest Service. 1995. Inland Native Fish Strategy Environmental Assessment, Decision notice and finding of no significant impact for the interim strategies for managing fish-producing watersheds in eastern Oregon and Washington, Idaho, western Montana and portions of Nevada.

USDA Forest Service. 1996. Metolius Watershed Analysis. Sisters Ranger District, Deschutes National Forest, Sisters, Oregon.

USDA Forest Service 1996. Metolius Wild and Scenic River FEIS.

USDA Forest Service. 1997. Metolius River Wild and Scenic River Plan. USDA Forest Service. Supervisors Office. Deschutes NF. Bend, OR.

USDA Forest Service. 1999a. Metolius River Stream Survey Report. Unpublished USFS Report. Deschutes National Forest, Supervisors Office, Bend, OR.

USDA. 1999b. De-Listing of Species Under the Endangered Species Act. Pacific Northwest Region. Portland, OR.

USDA Forest Service. 2001. Upper Jack Creek Stream Survey Report. Unpublished USFS Report. Deschutes National Forest, Supervisors Office, Bend, OR.

USDA Forest Service. 2001. Record of Decision and Standards and Guidelines for the amendments to the survey and manage protection buffer and other mitigation measures standards and guidelines. USDA Forest Service and USDI Bureau of Land Management. Portland, Oregon.

USDA Forest Service. 2003. White Paper by S. Jeffries and D. Zalunardo. Canada lynx (*Lynx canadensis*) habitat mapping. Deschutes National Forest, Bend, OR. 3 pp.

USDA Forest Service. 2004. Metolius Watershed Analysis – Update. Deschutes National Forest, Sisters, Ranger District, Sisters, Oregon.

USDA Forest Service 2005. Region 6 Invasive Plant FEIS Record of Decision.

USDA Forest Service, 2006. Deschutes and Ochoco National Forests and Crooked River National Grassland Invasive Plant prevention Practices.

USDA. 2006. Joint Aquatic and Terrestrial Programmatic Biological Assessment August 2006 – August 2009 for Federal Lands within the Deschutes Basin Administered by the Bureau of Land Management Prineville Office and for Federal Lands Administered by the Deschutes and Ochoco National Forests.

USDI. 2007. Endangered and Threatened Wildlife and Plants; Removing the Bald Eagle in the Lower 48 States From the List of Endangered and Threatened Wildlife; Final Rule. 50 CFR Part 17. Federal Register. Vol. 72, No. 130. Monday, July 9, 2007. Rules and Regulations.

USDI Fish and Wildlife Service. 1986. Bald Eagle Recovery Plan.

USFWS. 1989. List of Endangered and Threatened Wildlife and Plants (March 1, 1989).

USFWS. 1994. Section 7 Consultation Guidance for the Forest Ecosystem Plan. Bureau of Land Management, USDA Forest Service, and US Fish and Wildlife Service.

USGS Northern Prairie Wildlife Research Center. 2003. Columbia spotted frog, Rana luteiventris, Oregon spotted frog, *Rana pretiosa*. Website: http://www.npwrc.usgs.gov/narcam/idguide/rpret.htm. Accessed: November 3, 2004.

Verts, B. J. and L. N. Carraway. 1998. Land Mammals of Oregon. University of CaliforniaPress, Berkeley, CA. 668pp.

Zimmerman, C.E. and G.H. Reeves. 1996. Steelhead and rainbow trout early life history and habitat use in the Deschutes River, Oregon. 1995 annual report. USDA Forest Service, Pacific Northwest Research Station, Project No. 656107. Portland General Electric, Portland, Oregon.

Zimmerman, C.E. and G.H.,Reeves. 1999. Steelhead and Resident trout: Early life history and habitat use in the Deschutes River, Oregon. Portland General Electric, Portland, Oregon.

Glossary

adfluvial- life strategy of fish where some part of the year juveniles or adults reside in a lake and migrate to tributary streams to spawn.

EA- Environmental Assessment

ESA- Endangered Species Act

fluvial- life strategy of fish where some part of the year juveniles or adults reside in a river and migrate to tributary streams to spawn.

MSA- Magnuson-Stevens Act

smolts- life stage of juvenile salmon when they experience physiological changes and migrate from fresh water river or lake habitats to ocean to rear until they become adults.

Appendix A- Monitoring Plan

Table 1. Monitoring plan for the Metolius River Wood Restoration Project

Type of Action (monitoring / evaluation)	**By Whom ?**	**What?**	**How?**	**# of years / # of times/year**
Implementation Monitoring	USFS and UDWC	Number and size of habitat added	Survey site and inventory logs, measure size of logs, size of slow water habitat, max depth of slow water	Once post implementation
Effectiveness Monitoring	USFS	Number, species, age class of fish using new structures	Snorkel counts, two surveyors, mostly at night to count fish in measured section along streambank above and below added wood or at randomly selected control sites.	1) Pre-project 2) Post-project
Site rehabilitation monitoring	USFS	Plant survival and weeds at construction sites	Inspect sites.	1) Pre-project 2) Post-project
Site Protection monitoring	USFS	Cultural Site	Inspect digging in high probability sites	During Implementation

Appendix B- Programmatic Biological Assessment, Project Design Criteria

Description of the Programmatic Aquatic Restoration Activity Categories

The FS, BLM and Coquille Indian Tribe propose to implement 19 aquatic restoration activities listed in Table 4. Aquatic Restoration Activity Categories—descriptions, design criteria, conservation measures and excluded activities. Table 4 provides general project descriptions and design criteria, as well as the philosophical underpinnings of why and how aquatic restoration projects in this ARBA will be conducted. Next, general conservation measures that are to be applied to all 19 activity categories are listed in the table. These standard measures were developed to minimize adverse effects to the aquatic environment and ESA-listed fish species and their designated Critical Habitat as well as MSA habitats. Following the general project descriptions and conservation measures, each of the 19 activity categories are fully described, complete with design criteria, and any conservation measures that are specific to that particular activity. Excluded activities are those actions that have affects which are not predictable on the scale of this ARBA. The FS, BLM and Coquille Indian Tribe are not discouraged from doing these excluded activities but such activities must undergo separate ESA/MSA consultation.

Table 4. Aquatic Restoration Activity Categories—descriptions, design criteria, conservation measures and excluded activities.

Activity Category	Project Description, Design Criteria, Conservation Measures, and Excluded Activities
1. Large Wood, Boulder, and Gravel Placement (includes tree removal for large wood projects) 2. Reconnection of Existing Side Channels and Alcoves 3. Head-cut Stabilization and Associated Fish Passage 4. Bank Restoration 5. Fish Passage Culvert and Bridge Projects 6. Irrigation Screen Installation and Replacement (includes weir removal) 7. In-channel Nutrient Enhancement 8. Floodplain Overburden Removal 9. Reduction of Recreation Impacts 10. Estuary Restoration 11. Riparian Vegetation Treatment (non-commercial) 12. Riparian and Upland Juniper Treatment (non-commercial) 13. Riparian Vegetation Treatment (controlled burning) 14 – 19 continued on next page.	a) **General Project Descriptions:** Aquatic habitat projects are designed and implemented to restore or enhance stream and riparian area function and fish habitat. These projects will improve channel dimensions and stability, sediment transport and deposition, and riparian, wetland, floodplain and, hydrologic functions, as well as water quality. Furthermore, such improvements will help address limiting factors—related to spawning, rearing, migration, and more—for ESA-listed and other native fish species. Aquatic habitat restoration and enhancement projects are conducted within stream channels, adjacent riparian/floodplain areas, wetlands, and uplands. Work may be accomplished using manual labor, hand tools (chainsaws, tree planting tools, augers, shovels, and more), all-terrain vehicles, flat-bed trucks, heavy equipment (backhoes, excavators, bulldozers, front-end loaders, dump trucks, winch machinery, etc). Helicopters will be used for many large wood projects and salmon carcass placement projects b) **General Project Design Criteria (PDC):** All projects will be guided by design criteria that help restore or enhance stream channel, riparian, wetland, and/or upland functions that would occur under natural disturbance regimes. c) **General Conservation Measures (CM):** Conservation measures are intended to minimize effects to the aquatic environment, and the following apply, when relevant, to all 19 activity types listed in this table: i. **Technical Skill and Planning Requirements** a. Ensure that an experienced professional fisheries biologist, hydrologist or technician is involved in the design of all projects covered by this BA. The experience should be commensurate with technical requirements of a project. If ESA-listed wildlife/plant species occur in the planning area, as determined by a unit wildlife biologist or botanist, the appropriate specialist will assist with project design. b. Planning and design includes field evaluations and site-specific surveys, which may include reference reach evaluations that describe the appropriate geomorphic context in which to implement the project. Planning and design involves appropriate expertise from professional staff or experienced technicians (e.g. engineer, silviculturist, fire/fuels specialists.) c. The project biologist should insure that PDCs and CMs are incorporated into any implementation contract agreements. If a biologist is not the Contracting Officers Representative (COR), then the biologist must regularly coordinate with the project COR to insure the PDCs and CMs are being followed. ii. **State and Federal Requirements** a. Follow the appropriate state (ODFW or WDFW) guidelines for timing of in-water work. Exceptions to ODFW and WDFW in-water work windows must be requested and granted from the appropriate state agency. Exceptions can be approved through documented phone conversations or email messages with the state agency(s). Such guidelines are intended to prevent project implementation in fish spawning habitat when spawning is taking place or while eggs and alevins fish are in gravel. b. Project actions will follow all provisions and requirements (including permits) of the Clean Water Act for maintenance of water quality standards as described by Oregon Department of Environmental Quality (Oregon FS and BLM), Washington Department of Ecology (Washington FS and BLM) and the MOU between WDFW and the USFS regarding Hydraulic Projects Conducted by USDA Forest Service, Pacific Northwest Region, January 2005. c. All regulatory permits and official project authorizations will be secured prior to project implementation.

Table 4. Aquatic Restoration Activity Categories—descriptions, design criteria, conservation measures and excluded activities.

Activity Category	Project Description, Design Criteria, Conservation Measures, and Excluded Activities
14. Riparian Area Invasive Plant Treatment 15. Riparian Exclusion Fencing (includes water gaps and stream crossings) 16. Riparian Vegetation Planting 17. Road Treatments 18. Removal of Legacy Structures 19. Survey and Monitoring (includes fisheries, hydrology, geomorphology wildlife, botany, and cultural surveys in support of ARBA activities)	iii. **Pollution and Erosion Control Plans (PECP)** – Develop and implement a PECP for each authorized project, one that includes methods and measures to minimize erosion and sedimentation associated with the project. The following measures will assist in the creation of a PECP. a. Spill Prevention Control and Containment Plan (SPCCP) – The contractor will be required to have a written SPCCP, which describes measures to prevent or reduce impacts from potential spills (fuel, hydraulic fluid, etc). The SPCCP shall contain a description of the hazardous materials that will be used, including inventory, storage, handling procedures; a description of quick response containment supplies that will be available on the site (*e.g.*, a silt fence, straw bales, and an oil-absorbing, floating boom whenever surface water is present.) b. The PECP should be included in construction contracts or force account work plans. c. The PECP must be commensurate with the scale of the project and include the pertinent elements of iv., v., vi., vii. listed below. iv. **Minimize Site Preparation Impacts** a. Establish staging areas (used for construction equipment storage, vehicle storage, fueling, servicing, hazardous material storage, etc) beyond the 100-year floodplain in a location and manner that will preclude erosion into or contamination of the stream or floodplain. b. Minimize clearing and grubbing activities when preparing staging, project, and or stockpile areas. Stockpile large wood, trees, vegetation, sand, topsoil and other excavated material, that is removed when establishing area(s) for site restoration c. Materials used for implementation of aquatic restoration categories (e.g. large wood, boulders, fencing material etc.) can be staged within the 100-year floodplain. d. Prior to construction, flag critical riparian vegetation areas, wetlands, and other sensitive sites to prevent ground disturbance in these areas. e. Place sediment barriers prior to construction around sites where significant levels of erosion may enter the stream directly or through road ditches. Maintain barriers throughout construction. f. Where appropriate, include hazard tree removal (amount and type) in project design. Fell hazard trees within in riparian areas when they pose a safety risk. If possible, fell trees towards the stream. Keep felled trees on-site when needed to meet coarse woody debris objectives. g. Wildlife biologist should determine if a hazard tree is a potential ESA listed bird nest tree. Nesting trees that are hazardous to restoration activities may only be removed outside of active nesting season. v. **Minimize Heavy Equipment Impacts** a. Consider contracting with operators who use non-petroleum lubricants and fluids in their machinery. b. The size and capability of heavy equipment will be commensurate with the project. c. All equipment used for instream work shall be cleaned and leaks repaired prior to entering the project area. Remove external oil and grease, along with dirt and mud prior to construction. Thereafter, inspect equipment daily for leaks or accumulations of grease, and fix any identified problems before entering streams or areas that drain directly to streams or wetlands d. All equipment shall be cleaned of all dirt and weeds before entering the project area to prevent the spread of noxious weeds.

Table 4. Aquatic Restoration Activity Categories—descriptions, design criteria, conservation measures and excluded activities.

Activity Category	Project Description, Design Criteria, Conservation Measures, and Excluded Activities
	Minimize Heavy Equipment Impacts (continued) e. Equipment used for instream or riparian work shall be fueled and serviced in an established staging area outside of riparian zone. When not in use, vehicles shall be stored in the staging area. f. Minimize the number and length of stream crossings and access routes through riparian areas. Crossings and access routes should be at right angles. Stream crossings shall not increase risks of channel re-routing at low and high water conditions and shall avoid potential listed fish spawning areas when possible. g. Existing roadways or travel paths will be used whenever reasonable. Minimize the number of new access paths to minimize impacts to riparian vegetation and functions. h. Project operations must cease under high flow conditions that inundate the project area, except for efforts to avoid or minimize resource damage. i. Minimize time in which heavy equipment is in stream channels, riparian areas, and wetlands. When operating heavy equipment in stream channels it is because project specialists reasoned that such actions are the only reasonable alternative for implementation and/or would result in less sediment in the stream channel or damage (short- or long-term) to the overall aquatic/riparian ecosystem relative to other alternatives. vi. **Site Restoration** a. Upon project completion, remove project related waste. b. Initiate rehabilitation of all disturbed areas in a manner that results in similar or better than pre-work conditions through spreading of stockpiled materials (from C, iv. b. above), seeding, and/or planting with locally native seed mixes or plants. Planting shall be completed no later than spring planting season of the year following construction. c. Short-term stabilization measures may include the use of non-native sterile seed mix (when native seeds are not available), weed-free certified straw, jute matting, and other similar techniques. Short-term stabilization measures will be maintained until permanent erosion control measures are effective. Stabilization measures will be instigated within three days of construction completion. d. All riparian plantings shall follow FS direction described in the Regional letter to Units, Use of Native and Nonnative Plants on National Forests and Grasslands May 2006 (Final Draft), and or BLM Instruction Memorandum No. OR-2001-014, Policy on the Use of Native Species Plant Materials (Appendix B). e. When necessary, loosen compacted areas, such as access roads, stream crossings, staging, and stockpile areas. vii. **Wildlife General Conservation Measures** – For wildlife conservation measures common to all activities, see Chapter II, Section C, and Chapter V, Section E.

Table 4. Aquatic Restoration Activity Categories—descriptions, design criteria, conservation measures and excluded activities.

Activity Category	Project Description, Design Criteria, Conservation Measures, and Excluded Activities
1. Large Wood, Boulder, and Gravel Placement (Includes tree removal for large wood projects)	a) **Description** – Place large wood (LW) and/or boulders in stream channels and adjacent floodplains to increase channel stability, rearing habitat, pool formation, spawning gravel deposition, channel complexity, hiding cover, low velocity areas, and floodplain function. In areas where natural gravel supplies are low (immediately below reservoirs, for instance), gravel placement can be used to improve spawning habitat. Full channel-spanning porous boulder weirs (boulder weirs) can only be installed in streams with a legacy of splash damming, stream cleaning, or other activities that have resulted in highly uniform, incised, bedrock-dominated channels with few boulders or woody debris. Live and or dead trees may be removed to provide LW for restoration projects, under special conditions described herein. Large wood, boulder, boulder weirs and gravel projects would include the use of log trucks and dump trucks for transport and excavator-type machinery, spyders, cable yarders, draft horses, or helicopters for placement b) **Design Criteria** i. **LW , Boulder, and Gravel Placement** a. Place LW and boulders only in those areas where they would naturally occur and in a manner that closely mimic natural accumulations for that particular stream type. b. LW includes whole conifer and hardwood trees, logs, and root wads. LW size (diameter and length) should account for bankfull width and stream discharge rates. When available, trees with rootwads should be a minimum of 1.5x bankfull channel width, while logs without rootwads should be a minimum of 2.0 x bankfull width. Structures may partially or completely span stream channels or be positioned along stream banks. c. No conifers should be felled in the riparian area for in-channel large wood placement unless conifers are fully stocked and are consistent with project design criteria in vegetation treatment categories. Felled hazard trees can be used for in-channel wood placement. d. Key boulders (footings) or LW can be buried into the stream bank or channel but shall not constitute the dominant placement method of boulders and LW. e. Anchoring Large Wood– Anchoring large wood with cable should be used sparingly, primarily for the protection of infrastructure and in consideration of downstream landowner concerns. Before using cable, attempt to use, when feasible, the following anchoring alternatives in preferential order: (1) use of adequate sized wood sufficient for stability (2) oriented and place wood in such a way that movement is (3) ballasting (gravel and/or rock) is used to increase the mass of the structure to resist movement (4) use large boulders as anchor points for the large wood, and (5) wood is pinned with rebar to large rock to increase its weight f. Gravel augmentation should only occur in areas where the natural supply has been eliminated or significantly reduced through anthropogenic means. Gravel to be placed in streams shall be a properly sized gradation for that stream, clean, and non-angular. When possible use gravel of the same lithology as found in the watershed. After gravel placement, allow the stream to naturally sort and distribute the material. g. If other aquatic restoration activities included in this ARBA are used as complementary actions, follow the associated design criteria and conservation measures.

Table 4. Aquatic Restoration Activity Categories—descriptions, design criteria, conservation measures and excluded activities.

Activity Category	Project Description, Design Criteria, Conservation Measures, and Excluded Activities
Large Wood, Boulder, and Gravel Placement (includes tree removal for large wood projects) **Continued**	ii. **Boulder Weirs** a. Full channel spanning boulder weirs are to be installed only in highly uniform, incised, bedrock-dominated channels to enhance or provide fish habitat in stream reaches where log placements are not practicable due to channel conditions (not feasible to place logs of sufficient length, bedrock dominated channels, deeply incised channels, artificially constrained reaches, etc.), where damage to infrastructure on public or private lands is of concern, or where private landowners will not allow log placements due to concerns about damage to their streambanks or property. b. Install boulder weirs low in relation to channel dimensions so that they are completely overtopped during channel-forming flow events (approximately a 1.5-year flow event). If larger boulders are needed to withstand bankfull flows, boulder size should be determined through site specific analysis—such as shear stress analysis—and should not promote bank scouring and channel routing around the structure. c. Boulder weirs are to be placed diagonally across the channel or in more traditional upstream pointing "V" or "U" configurations with the apex oriented upstream. Boulder weirs are to be constructed to allow upstream and downstream passage of all native fish species and life stages that occur in the stream. This can be accomplished by providing plunges no greater than 6" in height, allowing for juvenile fish passage at all flows. d. The use of gabions, cable or other means to prevent the movement of individual boulders in a boulder weir is not allowed. e. Rock for boulder weirs shall be durable and of suitable quality to assure permanence in the climate in which it is to be used. Rock sizing depends on the size of the stream, maximum depth of flow, planform, entrenchment, and ice and debris loading f. The project designer or an inspector experienced in these structures should be present during installation. g. Full spanning boulder weir placement should be coupled with measures to improve habitat complexity and protection of riparian areas to provide long-term inputs of LWD. h. If other aquatic restoration activities included in this ARBA are used as complementary actions, follow the associated design criteria and conservation measures. iii. **Tree Removal for LW Projects** a. Tree felling in suitable nesting or dispersal habitat for Northern Spotted Owl (NSO), Marbled Murrelet (MM) and or bald eagles must occur after the disturbance dates listed in Tables 7a-7d. b. A wildlife biologist must be fully involved in all "Individual Tree Removal" planning efforts, and be involved in making decisions on whether individual trees are suitable for nesting or have other important listed bird habitat value. c. Trees may be removed by cable, ground-based equipment, horses or helicopters, and or felled directly into the stream. Felled trees may be stock piled for later use for instream restoration projects. d. No suitable nesting trees greater the 36" dbh are to be removed. Trees greater than 36" may be felled if a wildlife biologist determines those trees do not provide suitable nesting habitat. e. Individual trees or small groups of trees (<5) should come from the periphery of permanent openings (roads etc) or from the periphery of non-permanent openings (e.g. plantations, along recent clear-cuts etc). f. When acquiring trees from an area burned by wildfire, consult with a wildlife biologist for assistance in determining the location and number of trees that can be acquired.

Table 4. Aquatic Restoration Activity Categories—descriptions, design criteria, conservation measures and excluded activities.

Activity Category	Project Description, Design Criteria, Conservation Measures, and Excluded Activities
Large Wood, Boulder, and Gravel Placement (Includes tree removal for large wood projects) **Continued**	**Tree Removal for LW Projects (Continued)** g. Single tree removal may only be removed from the first two lines of trees from iv., e, above. h. Trees selected for LW restoration projects must be spaced at least one site potential tree height apart and at least one crown width from any trees with potential nesting structure for ESA listed bird species. i. No conifers should be felled in the riparian area for in-channel large wood placement unless conifers are fully stocked and are consistent with project design criteria in vegetation treatment categories. Felled hazard trees can be used for in-channel wood placement j. When removing LW from an area burned by a wildfire, consult a wildlife biologist to determine the latitude in which trees can be removed. c) **Conservation Measures** – No additional conservation measures are required d) **Excluded Activities**– The following activities are not included in this ARBA: In non-bedrock dominated systems, boulder weirs greater than ½ the channel width; an individual structure, such as a log jam, longer than 7 bankfull channel widths. Full spanning boulder weir structures installed perpendicular to the streamflow in bed-rock dominated streams are not covered in this consultation. Full spanning, downstream pointed U or V style weirs are not covered in this consultation.
2. **Reconnection of Existing Side Channels and Alcoves**	a) **Description** – Reconnect and/or restore existing side channels and alcoves to increase rearing habitat for juvenile fish and high flow refuge areas for all life stages of fish. Functioning side channels have inlet and outlet connections to the main channel and often contain flow only during flood events—bankfull or greater. Functioning alcoves are back-water channels that typically contain water during both low and high flows. This action includes the removal of plugs which block water movement through side channels and alcoves. Further, side channel and alcove improvements include fill removal within channels and alcoves, large wood (LW) and/or boulder placement, riparian planting etc. Boulder placement may be used in the main river to stabilize the channel and bring the entrance of the side channel into alignment (vertically and horizontally). Construction would involve use of heavy equipment, such as excavators, spyders, backhoes, and dump trucks. b) **Design Criteria** i. Excavated material removed from side-channels or alcoves shall be hauled to an upland site or spread across the adjacent floodplain in a manner that does not restrict floodplain capacity. ii. Design and construct side-channels in such a manner as to prevent the capture and relocation of the main channel. iii. Design project to naturally maintain inlet and outlet connections with the main stream channel (i.e. placement of LW to increase local scour). iv. Should fish rescue occur, use fish handling criteria listed under activity #5. v. If other aquatic restoration activities included in this ARBA are used as complementary actions, follow the associated design criteria and conservation measures. c) **Conservation Measures** – No additional conservation measures are required. d) **Excluded Activities** – Creation of new side channels and excavation of severely aggraded (completely filled in) side channels and alcoves.

Appendix C- Biological Opinions, Terms and Conditions

National Marine Fisheries Service Terms and Conditions

Reasonable and Prudent Measures

Reasonable and prudent measures are nondiscretionary measures to avoid or minimize take that must be carried out by cooperators for the exemption in section 7(o)(2) to apply. The Action Agencies have the continuing duty to regulate the activities covered in this incidental take statement where discretionary Federal involvement or control over the action has been retained or is authorized by law. The protective coverage of section 7(o)(2) will lapse if the Action
114

Agencies fail to exercise their discretion to require adherence to terms and conditions of the incidental take statement, or to exercise that discretion as necessary to retain the oversight to ensure compliance with these terms and conditions. The NMFS believes that full application of conservation measures included as part of the proposed action, together with use of the reasonable and prudent measures and terms and conditions described below, are necessary and appropriate to minimize the likelihood of incidental take of listed species due to completion of the proposed action.

The Action Agencies shall:

1. Minimize incidental take from the proposed activity categories.
2. Ensure completion of a monitoring and reporting program to confirm that the Terms and Conditions in this Incidental Take Statement are effective in avoiding and minimizing incidental take from permitted activities.

Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the Action Agencies and their cooperators, if any, must fully comply with conservation measures described as part of the proposed action and the following terms and conditions that implement the reasonable and prudent measures described above. Partial compliance with these terms and conditions may invalidate this take exemption, result in more take than anticipated, and lead NMFS to a different conclusion regarding whether the proposed action will result in jeopardy or the destruction or adverse modification of designated critical habitats.

1. To implement Reasonable and Prudent measure #1, the Action Agencies shall ensure that all proposed conservation measures and design criteria for each activity type be implemented.
2. To implement Reasonable and Prudent measure #2 (monitoring and reporting), the Action Agencies shall:
    a. Ensure the survival of at least 80 percent of plantings used in revegetation activities for at least three years post-planting.
    b. Use the NMFS Public Consultation Tracking System- Consultation Initiation and Reporting System (CIRS) (http://www.nmfs.noaa.gov/pcts) when this online system becomes available (anticipated launch date April 15, 2007) and Action Agency staff have been trained to use it. Prior to the CIRS becoming available, the Action Agencies shall provide the following information in paper form to the NMFS Oregon

State Habitat Office (OSHO) for projects implemented in Oregon, or the Washington State Habitat Office for projects implemented in Washington State.

The following information shall be provided:

1. A project notification report will be provided at least 30 days prior to implementation of any proposed project. This report should contain the following:
    a. Location: 6th field HUC, 12 digit code, and name
    b. Timing: Anticipated project start and dates
    c. Activity Type: Identify all proposed activity types that apply.
    d. Project Description: Brief narrative of the project and objectives
    e. Extent: Number of stream miles to be treated
    f. Species Affected: Listed fish and or wildlife species, critical habitat, and or EFH affected by the project.
2. Project Completion Report will be provided within 120 days of project completion. This report should contain the following:
    a. Timing: Actual project start and end dates
    b. The extent of the turbidity plume generated by any inwater construction activities.
    c. Agency contact information: Agency and project lead name.
    d. Fish Handling: If fish are handled during rescue operations the project biologist will describe removal methods, stream conditions, and the number of fish affected. This report will likely be limited to culvert replacement projects.
    e. Post-project assessment: The results of the Action Agencies' post project assessment should be report to NMFS.
    f. Prior to the launch of the CIRS system, the Action Agencies shall track implementation of this programmatic consultation at a regional level to ensure that the amount and extent of take identified in Table 16 is not exceeded.

NOTICE. If a sick, injured or dead specimen of a threatened or endangered species is found in the project area, the finder must notify NMFS through the contact person identified in the transmittal letter for this Opinion, or through NMFS Office of Law Enforcement at 1-800-853-1964, and follow any instructions. If the proposed action may worsen the fish's condition before NMFS can be contacted, the finder should attempt to move the fish to a suitable location near the capture site while keeping the fish in the water and reducing its stress as much as possible. Do not disturb the fish after it has been moved. If the fish is dead or dies while being captured or moved, report the following information: (1) NMFS consultation number (found on the top left of the transmittal letter for this Opinion), (2) the date, time, and location of discovery, (3) a brief description of circumstances and any information that may be relevant to the cause of death, and (4) photographs of the fish and where it was found. NMFS also suggests that the finder coordinate with local biologists to recover any tags or other relevant research information. If the specimen is not needed by local biologists for tag recovery or by NMFS for analysis, the specimen should be returned to the water in which it was found, or otherwise discarded.

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

The consultation requirement of section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions, or proposed actions that may adversely affect EFH. Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that may be taken by the action agency to conserve EFH.

The Pacific Fishery Management Council (PFMC) designated EFH for Pacific groundfish (PFMC 1998a), coastal pelagic species (PFMC 1998), and Pacific salmon (PFMC 1999). The proposed action and covered area are detailed above in the Introduction Section of this document. The USDA Forest Service, USDI Bureau of Land Management, and USDI Bureau of Indian Affairs are the action agencies for the proposed Program for Fish Habitat Restoration Activities in Oregon and Washington. The covered area includes habitats designated as EFH for various life-history stages of Pacific salmon, groundfish, and coastal pelagic species (Table 17). In addition, the covered activities will occur in, or adjacent to, habitats designated as Habitat Areas of Special Concern (HAPC) for Pacific groundfish (PFMC 2005). These HAPCs include estuaries, canopy kelp, seagrasses, rocky reefs, and the coastal waters and substrates of the States of Oregon and Washington from the mean higher high water line seaward to the three nautical mile boundary of the territorial sea. Based on information provided in the Biological Assessment and the analysis of effects presented in the Effects of the Action section of this document, the proposed action may result in adverse impacts to a variety of habitat parameters important to salmonids. Because the conservation measures included as part of the proposed action to address ESA concerns are adequate to avoid, minimize, or otherwise offset potential adverse effects to the EFH of groundfish and coastal pelagic species in Table 17 no adverse impacts to EFH or HAPCs of those species are anticipated.

The Biological Assessment clearly identifies anticipated impacts to the EFH for Pacific salmon that are likely to result from the proposed activities and the measures that are necessary and appropriate to minimize those impacts. These effects include delivery of sediments to streams through road decommissioning; head-cut stabilization; large wood, boulder, or gravel placement; culvert replacement; and removal of instream legacy structures.

NMFS determined that the action will have adverse effects on EFH for Chinook salmon, coho salmon, and pink salmon as follows:

1. Short-term degradation of water quality (turbidity) from road decommissioning; head-cut stabilization, large wood, boulder, or gravel placement, culvert replacement activities, and removal of instream legacy structures.
2. Short-term degradation of water quality (temperature) from reduction in riparian shade during riparian vegetation treatments that open the forest canopy.
3. Short-term reduction in the extent of small woody debris available for recruitment to streams and sediment capture (affecting structural components of instream habitat).
4. Short-term reduction in salmon food sources as a result of herbicide treatments to control invasive plant species.

All of these effects influence the ability of affected areas to support salmonid spawning, incubation, larval development, juvenile growth and mobility, and adult mobility. For a more detailed description and analysis of these effects, see Effects of the Action section of this document.

Essential Fish Habitat Conservation Recommendations

The conservation measures included in the Biological Assessment as part of the proposed activities are adequate to avoid, minimize, or otherwise offset the potential adverse effects, described above, from these activities to designated EFH for Chinook salmon, coho salmon, and Puget Sound pink salmon. NMFS understands that the Forest Service, BLM, and BIA intend to implement these conservation measures to minimize potential adverse effects to the maximum extent practicable. NMFS recommends that in order track implementation of restoration actions that occur in EFH. The Action Agencies implement the following conservation recommendation:

The Action Agencies should use the NMFS Public Consultation Tracking System- Consultation

Initiation and Reporting System (CIRS) (http://www.nmfs.noaa.gov/pcts) when this system becomes available (anticipated launch date April 15, 2007) and the Action Agency staff have been trained to use it. Prior to the CIRS becoming available, the Action Agencies should provide the following information in paper form to the NMFS Oregon State Habitat Office (OSHO) for projects implemented in Oregon, or the Washington State Habitat Office for projects implemented in Washington State.

A project notification report will be provided at least 30 days prior to implantation of the propose project. This report should contain the following:

a. Location – Sixth field HUC and stream name
b. Timing – Anticipated project start and dates
c. Activity Type – Identify all proposed activity types that apply.
d. Project Description – Brief narrative of the project and objectives
e. Extent – Number of stream miles to be treated
f. Species Affected – Listed fish and or wildlife species, critical habitat, and or EFH affected by the project.

2. Project Completion Report will be provided within 120 days of project completion. This report should contain the following:
    a. Timing – Actual project start and end dates
    b. The extent of the turbidity plume generated by any inwater construction activities.
    c. Agency contact information – Agency and project lead name.
    d. Fish handling – If fish are handled during rescue operations the project biologist will describe removal methods, stream conditions, and the number of fish affected. This report will likely be limited to culvert replacement projects.
    e. Post-project assessment – The results of the Action Agencies' post project assessment should be report to NMFS.

Appendix C- US Fish and Wildlife Service Terms and Conditions

Reasonable and Prudent Measures

Reasonable and prudent measures are nondiscretionary measures to avoid or minimize take that must be carried out by Action Agencies or their contractors for the exemption in section 7(o)(2) to apply. The Action Agencies have the continuing duty to regulate the activities covered in this incidental take statement where discretionary Federal involvement or control over the action has been retained or is authorized by law. The protective coverage of section 7(o)(2) will lapse if the Action Agencies fail to exercise their discretion to require adherence to terms and conditions of the incidental take statement, or to exercise that discretion as necessary to retain the oversight to ensure compliance with these terms and conditions.

The Service believes that full application of the CMs, PDCs, and Level 1 Team coordination processes included as part of the proposed action, together with use of the reasonable and prudent measures and term and conditions described below, are necessary and appropriate to minimize the likelihood of incidental take of listed species due to implementation of the proposed action.

The Action Agencies Shall:

Reasonable and Prudent Measure 1: Only those Action Agency employees who are well informed of the programmatic aquatic restoration implementation process, CMs, and PDCs shall use the programmatic aquatic restoration consultation.

Term and Condition 1.1: Prior to using this complex programmatic BO, FS and BLM shall provide instruction to Action Agency Level 1 team members and other Action Agency practitioners, covering the 19 programmatic activity categories, Level 1 ESA coordination process, monitoring, and reporting requirements.

Listed Fish:

Reasonable and Prudent Measure 2: Reduce potential for project-related sediment to impact listed fish and habitat adjacent to and downstream of aquatic restoration activity sites.

Term and Condition 2.1: Visually monitor project-related ***turbidity*** below each Group One aquatic restoration activity, where work using heavy equipment modifies stream bed and/or bank substrates. Visual monitoring will be conducted to determine if project-related turbidity below project sites is greater than 10 percent above background conditions. Visual monitoring of project-related turbidity will occur during construction activities at ½ mile (below project sites where fine sediments comprise a high percent of stream bed and banks) or ¼ mile (below project sites where fine sediments comprise a low percent of stream bed and banks) below each project site. If turbidity is visually determined to be exceeding these downstream limits of adverse impact, immediately review project site to determine if all activity-specific PDCs and CMs are being

185

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act requires federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the Action Agencies implement the following conservation measures.

General

1) Host annual project tours of select aquatic restoration activities for Level 1 and other Service Personnel. Provide project design data (cross sections, hydrology analysis, photos, etc) during project tours.

2) To protect and conserve lamprey and freshwater mussels in the project area that may be dewatered, implement the following protective measures:
   - Avoid dewatering unless necessary
   - If dewatering cannot be avoided, ramp flows for dewatering slowly over several days including nighttime, leave small depressional area that won't be affected by excavation as an escape area for lampreys, move lampreys and mussels out of project area or cover areas with straw to keep the area moist, avoid disturbance to these areas.

Bull Trout

1) Prioritize the culvert restorations based upon providing the greatest conservation benefits to bull trout pursuant to the draft recovery plans and/or by considering the following hierarchy:

- Where isolating factors are due to fish passage barriers at culverts, restore connectivity to small (less than 500 fish), remnant local populations if the risk of extirpation from isolation is eminent, unless a brook trout population exists that could impact bull trout;
- Where isolating factors are due to fish passage barriers at culverts, restore connectivity between subpopulations and/or core areas;
- Restore connectivity to high quality spawning and rearing habitat to expand the distribution of bull trout into areas with high reproductive potential.

2) Restore or enhance habitat conditions to maximum carrying capacity prior to or concurrent with culvert replacement or removal projects in those watersheds where aquatic and riparian habitat conditions preclude the recolonization or long-term persistence of bull trout populations.

3) Coordinate with the Service to develop a monitoring and evaluation program for the purpose of tracking progress towards attainment of bull trout recovery objectives for connectivity. The program should be designed with the following considerations:

- Document the benefits of restoring connectivity through implementation of the FS culvert replacement program by assessing the response of bull trout in terms of changes in population demography, reproduction, distribution, and growth rates;
- Assess bull trout response to changes in downstream habitat conditions using metrics proposed by Newcombe and Jensen (1996) or other appropriate measures to address the effects of turbidity, total suspended solids, and sediment deposition caused by culvert installations; and,
- Assess changes in sediment transport, debris conveyance, and stream function from pre-project conditions in response to installing culverts with stream simulation designs pursuant to the following guidance:

Tier 1: Extensive monitoring, done at all sites. Data to be collected immediately after project completion, then repeated after first subsequent wet season, and again after significant high flow events (25-year floods or greater).

Objectives:

1. Identify and quantify channel incision or aggradation, if any, in vicinity of project. (Tools: survey benchmarks, longitudinal profile, permanent cross sections, photo points);

2. Identify and quantify channel widening or bank erosion, if any, in vicinity of project. (Tools: longitudinal profile, permanent cross sections, photo points);

3. Assess project-related surface erosion and mass wasting. (Tools: photo points);

4. Assess vegetation recovery. (Tools: photo points);

5. Assess attainment and persistence of physical conditions necessary for fish passage (including dry season surface flow);

6. Semi-quantitatively document changes to streambed substrate in project vicinity (e.g., use streambed photography and substrate embeddedness indices);

7. Assess passage of sediment (Tools: photo points, cross sections, streambed photography);

8. Assess passage of organic debris. (Tools: photo points).

Tier 2: Intensive monitoring on stratified random sample of 12 sites region-wide:

Objectives:

1. Physically characterize the site:
   a. channel classification; geomorphic characterization (identification of geomorphic surfaces, source/transport/depositional/exchange reach, valley type or setting);
   b. channel dimensions;
   c. streambed surface and subsurface particle size assessment;
   d. streambank and exposed fillslope sampling and assessment of erosion/mass failure potential; multiple cross sections;
   e. longitudinal profile;
   f. hydrological characterization to estimate flood magnitudes and monthly mean flows;
   g. Large woody debris loading and mobility;

2. Quantify the magnitude and downstream extent of project-related turbidity and suspended sediment during the construction period;

3. Quantify the extent and magnitude of streambed surface deposition and subsurface siltation;

4. Quantify any changes in fine particle component of suitable spawning sites in the project vicinity (surface and subsurface);

5. Quantify the extent and magnitude of wet-season coarse sediment mobilization at the project site and in the reach;

6. Quantify project-related surface erosion and mass wasting;

7. Repeat surveys to determine channel and substrate changes for five years;

8. Direct assessment of fish passage with cooperation from the Service and WDFW;

9. At four of the sites, selected for representative conditions, monitor first wet-season suspended sediment loads and levels upstream (background) and downstream of project. (Tools: automated dataloggers with turbidity meters, water level recorders and bottle samplers).

10) All culverts that fail to meet design specifications, fail to provide passage for bull trout, or result in large-scale sedimentation or mass wasting should be reviewed and analyzed by the Master Performer Team prior to conducting remedial treatments. Reasons for the failure should be summarized and guidance provided to all the administrative units explaining the basis for the failure and how to avoid future failures.