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of Agriculture

**Forest
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Environmental Assessment

Indigo and Middle Fork Willamette Enhancement Project

**Middle Fork Willamette Ranger District
Willamette National Forest
Lane County, Oregon**

**Legal Locations: T.23S., R 3 E., Sections 9, 16, 21, 28, and 34
T.24S., R 3 E., Sections 3, 4, 10, 11, 12, and 13
T.24S., R 4 E., Sections , 10, 11, 12, 15, 16, 17, 18
T.24S., R 5 E., Section 18**

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Project Site Map

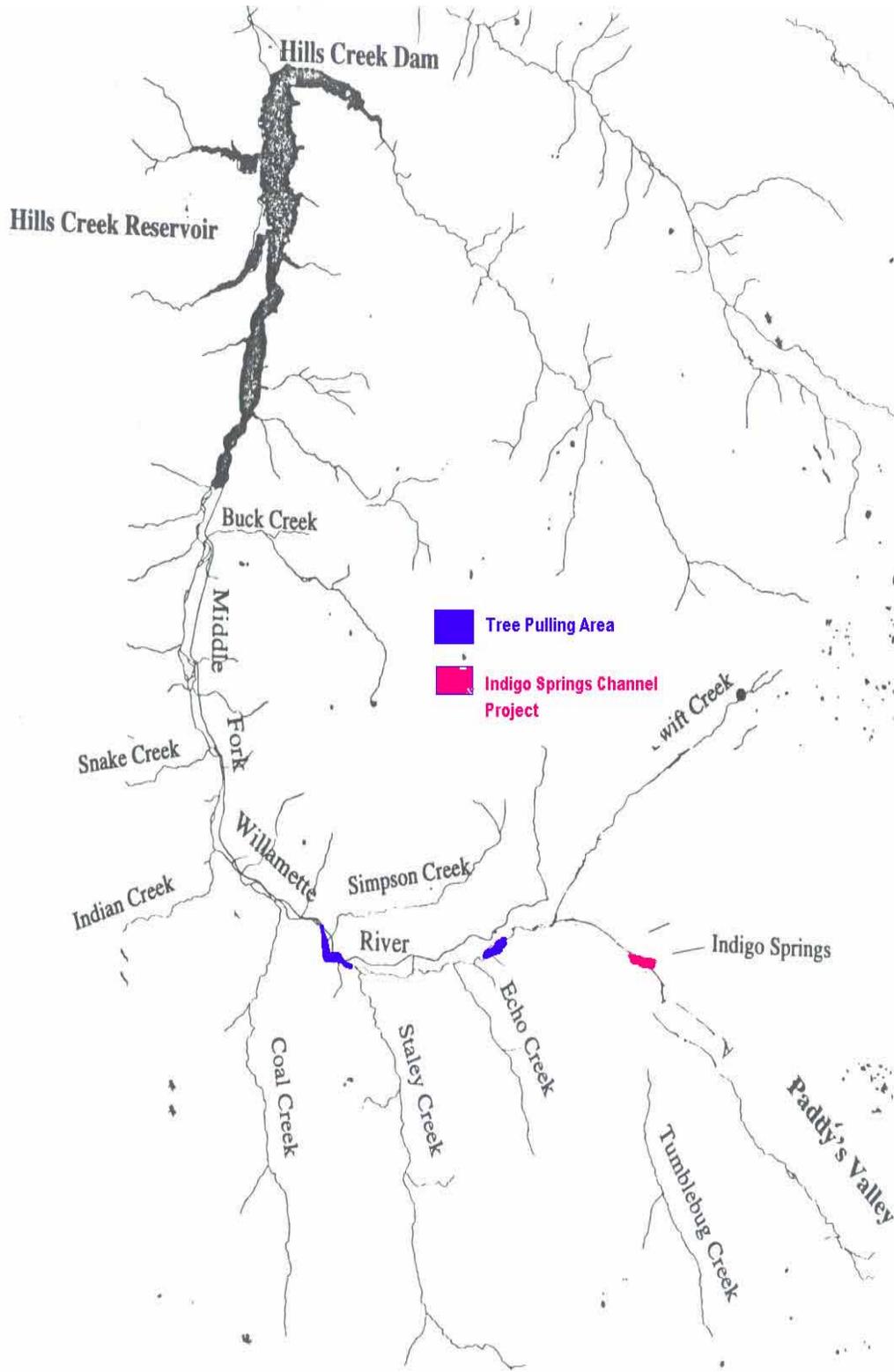


Table of Contents

Executive Summary	i
Purpose and Need for Action.....	1
Document Structure	1
Background	2
Proposed Action.....	2
Decision Framework	4
Public Involvement.....	4
Issues	5
Alternatives, including the Proposed Action.....	6
Alternative 1	6
Alternative 2.....	6
Mitigation Common to All Alternatives	9
Comparison of Alternatives.....	10
Table 1. Alternative Comparison Table	10
Environmental Consequences.....	10
Issue #1 Northern Spotted owl Effects.....	11
Issue #2 Water Quality	11
Alternative Effects on Resources other Than Project Specific Issues	12
Consultation and Coordination.....	22
Appendix A	24

Executive Summary

The Middle Fork Ranger District proposes to complete stream enhancement projects in the Upper Middle Fork Willamette River (HUC# 1709000101) and Hills Creek Reservoir (HUC# 1709000105) Watersheds to benefit bull trout and Spring Chinook salmon. In general, these projects would consist of placing large wood into the Middle Fork Willamette River and several tributaries. In addition, approximately 20 trees identified as “secondary “or non-dominate would be pulled over to utilize the entire tree and root wad for enhancement purposes. Our intent is to add approximately 1000 pieces of large wood and 400 rootwads to the stream system over the next five years (beginning in 2007 and continuing as additional funding becomes available). The majority of trees (800) would be placed by helicopter and approximately 180 would be placed with ground machines (excavator, backhoe etc) from existent access roads.

A second component of the project is to add a fish passage structure for bull trout at Indigo Springs. The stream channel would also be rerouted back into its original channel for about 150 feet on both sides of road 2100 to construct additional bull trout habitat. Large trees and gravel would be placed in the original channel sections to provide rearing and spawning habitat.

This Environmental Assessment (EA) addresses the environmental effects of completing the stream enhancement projects and the construction of a fish passage structure and spawning channel at Indigo Springs, the activities required to mitigate potential effects, alternatives considered, and public input received relating to the proposal.

Purpose and Need for Action

The purpose of this proposal is to enhance fish habitat in the Middle Fork Willamette River and several tributaries, provide fish passage and increase the amount of spawning habitat in Indigo Springs. The Indigo Springs culvert has been recognized as a barrier to fish passage. As currently configured, this culvert is not passable by any age class of fish since there is about a three-foot drop at the culvert's outlet. The length of the culvert and its concrete apron is greater than 65 ft., and the culvert lacks roughness characteristics. Roughness is necessary to create velocity breaks. The lack of velocity breaks prevents fish from resting in their attempt to migrate upstream through the long culvert.

Local biologists have identified Indigo Springs above the culvert as high quality spawning and rearing habitat for listed bull trout. The recently updated Watershed Analysis for the Upper Middle Fork Watershed (USDA, 2002) and the Bull Trout Recovery Plan (USFWS) has recommended providing fish passage at Indigo Springs. The updated WA also calls for the addition of stream enhancement structures in the Middle Fork Willamette and its tributaries to increase spawning habitat for bull trout and salmon. Recent stream surveys of the Middle Fork Willamette and many of the surrounding tributaries show a lack of spawning and pool habitat, which is directly related to the lack of large wood in the stream channels. Low volumes of large wood can impact the desired function of streams in terms of interaction with stream flow. Based on the amounts of large wood recorded in numerous stream surveys in the watershed there is a need to enhance the current levels of in-stream wood with additional pieces to develop spawning habitat. The purpose and need for this proposal responds to the general direction contained in the Northwest Forest Plan (USDA/USDI, 1994) standards and guidelines RF-4 and RF-6 (page C-33) for replacement of culverts which do not pass a 100 year flood and to provide for fish passage at all road crossings of fish-bearing streams.

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 impacts 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 significant 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 an environmental component. Within each section, the affected environment is described first, followed by the effects 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.
- **Appendices:** The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Middle Fork Willamette Ranger District Office in Analysis files.

Background ---

This project proposal was started by a project input form and then followed by a scoping letter that was sent out to interested parties. Before the project input form, an update of the 1996 Upper Middle Fork Willamette Watershed Analysis was completed indicating the need to enhance existing bull trout and salmon habitat and provide fish passage at Indigo Springs.

Proposed Action ---

The fish passage design for Indigo Springs includes reconnecting approximately 300 feet of original channel, 150 feet on each side of road 2100, to provide additional spawning area for bull trout. About one quarter of the water volume from Indigo Springs would be diverted into the original channel and passage structure. The remaining volume would continue through the existent culvert. The addition of a fish passage structure would allow returning adult bull trout the option to access the upper portion of Indigo Springs to spawn. A native streambed beneath the structure would also provide a travel corridor for amphibians, mollusks and other aquatic biota.

When road 2100 was built the Indigo Springs channel was rerouted under the road at its current location for convenience. A track excavator would remove material that has accumulated

in the abandoned channel on both sides of road 2100 while it is still dry. This material would be hauled to an approved waste area. Approximately five large trees (12 to 20 inch diameter) would be removed to allow access and development of the original channel. Several dozen small trees between 1 to 3 inches in diameter would also be removed within the original channel. The large trees would be used on site for stream enhancement structures within the channel. The large trees would also be removed from within the primary shade zone but occur on the north side of the channel and do not provide shade to the stream. These trees are considered non-dominant in the area. The channel would be finished with a mixture of spawning gravel, trees, and pool habitat that closely resembles and maintains the outstanding qualities of Indigo Springs.

The proposed action also includes the placement of approximately 1000 pieces of large wood and 400 rootwads into the Middle Fork Willamette River and lower sections of several tributaries between Buck Creek and Indigo Springs. Lineal distance of the project length is approximately 16 miles. Actual log placement distance would be approximately 10 miles within the 16 miles. Middle Fork tributaries include; Swift, Staley, Echo, Bear, Iko, Buck, and Tumblebug. Placement would be achieved by helicopter and ground machinery. Approximately 20 trees identified as “secondary “or non-dominant would be pulled over to utilize the entire tree and root wad. Trees were selected from adequately stocked riparian reserves and no loss of stream shade or increase in stream temperature is expected. A truck mounted yarder would be used to pull trees over to create a solid anchor for fish habitat structures. The majority of trees (800) and rootwads (300) would be placed by helicopter and about 180 trees and 100 rootwads would be placed with ground machines (excavator, backhoe etc) from existent access roads. The 20 trees to be pulled over would act as structural anchors for larger enhancement structures. Additional wood would be helicopter lifted behind each pulled tree to create large debris jams in the river.

Creating the Indigo Springs channel and completing the large wood enhancement projects would entail implementation of the following activities:

1. Remove five large trees along new Indigo Springs channel.
2. Remove material from historic Indigo Springs channel.
3. Transport fill material for storage on a nearby side road.
4. Construct new fish passage structure.
5. Create new habitat in the channel with trees and gravel.
6. Divert approximately ¼ of the volume of water from Indigo Springs into new channel.
7. Pull over approximately 20 trees in Middle Fork to use as anchors for stream enhancement structures.
8. Helicopter or use ground machines to place additional wood behind the anchors.

The fish passage structure would provide for a natural stream bottom in configuration and gradient to meet the purpose and need. The fill slopes would be armored with appropriately sized rock where water erosion could occur, and bare slopes would be re-vegetated with native grass

and forb species. These actions are proposed to begin in 2007, during the period defined by Oregon Department of Fish and Wildlife (ODFW) for instream activity in the Middle Fork Willamette River tributaries upstream of Hills Creek dam, July 1 through October 15.

Decision Framework

The Middle Fork District Ranger will decide whether or not to create the spawning channel and fish passage structure at Indigo Springs and complete stream enhancement work on the Middle Fork Willamette and its tributaries as proposed, or as modified by alternatives. This decision would also determine what actions should be taken to mitigate any potential environmental effects. A determination of Forest Plan compliance will be made, as well as whether or not implementation would require a Forest Plan amendment.

Public Involvement

Informing interested public parties is an ongoing process used to determine the scope and significance of a proposed set of actions, to determine the issues that should be addressed in analyzing proposed actions, and to determine the alternatives that need to be addressed when accomplishing the analysis. Agency and public comments are solicited throughout the project planning period to help determine the above items, in conjunction with the landscape analyses accomplished to determine the current condition of the planning area. The results of this preliminary analysis were used to help determine the issues for this planning effort.

In order to determine major issues affecting the decision, the Forest Service involved the public and a number of other agency interdisciplinary specialists. Scoping for this project began in January, 2006, and a scoping record was prepared and sent to individuals and organizations who had expressed interest in land management activities within the Middle Fork Ranger District.

The winter 2006 Willamette National Forest "Forest Focus", a quarterly planning newsletter included the first announcement of the Indigo and Middle Fork Willamette Enhancement Project proposal. This newsletter is the initial vehicle used to request comments and concerns about this and similar projects.

Additional information about the scoping process, project planning processes, and public involvement can be found in the Agencies and Persons Consulted section of this document. Copies of these various documents generated and received during the scoping process and their attached mailing lists can be found in the Analysis File under Public Involvement.

The organizations and people contacted included:

- The Native Plant Society
- The Oregon Department of Fish and Wildlife;
- McKenzie Fly Fishers;
- The Siletz Tribal Council;

- The Confederated Tribes of the Grand Ronde;
- The Klamath Indian Tribe
- US Fish and Wildlife Service and NOAA Fisheries

The following disciplines comprised the core Interdisciplinary (ID) Team which conducted the analysis of the proposed actions:

- Soils/hydrologist
- engineer
- wildlife biologist
- National Environmental Policy Act specialist
- fisheries biologist
- botanist
- archaeologist

This ID Team did most of the field work and analysis but also consulted with various other resource specialists, as documented in Chapter VII, as needed and as determined by ground conditions.

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)..." A list of non-significant issues and reasons regarding their categorization as non significant may be found at the Middle Fork Ranger District in the project record. As for significant issues, the Forest Service identified 2 topics raised during scoping. These issues include:

[Issue #1] Critical northern spotted owl habitat disturbance – The Indigo Springs passage and spawning channel project and the stream enhancement projects along the Middle Fork Willamette River is not within an area identified as a Critical Habitat Unit for spotted owls. There is suitable owl nesting and foraging habitat immediately to the north and east of the project site. The noise generated by construction vehicles could disturb nesting owls throughout the breeding season, particularly during the early breeding season (March 1 – July 15).

[Issue #2] Water Quality – 2a) Excavating the original channel and adding a fish passage structure could generate sediment which could enter Indigo Springs and be transported to sections of the watershed which contain both bull trout and Chinook

salmon. Juvenile bull trout occupy habitat upstream and downstream of the work area while adult and sub-adult bull trout and Spring Chinook salmon occupy lower sections of the Upper Middle Fork Willamette watershed. 2b) Removal of trees from the primary shade zone could result in stream temperature increase.

Alternatives, including the Proposed Action

This chapter describes and compares the alternatives considered for the Indigo and Middle Fork Willamette Enhancement Project. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public

Alternative 1

No Action

No Action, would not implement actions to restore in-stream large woody material or gravel substrate in the Upper Middle Fork Willamette project area. This alternative allows existing problems such as low in-stream wood density and simplified habitat for at-risk species to continue untreated and dependant upon natural rates of input to replenish existing condition. Slow rates of natural large wood input are not expected to compensate for missing elements of habitat complexity. Fish passage would not be completed at Indigo Springs and bull trout connectivity would continue to be fragmented and small populations further isolated. Additional spawning habitat would not be constructed. This alternative would not meet the purpose and need of the project proposal. The No Action alternative provides a basis for describing the environmental effects of the proposed action and other alternatives.

Alternative 2

The Proposed Action

The Indigo and Middle Fork Willamette Enhancement Project proposes to supplement existing woody material and to act as flow deflection to capture spawning gravels. The large woody material (LWM) would be placed in the Middle Fork Willamette channel and associated tributaries (see site map).

Existing large woody material would be supplemented with approximately 20 trees selected from adjacent riparian reserve, and with imported woody material from other upland sources. These sources largely include trees that were identified as hazardous within an administrative area and removed. The collection and staging of LWM from these sources has been evaluated in a separate project analysis (NW Oregon Programmatic Biological Opinion, October 9, 2002

Middle Fork Ranger District). The purpose of importing woody material is to supplement an existing low density of large woody material in the main stem Middle Fork Willamette River and its tributaries (WA 2002).

Techniques to place the woody material would minimize impacts to other resources. Cables would be used to pull over live trees from the riparian reserve (“anchor trees” providing stability for wood accumulations). Equipment used to tip live trees would work from adjacent spur roads. Following placement of tipped trees (anchors), material would be imported using helicopter or ground machines to form an accumulation or log jam. Helicopter placement provides full suspension to place imported material and avoids disturbance of the river bottom and adjacent riparian area. Not all trees and rootwads would be placed behind tipped trees. Many would be used to construct other complex jams without the use of a tipped tree for an anchor. By importing approximately 1000 pieces of LWM and 400 rootwads, the proposed final density of large woody material would be about 80 pieces per mile in some sections.

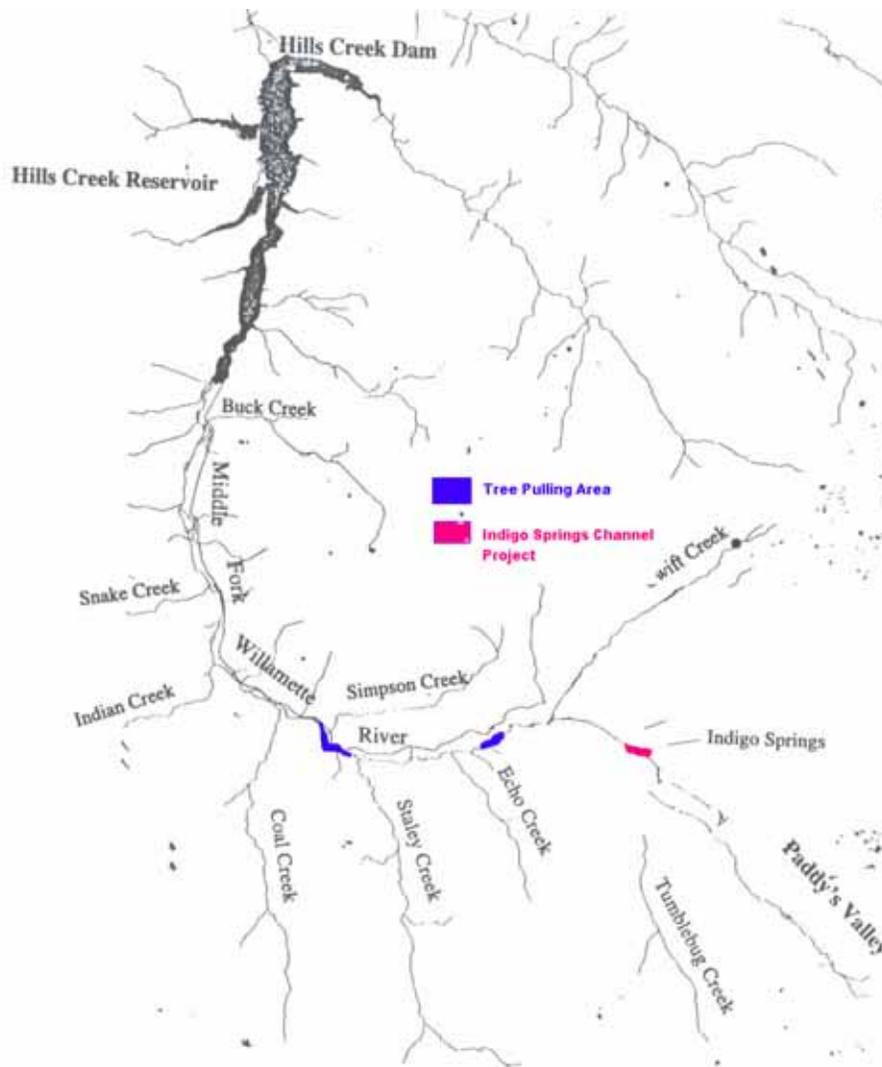
Anchor trees are large diameter trees (20 to 36 inches), with root mass attached, selected for their ability to remain stable during most high flow events. The 20 live or dead trees, serving as anchors, would be pulled over from fully stocked Riparian Reserve, located at distances of 20-70 feet from the active channel. The size of tree selected for anchors ranges from 15 to 36 inches in diameter at breast height. The 20 trees selected for restoration of in-stream wood are primarily located in two areas along Middle Fork Willamette. Trees are spread out over several hundred feet in both locations so as to maintain the current level of shade in all cases. Project implementation would occur over approximately 5 years for total wood placement. Tree tipping, of approximately 20 trees, would occur with approximately 200 trees placed by helicopter during summer 2007. Woody material jams would typically consist of 10-20 pieces of wood. Several opportunities exist for side channel spanning accumulations.

A helicopter landing for refueling and service would be located along Rd 2100. Restoration material would be flown directly from the staging site to the project area. A Flight Safety Plan and Spill Plan would be prepared prior to flight operations. Timing requirements for implementation are estimated at four days (summer 2007) and 2-3 days each for aerial placement of staged material in subsequent years.

This alternative also proposes to add a fish passage structure on Indigo Springs to regain fish passage at FS Road 2100 for bull trout. The fish passage structure would be located about 100 feet from the existent culvert. Approximately one quarter of the water volume from Indigo Springs would be directed into the original stream channel for about 150 feet on both sides of road 2100 to construct additional bull trout habitat. The remaining water volume would continue to flow through the existent culvert. Large trees and gravel would be placed in the original channel sections to provide rearing and spawning habitat for bull trout. Ground based machinery would complete the tasks of reforming the channel, routing Indigo Springs into its original channel, and placing trees and gravel.

Trees used within the new channel would come from on-site and imported from other areas. Gravel would be imported from an acceptable commercial site. Approximately 5 large trees, diameters 12 to 20 inches, would be removed to accommodate the channel and the replacement of the culvert. Trees to be removed are within the primary shade zone but 4 are on the north side of the channel and would not provide shade to Indigo Springs. In the case of one tree on the south side of the stream channel, other dominant trees immediately behind the removed tree would compensate for shade lost to Indigo Springs by the tree removal. In addition, these trees would be used in the channel to provide habitat for bull trout. In their new capacity, the tree trunks would continue to cast shade over Indigo Springs.

Figure 2. Indigo and Middle Fork Willamette Enhancement Project



Mitigation Common to All Alternatives

In response to public comments on the proposal, mitigation measures were developed to ease some of the potential environmental impacts the various alternatives may cause. The mitigation measures may be applied to any of the action alternatives. Best Management Practices would be followed during all aspects of project implementation.

- Seasonal restrictions of machinery use (no noise producing activities between March and July 15th) to avoid disturbance of potentially nesting northern spotted owls.
- In-channel work limited to low water periods to limit the amount of potential sediment movement, and to reduce the chance of affecting juvenile fish emerging from their nests.
- Construct channel and fish passage structures in dry channel before diverting water to minimize sedimentation.
- Place wood only in areas where they would naturally occur and in patterns that closely mimic that which would naturally occur in the stream.
- Only conifers from fully stocked riparian reserves are to be pulled over or removed.
- Gravel augmentation would only occur in areas where the natural supply has been eliminated or significantly reduced through anthropogenic means (road building in this case).
- Trees selected for restoration purposes must be spaced at least one site potential tree height apart and at least one crown width from any trees with potential nesting structure.
- Placement of sediment-catching structures, such as hay bales or sediment fences, in areas of stream channel disturbance when water is diverted.
- Re-vegetation of disturbed ground with native grasses, forbs, hardwood and conifer trees.
- Placement of armoring rock atop the stream banks beneath the stream simulation structure to minimize erosion at the disturbed construction sites.
- Require washing of machinery prior to transport to the site to remove foreign soil that could contain seeds of invasive plants.
- Spill plan will be in place prior to project equipment being near riparian habitat.
- Straw or weed free hay will be used to keep soil in place on any stream bank disturbance creating bare soil areas.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 1. Alternative Comparison Table

	Issues	1. No Action	2. Proposed Action	Measurement Criteria
1	Spotted owl disturbance during nesting season	None	May affect – not likely to adversely affect	Population Size
2	Water quality: chance of short-term increase in turbidity:	None	Low	NTU Turbidity Units
3	Water quality: Chance of long-term turbidity increases;	Low	Low	NTU Turbidity Units
4	Water Quality Increase in Temperature	None	Not Measurable	Degrees
5	Provision of upstream fish passage?	No	Yes	Fish Migration

Environmental Consequences

This section summarizes the physical, biological, social and economic 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 cumulative effects discussed in this chapter include an analysis and a concise description of the identifiable present effects of past actions to the extent that they are relevant and useful in analyzing whether the reasonable foreseeable effects of the proposed action and its alternatives may have a continuing, additive and significant relationship to those effects. The cumulative effects of the proposed action and the alternatives in this analysis are primarily based on the aggregate effects of the past, present and reasonably foreseeable future actions. Individual effects of past actions have not been listed or analyzed and are not necessary to describe the cumulative effects of this proposal or alternatives (CEQ Memorandum, Guidance on the Considerations of

Past Actions in Cumulative Effects Analysis, June 24, 2005). A listing of all past, present, and reasonably foreseeable actions known in the watershed are listed in Appendix A.

Issue #1 Northern Spotted owl Effects _____

The No Action alternative would have no effect on spotted owls or their habitat.

The action alternative (the Proposed Action) would not likely adversely affect northern spotted owls due to imposition of seasonal restrictions on noise-producing activities as discussed above under Mitigation Measures. The proposed Indigo Springs fish passage and channel work or the placement of large wood in the Middle Fork Willamette and its tributaries would not remove or alter existing spotted owl habitat.

Issue #2 Water Quality _____

The No Action alternative would maintain the current condition of Indigo Springs as a fish migration barrier and would not provide additional spawning for bull trout with the addition of a new channel. Fish enhancement structures on the Middle Fork Willamette River would not be constructed and the current levels of large wood would persist. Fish habitat would not be improved.

2a. Sedimentation

Water quality in Indigo Springs is quite high. Even winter storm events do not generate brief periods of turbidity as in the surrounding streams because the water source at Indigo Springs is an underground spring. The action alternative would maintain existing water quality, except for a small, short-term increases in turbidity associated with the proposed new channel and fish passage structure. The sediment generation would occur in the process of diverting the stream, and running water into the new channel for the first time. Indigo Springs has a high enough gradient that any sediment that enters the main stem would be immediately flushed out of the system.

The action alternative could generate some amount of sediment despite the implementation of the above specified mitigating measures. There is realistically no way to avoid the mobilization and transport of some small fine materials when the stream is returned to its original channel, and it is essentially unknown how much material could be mobilized. The composition of the substrate under the existing culvert is granular, but because Indigo Springs is completely ground fed there is little potential for sediment mobilization due to unpredictable weather events that could affect stream flow such as summer thunderstorms. That being said, it is thought that sediment production would be minimal in magnitude and short-term in duration

The pulling over of 20 trees and subsequent addition of large wood via helicopter and ground machinery could generate some amount of sediment into the Middle Fork Willamette and its tributaries as well. However, from past experiences on projects of this nature, sediment levels would be extremely limited and minimal in nature. Logs added by helicopter may release a small

plume of fine sediment as they are released but in general this sediment is not visible to the naked eye. Any sediment released into the Middle Fork Willamette would be quickly dissipated downstream.

2b. Stream Shade and Temperature

The Middle Fork Willamette River from river mile 52.5 to 64.1 (confluence of Staley Creek to Hills Creek Reservoir) is listed by the Oregon Department of Environmental Quality on the 303(d) list as water quality limited for high summer water temperatures.

The 5 trees being removed at the Indigo Springs channel improvement site will have no effect to stream temperatures. The 20 trees to be pulled over along the Middle Fork Willamette are considered co-dominant with standing large adjacent trees which provide shade to the stream channel. As the trees are dispersed within the riparian area, there are many trees remaining and providing shade to the stream channel. Other similar projects on the Willamette National Forest have analyzed tree pulling for the changes in stream temperature due to the loss of primary shade such as the South Fork McKenzie River Enhancement Project EA (40 trees pulled over to act as stream key features). Findings of the South Fork McKenzie River Project used the Browns Model (EPA 1980) to demonstrate that stream temperatures through the enhancement reaches would show an immeasurable difference between the pre-project and the post treatment condition. Conditions for the Middle Fork Willamette project are similar but with fewer trees. The sufficiency analysis of riparian reserves to meet water quality objectives (Northwest Forest Plan Temperature TMDL Implementation Strategies, FS and BLM, 2005) supports the concept of immeasurable stream temperatures from management along a small portion of a stream channel and suggests that maintaining an effective shade of 80% would maintain stream temperatures and could result in stream temperature increases that are not measurable.

Alternative Effects on Resources other Than Project Specific Issues

Response to the Aquatic Conservation Strategy Objectives

The Aquatic Conservation Strategy objectives presented on page B-11 of the Northwest Forest Plan Standards and Guidelines (USDA/USDI, 1994) relate to several of the above issues. The objectives are presented below and are abbreviated. The rationale for the finding of these effects is also presented, and additional rationale and discussions of the ACS compliance can be found in the Fish Analysis report found in the Analysis File.

1. Maintain and restore the distribution, diversity, and complexity of watershed features;

Due to the scale of the project, neither the action alternative nor no action would have an effect upon watershed and landscape-scale features.

2. Maintain and restore spatial and temporal connectivity within and between watersheds;

The action alternative was developed specifically to improve spatial connectivity of the riparian environment. Addition of a fish passage structure would create approximately 300 feet of prime spawning habitat accessible to bull trout. Enhancement structures in the Middle Fork Willamette River would improve habitat along the main corridor that bull trout and salmon migrate through. The No Action alternative would not restore the connectivity of fish habitat in Indigo Spring, Middle Fork Willamette or its tributaries.

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

The proposed action would restore the integrity and complexity of the original Indigo Springs stream channel. The designed spawning channel would also restore the channel bottom to more or less its original configuration and gradient. Banks and bottom configurations would also be restored to their historic integrity by the addition of large wood in some sections. No significant increases in peak flows or debris torrent initiation, which could change channel configuration, are anticipated as a result of the action alternative.

4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems;

Water quality in Indigo Springs is very high and remains that way even in storm events. Water quality in the Middle Fork Willamette is also high in the majority of the project area except for brief periods of turbidity during winter storm events. The action alternative would maintain or improve existing water quality, except for a potential small, short-term increase in turbidity associated with the proposed new channel construction at Indigo Springs. The sediment generation would occur in the process of diverting the stream into the new channel. Trees that are pulled over in the Middle Fork Willamette may create a short-term low magnitude increase in sediment, but overall the magnitude is expected to be minimal. Overall no direct shade would be lost to the stream channels and therefore water temperatures would remain the same. The No Action alternative would not have a short-term effect on water quality.

5. Maintain and restore the sediment regime under which aquatic ecosystems evolved;

The action alternative would maintain the sediment regime in this stream system over the long-term. Displaced soil from the excavation of the new channel would be hauled to an approved waste area or used as fill on site. Any exposed areas would be re-seeded upon completion of the project. Increases in sedimentation from the project are expected to be short-term in nature and minimal in magnitude.

6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats, and to retain patterns of sediment, nutrient, and wood routing;

Stream flows in this area are within the range of natural variability and are currently very likely near the middle of this range considering that in times past a large percentage of the area has been affected by severe wildfire (USDA, 2002). All alternatives would maintain current stream flow conditions. No proposed actions would change the amount of water flowing from this area. Neither alternative would have a significant effect upon peak flows.

7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands;

There are no floodplains in the project area. The alternatives would not increase inundation of floodplains along Indigo Springs or the Middle Fork Willamette, as neither would have any effect upon peak flows.

8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas;

Neither the proposed action nor the No Action alternative would restore this riparian area which has been affected by road construction. The action alternatives would remove numerous young (1-3 inch diameter trees, shrubs) vegetation which has developed within the original Indigo Springs channel. In addition, approximately 5 large trees would be removed to accommodate machinery and the new spawning channel at Indigo Springs. As mentioned in the analysis, these trees are sub-dominated and no shade would be lost to the stream. The trees being pulled over on the Middle Fork Willamette River are also sub-dominants and no shade would be lost there either. Water temperatures would remain at their current levels by maintaining the same levels of shade of the stream channels.

9. Maintain and restore habitat to support well distributed populations of native plant, invertebrate, and vertebrate riparian-dependant species;

The action alternative has been proposed specifically to make suitable spawning habitat accessible to threatened bull trout. The action alternative would also provide for the potential movement of other vertebrate and invertebrate aquatic species at Indigo Springs. The No Action alternative would not provide for continued restoration of the bull trout population in this watershed.

Botanical Plants**Potential Effects on Sensitive Plant Species**

Potential effects are documented in this Biological Evaluation in accordance with the formats put forth for listed species in the 1986 Endangered Species Act regulations (50 CFR Part 402) and the March 1998 USFWS/NMFS Endangered Species Consultation Handbook; and for sensitive species, in the Forest Service Manual section 2670 and in a memo issued August 17, 1995 by the Regional Foresters of Regions 1, 4, and 6. Attachment 3 gives details on the effects categories described in this memo. Table 2 shows conclusions for effects of proposed actions on sensitive species. The fungi impacts are described in terms of fungus functional group (eleven species are mycorrhizal, four are saprophytic on litter and wood, and one is a parasite on truffles). Since the parasitic Cordyceps is dependent on a mycorrhizal fungus for its survival, effects for parasitic fungi is lumped with mycorrhizal.

Environmental Consequences, Direct and Indirect Effects

No sensitive vascular species currently listed as sensitive were located during field reconnaissance. No direct or indirect impacts to sensitive vascular species are anticipated in any of the Alternatives.

Lichens and Bryophytes

No nonvascular lichen or bryophyte species currently listed as sensitive were located during field reconnaissance. No direct or indirect impacts to sensitive non-vascular lichen or bryophyte species are anticipated in any of the Alternatives.

Fungi

Most fungi form mycorrhizal relationships with conifers, and thinning has been shown to have negative short term (5-7 years) impacts to fungi (Pilz et al 2003). It is likely that individual sites of fungi may be negatively affected in the short term by host tree removal, physical disturbance, soil compaction, and disruption of mycelial networks if the fungi are present (Kranabetter and Wylie 1998, Amaranthus and Perry 1994). Reductions in the number of fruiting bodies of chanterelles, a common mycorrhizal species, were noted after initial thinning in similar second growth stands but appear to rebound after several years (Pilz et al 2003). Tree blasting and uprooting by mechanical means would result in minor disturbance to soil-dwelling fungi through vegetation disturbance and removal, soil disturbance, and disruption of mycelial networks, but in a much localized area. No survey was conducted to determine presence of sensitive fungi, and no fungi species listed as sensitive were incidentally located during field reconnaissance for other sensitive botanical species. Therefore, it is unknown what local species, if any, would be impacted by stream restoration activities.

Cumulative Effects

The area analyzed for cumulative effects to botanical TES and Survey and Manage resources are the 6th field watersheds where the project area is located. These subwatersheds contain several sensitive and survey and manage species and similar habitats that increases the likelihood of those species suspected to be in the project area. Sites have been identified through various projects that have been surveyed for botanical species including those associated with Survey and Manage Regional Random Grid surveys, and various timber sale, stream, trail and campground projects. Some of these survey efforts have resulted in identification of new sites in the watershed for vascular and non-vascular species. No cumulative effects to vascular, nonvascular lichen and bryophyte species are expected. Cumulative effects to sensitive fungi would consist of approximately 25 acres of minor ground and vegetation disturbance where sensitive fungi could occur.

Conclusions

In summary, because field reconnaissance did not yield any positive sighting results for sensitive vascular, lichen and bryophyte botanical species, the proposed project was given a No Impact rating. Because no surveys were completed to determine effects on fungi, the proposed project

was given a May Impact Individuals or Habitat (MIIH), But Will Not Likely Contribute to a Trend Towards Federal Listing or Loss of Viability for the Population or Species rating.

Wildlife

Management Indicator Species

Background and Effects Summary: The Willamette Forest Plan has identified a number of terrestrial wildlife species with habitat needs that are representative of other wildlife species with similar habitat requirements for survival and reproduction. These management indicator species (MIS) include spotted owl, bald eagle, peregrine falcon, cavity excavators, pileated woodpecker, deer, elk, and marten. Many of these species have potential to occur in or near the project area. Spotted owls, bald eagles, and peregrine falcons are addressed in a separate Biological Analysis/Evaluation. Activity associated with the proposed action is consistent with, or exceeds Willamette Forest Plan Standards and Guidelines as they pertain to MIS management (FW-121, 122, 124-133, 136-153, 162-173; MA-9b-08 through 18, MA-9c-08 through 19).

No suitable habitat for terrestrial MIS would be modified by proposed activities associated with the Middle Fork Restoration and Indigo Culvert Replacement Project. Activities could result in disturbance to MIS that may be present in or adjacent to work areas. However, any disturbance that may occur associated with this project is not of a scale that would threaten the viability of any MIS to persist within the project area or within any local population.

MIS summary:

Proposed activities would not modify any currently suitable habitat for MIS. Some activities may disturb individual terrestrial MIS if they are present nearby. However the disturbance would not threaten the capability of any local population of these species to persist or become established in the project area. Any project effect considered negative in this regard would be short-term and minimal compared to the amount of habitat available in the surrounding landscape. Cumulative effects to MIS from proposed activities would be small in scale yet generally beneficial as they contribute to long-term improvements in the overall diversity of habitat in the Indigo and Middle Fork Willamette Enhancement Project area. For a detailed discussion on MIS see the Wildlife reports in the project file.

Effects to Survey and Manage Species:

The Indigo and Middle Fork Willamette Enhancement Project would not modify or disturb suitable habitat to any extent that would cause a level of negative effects that would influence the potential persistence of Survey and Manage species in suitable habitat associated with this project. For a detailed discussion on Survey Manage species see the Wildlife reports in the project file.

Direct, Indirect, and Cumulative Effects

Because the Middle Fork Restoration and Indigo Culvert Replacement Project would not result in any negative modification or disturbance of suitable habitat for Survey and Manage species, there are no recognized direct or indirect effects to these species from proposed activities. Cumulative effects for the project were analyzed at the 6th field scale. There are no activities that are reasonably certain to occur within the project area that would result in cumulative effects to Survey and Manage species from modification or consequential disturbance of habitat. Cumulative effects from this project in conjunction with past actions should be positive for these species as overall riparian biodiversity increases in response to the proposed restoration of instream habitat.

TES Habitat

Threatened, endangered, and sensitive plant habitats in the area which would be disturbed by the action alternatives were surveyed. See the Botanical Review in the Analysis File.

Threatened, endangered, and sensitive animal species are addressed in the Indigo and Middle Fork Willamette Enhancement Project Biological Evaluations (BE), which can be found in the project Analysis File. The BEs were conducted to evaluate the effects on TES plant and animal species within the analysis area. According to the wildlife BE, the northern spotted owl is a threatened species that may be affected by implementation of this project, but would not likely be adversely affected. For a discussion of the effects on northern spotted owls, see Issue #1. Habitat for a number of sensitive species occurs within the project area; harlequin ducks, and a number of aquatic insects (see the Wildlife and Aquatic BEs in the Analysis File). Most of these species are associated with riparian area and wetland special habitats

Timber harvest has modified approximately one half of the terrestrial habitat throughout the watershed in and adjacent to the Indigo and Middle Fork Willamette Enhancement Project. Overall, past management activities (dominated by regeneration and salvage harvest) that have contributed to affect habitat surrounding the project area on a measurable scale have had a mixed effect on terrestrial wildlife species. Generally speaking the maintenance and development of habitat associated with old-growth characteristics on approximately one half of the area has favored one group of species, while the conversion of approximately one half of the area to early and mid seral closed canopy habitat set in a mosaic across the landscape has favored another group of species. Other than limited roadside salvage, no harvest activity has occurred around the project area during the past decade.

At present there is one reasonably foreseeable action that would affect current seral class conditions for stands in or adjacent to the project area. This action was determined at a larger landscape scale and should not be considered in the same sense as the prior cumulative effects discussion for Survey Manage species. Cumulative effects for Survey and Manage was considered at a project level and this discussion is more related to a landscape level. Timber

harvest associated with the Jim's Creek Savanna Restoration Project is expected to affect approximately 400 acres of predominantly mature closed canopy forested habitat over the next five years.

The overall effect of the Indigo and Middle Fork Willamette Enhancement Project would not result in a change in seral composition, and would therefore have no measurable contribution to cumulative effects from past actions. Although this project would not change seral conditions, it would improve structure and composition within the aquatic community. This effect would ultimately result in a positive qualitative improvement in overall biodiversity across the project area and contribute to a positive cumulative effect.

Fish Species

During construction of the Indigo Springs channel and fish passage structure there would be no fish present and no flow to the stream network. The project would be completed in three phases. The lower channel would be constructed first, followed by construction of the fish passage structure and finally the upstream channel. The lower channel, fish passage structure, and the majority of the upper channel would be constructed in a dry environment. Not until the final "plug" is removed from the upper channel will the new channel become wet. Therefore, sediment issues and the impact on the aquatic environment would be minimized. A short-term flush of fine sediment is expected to occur when the final plug is removed and water is allowed into the new channel. This flush of sediment may have a short-term affect on juvenile bull trout residing in Indigo Springs. However, water velocity in the main stem of Indigo Springs is more than sufficient to rapidly carry any sediment downstream and outside of Indigo Springs where it would disperse in the Middle Fork Willamette.

Categories of aquatic enhancement activities such as Large Wood, Boulder, and Gravel Placement and Tree Removal for Large Wood and Fish Passage Culvert and Bridge Projects are included in the April, 28, 2007, Fish Habitat Restoration Activities in Oregon and Washington Programmatic Biological Opinion from NOAA Fisheries. Consultation for projects of this nature have been completed with NOAA Fisheries, however consultation with the USFWS for bull trout is ongoing. Given that bull trout may be present in Indigo Springs and juvenile salmon or bull trout may be present in the Middle Fork Willamette when trees are pulled over the Indigo and Middle Fork Willamette Enhancement Project **May Affect, Likely to Adversely Affect (LAA) bull trout and spring Chinook salmon**, due to the potential for alteration of habitat, disturbance of fish, and potential for short-term degradation of water quality through sediment delivery. It is likely the short-term effects would be disturbance of fish, and potential of sediment delivery. The long-term beneficial effects for this project is the increase of spawning habitat for bull trout, increase of pool depth and overall pool quality, and increase in fish cover. In addressing short term effects, additional conditions would allow further protection of bull trout and their habitat. The proposed project activities would not exceed the typical range of effects of in stream fish enhancement projects.

Material from the excavated downstream channel would be spread out in the immediate work area, compacted and then replanted with native seeds to stabilize the soils and prevent erosion. In the upper channel, excavated material would be hauled to an approved waste area approximately 0.2 miles from the site, spread out and replanted with native seeds to prevent erosion.

There may be a short-term impact on MIS fish species, including bull trout and spring Chinook salmon in the Middle Fork Willamette River and its tributaries when trees are pulled over and placed with the helicopter and/or ground machinery. Fine sediments may be momentarily disturbed when the tree/logs hit the water and/or the streambed. The project would occur late in the spawning season for listed bull trout and spring Chinook salmon. Therefore, adult bull trout would have returned to Hills Creek Reservoir and adult salmon would all be dead by the implementation date. Redds that are created by both species are easily identified and no work would occur in close proximity to spawning sites..

Management Indicator Species and Best Management Practices

Resident salmonids (rainbow and cutthroat trout) and other aquatic species are Management Indicator Species in the Willamette Land and Resource Management Plan. As Management Indicator Species, federal projects need to ensure the viability of these species when conducting activities on National Forest System land; therefore the following conditions must occur:

- 1. Ensure a professional fisheries biologist is involved in the design of the project**
- 2. Do not dispose waste on active floodplains (approximately 100 feet from the stream channel).**
- 3. Stabilize potential erosion areas and control sedimentation.**
- 4. Maximize activities during dry season to avoid wet periods.**
- 5. Follow ODFW guidelines for in-water work period.**

For a more detailed discussion on aquatic species see the Fisheries BE located in the project file.

Soils

Soil percolation tests were complete at the site and it appears that soils in the new Indigo Springs channel are relatively high in clay particles. This would allow the channel to maintain water flow on the surface rather than losing water into the substrate. As mentioned above, the material excavated from the channel would either be spread out in the work area or hauled to a waste storage area. The initial step would be to remove and set aside the duff layer and larger organic material. Soils would then be removed to form the channel, spread, compacted and the duff returned to the top. Native seeds would be used to reseed any disturbed area to prevent erosion.

Air Quality

Air quality would not be affected, as disposal of waste or slash by burning is not proposed.

Cultural Resources

The project site was reviewed for cultural resource sites, and no sites are known to exist in the project area (see the Project Review for Heritage Resources Report in the Analysis File). If any cultural sites are found during implementation of any proposed activity within the action alternative, the activity would be discontinued, and contract clauses would be invoked until the site is evaluated for significance and appropriate mitigation measures are performed.

Effects on Recreational Opportunities

The Indigo Springs Campground recreational facilities would be affected by the proposed action. Traffic would be delayed in and around the construction site and on FS Road 2100. Construction noise and activity may render the Indigo Springs Campground less attractive for camper use. Delays and noise would be kept to a minimum and if necessary a bypass road would be constructed around the fish passage construction site to keep traffic flowing through the area.

The Recreational Fisheries Executive Order #12962 (June 8, 1995) directs Federal agencies to improve the productivity of aquatic resources in order to increase recreational fishing opportunities. This project area provides little in the way of recreational fisheries other than those provided downstream by the Middle Fork River. Nothing proposed by the action alternative would affect recreational fishing quality or opportunities, other than provision of more and better spawning and rearing habitat for native fish.

Effects on Irreversible and Irrecoverable Commitments of Resources

No irreversible and irretrievable commitments of resources would result from the proposed action. A new stream crossing structure could always be completely removed in the future, and if the culvert is removed it could always be replaced.

Short-term and Long-term effects

The No Action alternative would have no short-term effects, but its implementation would have a long-term effect on bull trout spawning habitat accessibility. The action alternatives would have some small, short-term low magnitude effects on turbidity levels, but would have a long-term positive affect on spawning habitat accessibility.

Effects on Consumers, Civil Rights, Minority Groups, Women, and Environmental Justice

All contracts offered by the Forest Service contain Equal Employment Opportunity requirements. Firewood permits are offered to all members of the public.

Executive Order #12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, directs Federal agencies to address effects accruing in a disproportionate way to minority and low income populations; The closest population or habitation to the project area is the City of Oakridge, (population 3400), and Westfir (population

300), some 30 road miles north of the project area. These communities contain some low income people and some minority persons. No disproportionate impacts to the citizens of Westfir and Oakridge are anticipated.

Effects on American Indian Rights

No impacts on American Indian social, economic or subsistence rights are anticipated. No impacts are anticipated related to the American Indian Religious Freedom Act. Several tribal organizations with the State of Oregon which have historic interests in this area have been contacted in reference to this planning effort.

Effects on Farmlands, Rangelands, and Forestlands

No farmland or rangeland is found in the project area. The project area is surrounded by forest land and no alternatives would affect the management of that land. The proposed action is consistent with the management direction contained in the Willamette National Forest Land Management Plan as amended by the Northwest Forest Plan.

Effects on Wetlands and Floodplains

Floodplains do exist throughout the project area as it is entirely in riparian reserve along Indigo Springs and the Middle Fork River. None of the alternatives would have an affect upon wetland or floodplains.

Legal and Policy Requirements, and other NEPA Decisions

The action alternative complies with the following legal and policy requirements as follows:

Federal Laws and Policies:

The Preservation of American Antiquities Act, June 1906---The area proposed for ground-disturbing activities has been evaluated for the presence of inventoried cultural resources. No inventoried sites exist on the project sites. The areas disturbed would be limited to that areas previously disturbed by road construction (see the Project Review For Heritage Resource form in the Analysis File).

The National Environmental Policy Act (NEPA), 1969---NEPA establishes the format and content requirements of environmental analysis and documentation such as the Indigo and Middle Fork Willamette Enhancement Project analysis. The entire process of preparing an environmental assessment was undertaken to comply with NEPA requirements, as codified by 40 CFR 1501 and the Forest Service Handbook 1909.15, Chapter 40.

The Endangered Species Act, December 1973--- Field surveys for all listed endangered, threatened, or sensitive species has been conducted to determine possible effects of any proposed activities in the project area. (see the Wildlife and Plant Biological Evaluations in the Analysis File) Action is proposed specifically to enhance habitat available for bull trout and Spring Chinook salmon, both species listed under the ESA.

The National Forest Management Act (NFMA), 1976---All alternatives were developed to be in full compliance with NFMA via compliance with the Willamette National Forest Land and Resource Management Plan, as amended. This EA contains numerous references as to how this project complies with Forest Plan and Northwest Forest Plan standards and guidelines, usually parenthetically.

Clean Air Act Amendments, 1977---The action alternative was designed to meet the National Ambient Air Quality Standards, as direction by the Oregon Smoke Management Act, through avoidance of practices which degrade air quality below health and visibility standards, as fully discussed in the Fuels Management Prescription contained in the Analysis File.

The Clean Water Act, 1982---The alternatives all meet and conform to the Clean Water Act, Amended 1982. This Act establishes a non-degradation policy for all federally proposed projects. None of the action alternatives would degrade water quality below standards set by the State of Oregon. This is accomplished through project design and planning, application and monitoring of Best Management Practices (BMPs), and adherence to the Northwest Forest Plan's Aquatic Conservation Strategy.

Consultation with the Oregon State Historic Preservation Officer (SHPO)---SHPO has been consulted concerning proposed activities. The Advisory Council on Historic Preservation (ACHP) has been consulted about measures to protect significant archeological sites from adverse affects (see the Project Review for Heritage Resources Form in the Analysis File).

Other NEPA decision documents:

The Standards and Guidelines contained in The Willamette National Forest Land and Resource Management Plan (USDA, 1990, as amended by USDA/USDI, 1994) played a major role in determining the Purpose and Need and in the development of all the alternatives. As mentioned above, the action alternatives comply with all aspects, standards, and guidelines of the Forest Plan(page C-32 and 33; USDA/USDI, 1994).

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:

FEDERAL, STATE, AND LOCAL AGENCIES:

NOAA Fisheries

USFWS

Oregon Department of Fish and Wildlife

Trout Unlimited

City of Oakridge

Oregon Natural Resources Council

Sierra Club
Middle Fork Willamette Watershed
McKenzie Flyfishers
Cascade Flyfishers
Native Fish Society

TRIBES:

Siletz Tribe
The Cow Creek Band of the Umpqua Tribe of Indians
The Confederated Tribes of the Grand Rhonde
The Confederated Tribes of the Warm Springs Reservation

Appendix A

Listing of past, present, and reasonably foreseeable future actions known in the watershed.

- 1). Jims Creek Savannah/Meadow Restoration Project: This project would harvest approximately 400 acres of primarily Douglas Fir to restore meadow habitat and oak savannah.
- 2). Salvelinus Stream Restoration Project: added 200 logs to the Middle fork Willamette River for fish habitat improvement.
- 3). Bear Creek Stream Restoration Project: added 200 logs in Bear Creek for fish habitat improvement.
- 4). Upper Middle Fork Bull Trout Enhancement Project: added 200 logs in Swift and Echo Creeks for fish habitat improvement.

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