Environmental Assessment

Title: Headcut Stabilization
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Name and Location of Preparing Office: Prineville District Office, Bureau of Land Management, Prineville, Oregon.

Chapter 1: Introduction

Introduction

This Environmental Assessment (EA) has been prepared for the Prineville District Field Office in order to improve watershed health district-wide by halting the advancement of headcuts up riparian corridors. A headcut is an erosional feature found in streams where a sudden change in streambed elevation occurs, generally resembling a waterfall or a small cliff face if the channel is dry. This action is needed because many streams within the district have headcuts that may result in down-cutting which threatens the integrity of the affected riparian communities.

This EA is a district-wide analysis of potential impacts that could result with the implementation of a proposed action or alternatives to the proposed action. The EA assists the BLM in project planning and ensuring compliance with the National Environmental Policy Act (NEPA), and in making a determination as to whether any "significant" impacts could result from the analyzed actions. "Significance" is defined by NEPA and is found in regulation 40 CFR 1508.27. An EA provides evidence for determining whether to prepare and Environmental Impact Statement (EIS) or a "Finding of No Significant Impact" (FONSI). A FONSI is a document that briefly presents the reasons why implementation of the proposed actions will not result in "significant" environmental impacts (effects) beyond those already addressed in the applicable Resource Management Plans. If the decision maker determines that this project has "significant" impacts following the analysis in the EA, then an EIS would be prepared for the project.

A decision record (DR) may be signed following public comment on the EA to document the decision. Future, site-specific projects will then be analyzed utilizing a determination of NEPA adequacy (DNA).

Proposed Action

The proposed action is to stabilize up to 10 headcuts per year that are occurring throughout the district. A headcut is an abrupt vertical drop in the bed of the channel and is an active erosional feature that oftentimes resembles a small cliff or waterfall. Stabilization efforts would be site specific and the required clearances would be performed for each instance. Ground disturbing activities would likely encompass less than two acres per site, including actions such as equipment access and material staging. The EA will be reviewed prior to each project to ensure that the analysis and decisions made within the document are still valid and that any new science or methods would still fall within the scope of the EA. The stabilization methods could include the placement of large rock or wood or the use of bioengineering methods such as coir fiber nets or willow mats using either heavy machinery or hand tools.

Purpose & Need

The need for action is to address the lowering of the water table, changes in vegetative communities, and increase in sedimentation within riparian environments throughout the district due to the formation of headcuts. Headcuts frequently form when there is a greater amount of energy within the flowing water than there is sediment being transported by the stream (Simon and Darby, 2002). Changes in climate, alterations in watershed vegetation, and an increase in impervious surfaces lead to increased runoff volumes and peak intensities which thus deliver that increase in stream energy relative to previous flow regimes. This, combined with the loss of stabilizing riparian vegetation, can result in the formation of a headcut within the stream channel (Novotny, 2003).

As a headcut migrates up a water course, the stream becomes disconnected from its floodplain and the water table is lowered so that what was once a thriving riparian community becomes an upland terrace. The resulting downcut stream then represents an ecosystem in which "habitat diversity and niche potential are reduced, and. . .the quality and functions of the species occupying the system are changed'' (Simon and Darby, 2002).

The purpose of this project is to conserve and restore, within the existing site capability and natural disturbance regimes, stream channel integrity, channel processes, sediment regimes, surface to groundwater interactions, diversity and productivity or native riparian and aquatic plant communities, and riparian and aquatic habitats for locally important fish stocks by stabilizing headcuts. This action is designed to prevent their migration upstream which would undermine agency efforts through previous planning and management activities at maintaining healthy and diverse riparian areas on public lands.

Relevant Plans and Conformance

John Day Resource Management Plan and Record of Decision (1985)

The proposed project is in conformance with the John Day RMP by meeting objective two to "enhance water quality and manage aquatic habitat" (p. 12).

Draft John Day Basin Resource Management Plan and Environmental Impact Statement (2008)

The proposed action would meet the objectives identified within the proposed John Day Basin RMP, a plan still in progress but expected to be completed in 2012, by helping to "move all perennial, perennial interrupted, and intermittent streams toward Properly Functioning Condition" (p. 59) and by "conserving and restoring, within existing site capability and natural disturbance regimes, water quality to provide beneficial uses and stable and productive riparian and aquatic ecosystems" (p. 62) as well as "stream channel integrity, channel processes, and sediment regimes" (p. 63). In addition, the project will help to "conserve and restore… surface to groundwater interactions that support healthy riparian and wetland areas, aquatic habitats, and physical functions of stream channels" (p. 65).

Two Rivers Resource Management Plan Record of Decision and Rangeland Program Summary (1986)

The proposed project complies with the Two Rivers RMP by helping riparian areas to reach their full potential by enacting measures to protect or restore their natural function (p. 10).

Upper Deschutes Resource Management Plan Record of Decision (2005)

The proposed project complies with the watershed/hydrologic function and water quality objective of the Upper Deschutes RMP by "ensuring that water quality influenced by BLM activities a) achieves or is making significant progress toward achieving established BLM objectives for watershed function, and b) complies or is making progress toward achieving State of Oregon water quality standards for beneficial uses as established per stream by the Oregon Department of Environmental Quality " (p. 42).

Record of Decision: John Day River Management Plan, Two Rivers, John Day, and Baker Resource Management Plan Amendments (2001)

The proposed project complies with the John Day River Management Plan by protecting "water quality by mitigating, diminishing, or eliminating sources of water pollution originating on public lands" and by protecting and enhancing riparian vegetation (p. 3).

Baker Resource Management Plan Record of Decision and Rangeland Program Summary (1989)

The proposed project complies with the Baker RMP by maintaining, restoring, or improving "riparian areas to achieve a healthy and productive ecological condition for maximum long-term multiple use benefits and values" (p. 16).

Brothers/LaPine Resource Management Plan, Record of Decision and Rangeland Program Summary (1989)

The proposed project complies with the Brothers/LaPine RMP by providing for "watershed rehabilitation to areas where deterioration of the watershed values due to accelerated erosion and runoff has been significant" (p. 14).

Implementation of Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH) (1994)

The proposed project complies with the riparian goals of PACFISH by "maintaining and restoring water quality, stream channel integrity, channel processes, sediment regime,… and natural timing and variability of the water table elevation in meadows and wetlands" (p. 15).

Scoping and Issues

The BLM mailed 43 scoping letters in April 2011, and received five comment letters in return. The letters were from The Blue Mountains Biodiversity Project, Friends of Rudio Mountain, Inc., The Confederated Tribes of the Umatilla Indian Reservation, Oregon Wild, and Oregon Natural Desert Association. Many of those comments are summarized and addressed in this EA in the Issues section and in Alternatives Considered but Eliminated from Detailed Analysis. In many cases, the comments led to the

incorporation of project design features into the action alternative. These project design features can be found within the best management practices describes in Chapter 2.

Issues Considered in Detail

To be useful to the decision-maker and the public, environmental documents should focus on significant issues, rather than exploring every possible issue. An issue is a point or matter of discussion, debate, or dispute about the potential environmental effects or impacts, of an action. Significant issues are those related to significant or potentially significant effects. To warrant detailed analysis, the issue must also be within the scope of the analysis, be amenable to scientific analysis rather than conjecture, and not have already been decided by law, regulation, or previous decision. Detailed analysis is useful only if it will help make a reasoned choice between alternatives. Scoping efforts, project interdisciplinary team deliberations, and BLM specialists input have brought forward the following issues.

1. **Effects to riparian and aquatic ecosystems:** The ground disturbing activities located along the stream corridor associated with headcut stabilizations have the opportunity to affect conditions within the riparian and aquatic ecosystems. The placement of stabilizing material may impact amphibians, fish, macro invertebrates, and vegetation at the project site. In addition, the excess sediment derived from the construction of the stabilization method could have an impact on aquatic organisms downstream of the project. However, no action can create issues of its own such as resulting fish passage barriers or higher stream temperatures resulting from the disconnect of the channel from its floodplain and lowering of the water table.

Issues considered but eliminated from detailed analysis

While a number of other issues were raised during the internal and external scoping process, not all of them warranted detailed analysis to make a reasoned choice between alternatives or to determine the significance of impacts. Included below are issues not analyzed or considered further in this EA.

1. **Effects on invasive species:** The construction equipment and materials along with the ground disturbing activities associated with the project could propagate the spread of invasive species. Best Management Practices (BMPs) are included as part of the proposed action to ensure that project related activities does not spread invasive species. Construction equipment would be routinely checked for weeds and cleaned and source sites for material would be checked prior to usage. Disturbance areas would be reseeded or planted with appropriate native vegetation and subsequently monitored for invasive species. Integrated weed management actions, including herbicides used, have been addressed in a separate EA. Therefore, no potentially significant effects are expected and this issue is not analyzed in detail in this EA.

2. **Effects on wildlife:** The noise and activity associated with the construction of headcut stabilizations or the use of trees or old growth trees for inclusion in the project could have an effect on wildlife. BMPs are included as part of the proposed actions that would address how the project could affect wildlife by protecting nesting habitat, minimizing disturbance to wildlife,

and preventing the degradation of wetland habitat. Therefore, no potentially significant effects are expected and this issue is not analyzed in detail in this EA.

3. **Effects on cultural resources and special plant species:** The excavation of bank material, use of heavy equipment, and placement of construction materials could have an impact on cultural resources and special plant species within the project areas. BMPs are included as part of the proposed action that would protect these resources from disturbance by surveying project sites for special plant species and cultural sites. Care would be taken to avoid these sites if they are found so that there would be no effect on these resources. Therefore, no potentially significant effects are expected, and this issue is not analyzed in detail in this EA.

4. **Effects on areas with wilderness or wilderness character:** The activities associated with the construction of the stabilization efforts could have an impact on wilderness or wilderness character if the project site falls within one of these categories. BMPs are included as part of the proposed action that would address how projects are implemented within wilderness or on lands with wilderness character. Therefore, no potentially significant effects are expected and this issue is not analyzed in detail in this EA.

5. **Effects on livestock grazing:** Temporary livestock exclosures may be required around the project area if seeding or riparian plantings have occurred or if there is potential for bank trampling in an area that is susceptible to livestock impacts. However, the exclosures are expected to be relatively minor, no more than two acres, in relation to the size of the overall allotment. Therefore, this would have little effect on the overall amount of forage available within the allotment. BMPs are included as part of the proposed action that would address how the project and fence construction are implemented so that there are no effects on this resource.

Chapter 2 Alternatives

Alternative 1: No Action

The No Action Alternative provides a baseline for the comparison of alternatives. This alternative represents the existing condition and no efforts would be implemented to attempt to prevent a headcut from progressing upstream and the subsequent lowering of the water table and change in the riparian vegetative community.

Alternative 2: Proposed Action

The proposed action is to stabilize up to 10 headcuts per year that are occurring throughout the district. Stabilization efforts would be site specific and the required clearances would be performed for each instance. Ground disturbing activities would likely encompass less than two acres per site, including actions such as equipment access and material staging. The stabilization methods could include the placement of large rock or wood or the use of bioengineering methods such as coir fiber nets or willow mats using either heavy machinery or hand tools.

One method of headcut stabilization would be the introduction of some large roughness elements into the stream channel, such as boulders or log jams. In many stream systems within the Pacific Northwest, large wood and boulders provide natural grade control in the form of channel spanning log jams or debris flow deposits. Hence, the designed rock and wood structures should mimic natural colluvial features, such as debris flow or landslide deposits, that provide this base level control or grade stabilization in areas where the risk of headcut migration exists. This technique is applicable to a wide range of stream types, from low gradient meandering streams to high gradient cascade channels. The goal of using large roughness elements is not to completely halt the incision process, but rather to slow it down and spread the elevation change over a greater length of channel. Since log jams are porous structures, not all of the sediment would be held in place; however, sediment inputs would be spread out over time rather than introduced to the stream as one large pulse. A log jam is also self-maintaining as long as more large wood is available in the stream system. Rock and wood would be sized so that it is not mobile during the design flood. Buoyancy calculations to determine appropriate ballast requirements would be completed for structures that would be completely inundated (USFWS 2007 and NMFS 2008). Logs utilized within the logjams may be recruited from riparian areas by tipping or falling conifers less than 21 inches in diameter if they are fully stocked along the stream channel and are outcompeting native riparian species.

A second method of addressing stream degradation may be the construction of log or rock weirs. Rock and log weirs are very low channel spanning structures that are often used to stabilize streambeds and halt channel incision. These weirs are used in low gradient (generally less than 2 percent) streams. The weirs are 'V' shaped, oriented with the apex upstream, and are lower in the center to direct flows to the middle of the channel. A series of V weirs would help to stabilize stream gradient, dissipate energy, provide some level of bank protection, and would maintain fish passage. Weirs would be keyed into the stream bed by a minimum of 2.5 times their exposure height to minimize structure undermining due to scour. The weir would also be keyed into both banks a minimum of eight feet. If several structures would be used in series, weir spacing would be no closer than the net drop divided by the channel slope

(for example, a one-foot-high weir in a stream with a 2 percent gradient would have a minimum spacing of 50 feet.) Weirs can fail if flow goes subsurface below the weir material. If placed material is coarse and unconsolidated, it is possible that upstream flows would go subsurface and reemerge at the downstream end of the structure, effectively causing a complete passage barrier. Careful consideration of the subsurface flow is therefore required before weir construction. The inclusion of fine material in the sediment mix and construction techniques that include washing material into place to seal the weir to the channel be would be preferred (USFWS 2007 and NMFS 2008).

Bioengineering techniques, such as coir fiber nets or willow mats, could be used in very low energy settings, such as along overflow channels of low gradient streams, in order to stabilize a headcut as well. This technique would attempt to reduce flow velocities and resulting shear stress by adding roughness, i.e. vegetation, to the channel and incorporating a stabilizing mat of root mass along the headcut itself.

In coordination with any headcut stabilization method employed, it would be necessary that riparian plantings occur in the disturbed area as well. A vigorous riparian community is crucial for increasing channel roughness, trapping sediments, and retaining organic debris. If there is adequate soil moisture, wetland herbaceous species, such as sedges and rushes, can be planted. Woody vegetation like willows and cottonwoods can oftentimes be planted as cuttings as long as the water table is within reach of the plant roots. A temporary fence may need to be constructed around the disturbed area so that riparian vegetation has the opportunity to become established. Fenced off areas would likely encompass approximately two acres in size and the length of fence that would need to be constructed would likely be approximately 1,200 feet.

Post project monitoring would follow the completion of any stabilization method. Monitoring would likely entail the performance of surveying channel cross sections and longitudinal profiles to ensure that the headcut has not continued to migrate upstream and that the channel geometry is remaining consistent with what would be expected at that site. In addition, vegetative recovery would be monitored to verify complete recovery of the project site. If stabilization efforts are determined to not be effective, additional efforts would be employed to either perform the necessary maintenance on the project or to redesign and reconstruct a new stabilization technique.

Alternatives considered but eliminated from detailed analysis

Include channel realignment as a possible method of headcut stabilization.

The BLM discussed the option of performing large scale, stream restoration actions, such as channel realignment, and determined it would be beyond the scope of this EA. A project of that magnitude would likely require a greater detail of input and analysis than what is being proposed under this current project and is economically infeasible with the project funding provided. In addition, channel realignment is not covered under the Aquatic Restoration Biological Opinion or Assessment and would thus require additional consultation with US Fish and Wildlife or the National Marine Fisheries Service regarding the project's effects on fish. This would result in a delay of each project and in the process, project sites could continue to degrade and the headcuts could continue to migrate, changing the entire project site. Most existing headcuts are expected to respond without the need for channel realignment

and the delays would make it increasingly difficult to meet the purpose and need of the project. Therefore, this alternative was considered but eliminated from detailed analysis in this EA.

Include changes in land use activities as a method of stabilizing headcuts.

The BLM considered changing land use activities, such as grazing or off road vehicle use, as a method of stabilizing headcuts. However, the response to these changes, while they may fix the overall cause of the headcut, wouldn't fix the immediate problem. Therefore, only addressing changes in land use activities would be ineffective in stabilizing active headcuts. In addition, the danger posed by the headcut to riparian areas upstream of the degradation would be too great to hope that no further incision would occur while waiting for the problem to fix itself. Thus, this alternative does not address the purpose and need of the project and thus, was eliminated from detailed analysis.

Include reintroduction of beaver to reaches experiencing headcutting.

The BLM discussed that it could be possible to re-stabilize reaches experiencing channel degradation through the reintroduction of beaver. While the presence of beaver structures does help to decrease stream velocity and energy and thus help prevent the formation of headcuts, the likelihood that a structure would be constructed at a site that would help to stabilize the headcut is relatively unlikely. It would also be necessary that the beaver's would be relocated into sites that provide adequate habitat with an ample food source in order for the reintroduction to succeed. In addition, beaver structures tend to be temporary in nature and would fail to address the problems posed by the headcut in a long term manner. Therefore, it was felt that the reintroduction of beavers would be an ineffective means to stabilize headcuts and would not meet the purpose and need for the project. Thus, this alternative was eliminated from detailed analysis.

Best Management Practices

The following actions are part of the proposed action alternative. While they are organized below under the main resource for which they are designed to reduce undesirable effects, some of them would reduce impacts to more than one resource.

Hydrology

- Rock and organic material placement is often used on severe headcuts in meadow areas to stop further channel incision. Stream types are typically Rosgen "C" and "E" channel types.
- When armoring a headcut, use sufficient sizes and amounts of material to prevent continued up-stream movement of the headcut. Materials can include both rock and organic materials which are native to the area/
- Focus stabilization efforts in the plunge pool, the headcut, as well as a short distance of stream above the headcut.
- Minimize lateral migration of channel around the headcut ("flanking") by placing rocks and/or organic material at a lower elevation in the center of the channel cross section to direct flows to the middle of the channel.
- Construct weirs in a 'V' shape, oriented with the apex upstream, and lower in the center to direct flows to the middle of the channel.

- Key weirs into the streambed to minimize structure undermining due to scour, preferably at least 2.5 times their exposed height. The weir should also be keyed greater than eight feet into both banks, if feasible.
- Include fine material in the weir material mix to help seal the weir channel bed, thereby preventing subsurface flow. Geotextile material can be used as an alternative approach to prevent subsurface flow.
- Large roughness elements, such as wood and boulder placement, are the preferred headcut treatment for those areas where large wood and boulders provide natural grade control.
- Rock and wood structures should mimic natural colluvial features, such as debris flow or landslide deposits, to provide channel stabilization.
- Rock and wood used in stabilization structures should be sized so that it is not mobile during the design flood.
- Wood to be felled within the riparian areas for use in logjams or stabilization structures will not be greater than 21 inches dbh.
- 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 sizes should be determined through a site-specific analysis, such as a shear stress analysis, and should not promote bank scouring and channel routing around the structure.
- The use of gabions, cable or other means to prevent the movement of individual boulders in a boulder weir is not allowed.
- 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, plan form, entrenchment, and ice and debris loading.
- The project designer or an inspector experienced in these instream structures should be present during installation.
- Include Pollution and Erosion Control Plans (PECPP) and Spill Prevention Control Plans (SPCCP) in contracts, agreements, and project plans when activity proposed to occur within stream channels may result in: mobilization of fine sediment, pesticide/herbicide use, short-term riparian disturbance, or harassment of ESA-listed aquatic species. PECPs will include provisions for minimizing site preparation impacts, minimize heavy equipment impacts, and site restoration.
- SPCCP will: describe provisions to prevent or reduce impacts from potential spills ((fuel, hydraulic fluid, etc), describe 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).
- 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 and preferably outside of Resource Management Area s (RMAs).
- All equipment 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 for leaks or accumulations of grease, and fix any identified problems before entering streams or areas that drain directly to streams or wetlands. During instream heavy equipment work, consider deploying an oil-absorbing floating boom downstream. Equipment used for

instream or riparian work shall be fueled and serviced in an established staging area outside the riparian zone. When not in use, vehicles shall be stored in the staging area.

Fisheries

- In streams with current or historic fish presence, provide fish passage over stabilized headcuts. Log or rock structures may be used to provide fish passage.
- If several structures will be used in series, space the weirs at the appropriate distances to promote fish passage of all life stages of native fish. Incorporate state fish passage criteria (jump height, pool depth, etc.) in the design of weir structures. Recommended weir spacing should be no closer than the net drop divided by the channel slope (for example, a one foot high weir in a stream with a 2 percent gradient will have a minimum spacing of 50 feet).
- To promote or maintain fish passage, ensure that wood and boulder structures should contain enough spaces to allow for up and downstream movement of fish.

Wildlife

- Retain trees that currently provide nesting habitat(s).
- In crucial wildlife habitats major construction and maintenance work will be scheduled to avoid or minimize disturbance to wildlife. Areas disturbed during project construction will be reseeded with a mixture of grasses, and shrubs to meet site specific needs or habitat requirements.
- Project activities that have the potential to disturb bald eagle winter roosts shall be restricted within 400 meters of the roosting area from November 1 to April 30th.
- In the 0.25 to 0.75 air mile circle around active peregrine nests, human activity (foot, vehicle, or aerial entry) is prohibited during the nest season, except for peregrine falcon monitoring and related activities, law enforcement, or to preserve human life in emergencies.
- Changes in hydrology of a stream should be for restoration purposes only.
- The project area will be surveyed for spotted frogs. If frogs are present within the project area relocate as many frogs that can be captured to the nearest suitable habitat outside of the project area.
- If overwintering habitats occur within the project area, minimize impacts by staging equipment and designing travel routes around these areas when possible.
- If spotted frog eggs are present within the project area delay project implementation if permitted within the State instream work dates until after the eggs hatch and the tadpoles have been removed.

Invasive Species

- Conduct botanical inventory for the presence/absence of noxious weeds prior to all project implementation. Inventory would be conducted during the season(s) appropriate for species identification, allowing for occupied plant habitat to be identified, flagged and treated as needed.
- All contracts involving ground disturbing activities will contain provisions which hold contractors responsible for the prevention or control of noxious weeds caused by their operations.

- Rock sources and stockpiles shall contain no known noxious weeds. The Government reserves the right to inspect the rock source and stockpiles through a site visit. If noxious weeds do exist, the Contractor shall submit to the Government a written weed control plan that clearly defines the actions taken by the Contractor to eliminate the noxious weeds. This will be achieved at least three months prior to implementation of the project.
- In order to prevent the potential spread of noxious weeds into the Prineville District BLM, all contractors involved in land disturbing activities such as headcut rehabilitation and other resource related activities which might include fire equipment, will be required to clean all equipment prior to entry on BLM lands.
- Cleaning shall be defined as removal of all dirt, grease, plant parts, and material that may carry noxious weed seeds into BLM lands. Cleaning prior to entry onto BLM lands may be accomplished by using a pressure hose.
- Prior to initial move-in of all equipment, and all subsequent move-ins, the operator shall make the equipment available for BLM inspection at an agreed upon location off federal lands. Equipment will be visually inspected by a qualified BLM specialist, to verify that the equipment has been reasonably cleaned. Only equipment inspected by the BLM will be allowed to operate within the project area, or in the immediate vicinity of the project area. All subsequent move-ins of equipment shall be treated the same as the initial move-in. and anytime the equipment is removed and returned to the road area.

Vegetation, Special, Strategic Plant Species and Special Habitats

- No conifers should be felled in the riparian area unless conifers are fully stocked and are consistent with vegetation objectives.
- Individual trees or small groups of trees (less than five) should come from the periphery of permanent or non-permanent openings.
- All headcut rehabilitation sites will be surveyed for strategic and sensitive plant (ssp) species as well as special habitats prior to proposed actions. Inventory would be conducted during the season(s) appropriate for species identification, allowing for occupied plant habitat to be identified, flagged and protected as needed.
- Special habitat sites include orchids and other species not common to the east side of the Cascade Mountains. These sites will be preserved. Orchids and other special habitat species require 15 (fifteen) or more years to re-establish.
- If strategic and/or sensitive plant species are found or if the site is determined to be a special habit, measures will be taken to preserve these species. The strategic and sensitive plant species may be removed from the project area prior to implementation and preserved for replanting in proper locations after the project has been completed.
- Treatments would occur during periods of special status plant dormancy.
- Rehabilitation of all disturbed riparian areas will result in similar or better than pre-work conditions through the spreading of stockpiled materials, seeding, and/or planting. In riparian areas, planting shall be completed no later than spring planting season of the year following end of disturbance. 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 or disturbance.

Cultural Resources

- Locate, protect and preserve historic and archaeological resources in accordance with legal authorities and policies prior to implementation. To comply with the National Historic Preservation Act (NHPA), 36 CFR 800 and Executive Order 11593, all areas where ground is to be disturbed, activities will be inventoried for prehistoric and historic features. Where feasible, all sites would be avoided. If sites determined eligible cannot be avoided, a determination of effect of the project on the site, including mitigation measures will be done in consultation with SHPO. (1989 Brothers Resource Management Plan, 1984 John Day Resource Management Plan, 1999 John Day River Management Plan, 2008 Proposed John Day Basin Resource Management Plan, 1986 Two Rivers Management Plan, and 2005 Upper Deschutes Resource Management Plan)
- Plan and conduct Section 106 of the NHPA according to the 1998 Protocol for Managing Cultural Resources on Lands Administered by the BLM in Oregon. Schedule compliance prior to project implementation (recommend one year or one field season prior to implementation). Section 106 compliance would include consultation with the Oregon SHPO and interested tribes.
- All treatments would be designed to avoid disturbance to historic properties and paleontological resources. Project design may avoid treatment to sensitive areas or modify treatment prescriptions to avoid impacts.
- Any new discoveries of cultural or paleontological resources during implementation would temporarily stop project activities and the district cultural specialist would be contacted. The project would resume upon completion of assessment and coordination.

Range

- Temporary exclosure fence types may include barbed-wire, high-tension, smooth-wire, let-down, electric, buck and pole, and other similar types.
- Fence construction may involve use of all-terrain vehicles, flatbed trucks, and manual power tools.
- Fence placement should allow for the lateral movement of the stream.
- Fences that cross the stream should not inhibit up or downstream movement of fish and or significantly impede bedload movement. Consider passage of large wood and other debris when constructing the fence.
- When using pressure treated lumber for fence posts only, complete all cutting/drilling offsite so that treated wood chips and debris does not enter the water or flood prone areas.
- All fences constructed will be built to standard Bureau wildlife specifications.
- All temporary fences constructed within active allotments will require notification and consultation with the relevant permittee / lessee.

Wilderness, Wilderness Study Areas, and Lands with Wilderness Characteristics

- Treatments involving the use of mechanized equipment would not be allowed within Wilderness or Wilderness Study Areas.
- All project actions would ensure that lands with wilderness characteristics retain their wilderness characteristics such that the BLM could designate them as wilderness in a future land use plan amendment.

Chapter 3: Affected Environment and Environmental Effects

Introduction:

The **affected environment** includes a succinct description of the present condition and trend of issue-related elements of the human environment that may be affected by implementing the proposed action or an alternative. It describes past and ongoing actions that contribute to present conditions, and provides a baseline for analyzing cumulative effects.

The **effects** are the known and predicted effects from implementation of the actions, limited to the identified issues. Direct effects are those caused by the action and occurring at the same time and place. Indirect effects are those caused by the action but occurring later or in a different location. Cumulative effects result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. The analysis includes other BLM actions, other federal actions, and non-federal (including private) actions. Reasonably foreseeable future actions are those for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends.

The description of the current state of the environment provided in the affected environment section inherently includes the effects of past actions and serves as a more accurate and useful starting point for a cumulative effects analysis than would attempting to establish such a starting point by "adding" up the effects of individual past actions. The importance of "past actions" is to set the context for understanding the incremental effects of the proposed action. This context is determined by combining the current conditions with available information on the expected effects of other present and reasonably foreseeable future actions. Here the cataloguing and analysis of the effects of other present and reasonably foreseeable actions relevant to the effects of the proposed action is necessary, and is described below. By comparing this total effect of the "no action" alternative to the effects described when adding the proposed action or any action alternative, we can discern the "cumulative impact" resulting from adding the "incremental impact" of the proposed action to the current environmental conditions and trends.

Riparian and Aquatic Ecosystems

Existing Environment

The project area for this EA encompasses all BLM managed stream corridors within the Prineville District. The BLM manages land and water in 131 different watersheds (5th field HUCs) within the project area which includes nearly 45,000 miles of streams (7,675 miles managed by the BLM) including:

- **Ephemeral** streams which do not flow during an average water year but do flow in response to large precipitation events. There are over 13,500 miles of ephemeral streams within the Prineville District of which the BLM manages nearly 3,500 miles.

- **Intermittent** streams which flow during spring runoff of an average water year, but generally dry up later in the summer. There are nearly 25,000 miles of intermittent streams within the Prineville District of which the BLM manages 3,700 miles.
- **Perennial** streams which flow with some water all year of an average water year. There are nearly 6,500 miles of perennial streams within the Prineville District of which the BLM manages over 500 miles.

Stream channels and flood plains are important because their shape and condition affect how rapidly water flows through a river system, how much water is stored in the basins, how clean the water is, and how much erosion occurs. These functions in turn affect fish and wildlife habitat, agriculture, recreation, and the susceptibility of local communities and landowners to floods.

Prior to disturbances such as grazing, mining, and farming initiated during European settlement, stream channels within the project area were generally well vegetated and had frequent interaction with their floodplains. As early land management reduced the watershed cover, overland flow of water increased and stream channels deepened to match the increased supply of water and sediment. Major flood events in the late 1800s were the likely immediate cause of the deepening of the channels. Channel incisions eventually lead to bank failure and subsequent channel widening.

The result of this process is that new channels are usually lower than predisturbance channels, and the old floodplain now functions primarily as a terrace. The final stage of channel evolution results in a new bankfull channel and active floodplain at a new, lower elevation. Many stream channels in the project area have new, lower elevation channels and floodplains (Figure 1).

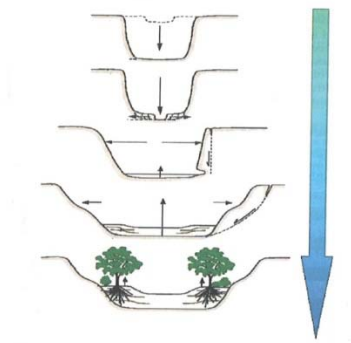

Figure 1 – Stream Channel Evolution

Although channels have downcut during floods more than 100 years ago and many have reached a new equilibrium or intercepted an erosion-resistant layer, there are still 41 stream reaches identified within BLM managed land on which at least one headcut is occurring (Figure 2). These headcuts are re-initiating the channel evolution process, creating a new, over widened and incised channel, often within a previously incised channel, and turning the newly developed floodplain into a new terrace. Although changes in riparian area management over the last 20 years have allowed for vigorous riparian vegetation growth, the relative youth of these restorative efforts have allowed continued degradation of some stream systems. Diversity of riparian vegetation age class, composition of riparian vegetation, and development of dense stream bank root masses is still relatively rare. These attributes require consistent management over an extended period of time, sometimes more than 100 years.

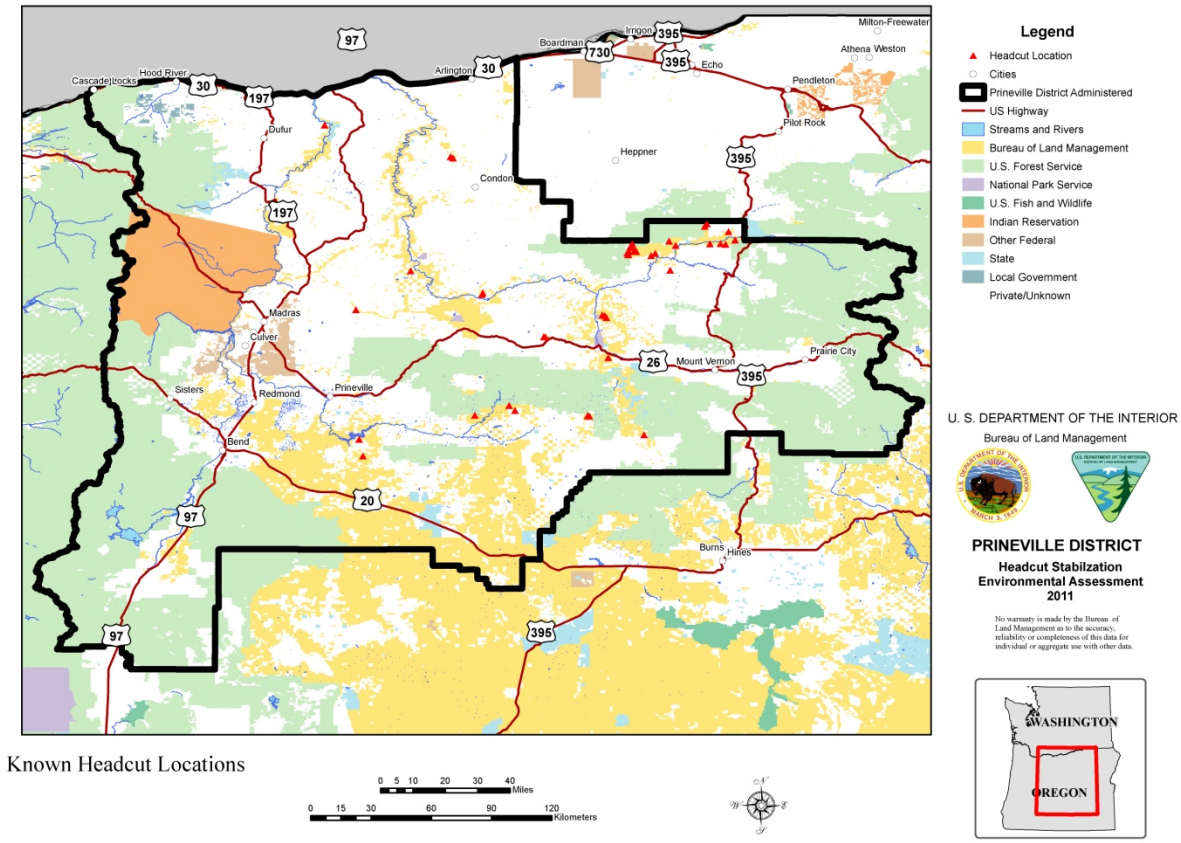

Figure 2 - Known Headcut Locations

In addition, as many of the rivers and streams located downstream from a reach downcut and lower over the years, the effects can be felt all the way up into the headwaters. Small changes in elevation downstream create reaches that are steeper and thus contain more energy than they were designed to handle. This leads to upstream reaches downcutting as well in order to balance that energy out. Oftentimes, the only thing that can stop this progression is a hardened point along the stream channel, such as a bedrock outcropping, that the channel cannot erode through.

Management across the district has emphasized riparian area restoration for over 30 years. Management of timber, grazing, and road building have emphasized actions compatible with achieving improving riparian conditions. The measures have been effective in improving channels and floodplains on BLM managed public land.

There are currently 94 reaches of streams identified by the Oregon Department of Environmental Quality (ODEQ) as being water quality impaired (303d) on BLM managed lands within the Prineville District, totaling 336 miles of stream. The vast majority of those stream miles, 302, are failing to meet the state temperature standards (ODEQ, 2010).

Effects

Alternative 1 (no action) would result in the continued degradation of riparian environments over time. This is based on the assumption that without corrective action, the headcuts would continue to migrate upstream, reducing the stream's access to its floodplain, and transforming riparian vegetative communities to upland terraces. The nearly flat, wide valley bottoms associated with undisturbed stream corridors allow for the redistribution of floodwaters across the entire valley width. This then increases the amount of herbaceous biomass present in these conditions. However, once a channel becomes incised following the migration of a headcut, the floodwater is often confined within the channel. This greatly reduces the available floodplain as well as increases the velocity of the water in the channel, resulting in the downstream transport of many finer grained particles and leaving behind coarser gravels and cobbles (Stavi et al., 2010).

The concentration of the streams energy within a confined channel immediately downstream of a headcut may also initiate further downcutting to a base level of erosion. The base level of erosion represents the equilibrium condition in which a stream cannot further degrade (Bull 1997). Thus, each headcut located on district, if left untreated, could result in a total of 78 tons of sediment being delivered into the stream systems and 0.75 acres of riparian vegetative communities transformed into an upland terrace. These numbers were determined by surveying what was felt to be an average, representative headcut and extrapolating how far the headcut may migrate upstream based upon valley and channel slope and possible grade holding material or structures. The increase in sediment being supplied to the stream would also act to increase turbidity. However, because most headcut migration occurs during times of high flows, the turbidity of the system would likely already be increased, thus muting the effect of the downcutting on the turbidity of the stream.

Incised streams have been found to generate two to three times the rates of suspended solids and turbidity than those streams that have not degraded (Shields Jr., et al., 2010). This results from eroding banks that generally occur downstream of a headcut as the stream widens out as well as from the headcut itself. In addition, the confined nature of the channel conveys a greater amount of energy than a stream that has access to its floodplain typically would; thus more erosive power results in higher sediment delivery and turbidity.

Increased fine sediment delivery is likely to affect fish through increased deposition in the substrate. Sediment that cannot be transported by the stream can become embedded in spawning gravels, reducing egg and alevin survival. Also, increased sediment load is detrimental to juvenile salmonids by introducing suspended particulate matter that interferes with feeding and territorial behavior (Berg and Northcote 1985). Studies have shown that sediment inputs resulting in substrate embeddedness of greater than one-third can result in a decrease in benthic invertebrate abundance; thus decreasing food available for juvenile salmonids (Waters 1995).

Downcut streams can increase the temperature of a stream by reducing groundwater discharge and hyporeic exchange, the mixing of shallow subsurface and surface water within the bed and banks of a stream, within the channel. The amount of floodplain available that can store water during spring

runoff and then slowly release it during summer low flows is greatly reduced along incised channels. This discharge of water from the floodplain into stream channels both acts to cool the channel by virtue that the groundwater is cooler than the surface water and to increase base flows so that solar energy would have less of an effect increasing stream temperatures. The loss of sinuosity, gravel bars and porous, alluvial channel beds can also decrease the amount of hyporeic flow occurring along a channel reach. Hyporeic flow acts to cool stream temperatures by redirecting flow through banks, gravel bars and into the subsurface. It has been shown that the effects of a downcut channel can increase maximum stream temperatures by more than 3 ℃ (Loheide II and Gorelick, 2006).

There are numerous species of wildlife which would be negatively affected by headcuts. These include species of reptiles, amphibians, neotropical migrant birds and mammals which depend on a healthy riparian and stream ecosystem for breeding/nesting and for the invertebrates, seeds, or vertebrate prey on which they feed. In streams with populations of amphibians, headcuts may result in the elimination of critical overwintering and breeding habitat that could result in the local extirpation of species such as Oregon spotted frogs (*Rana pretiosa*), an ESA candidate species and Columbia spotted frogs (*Rana lutieventris*) which are considered sensitive in the Prineville District.

Alternative 2 would stabilize up to ten headcuts per year on the Prineville District at a rate dictated by time and funding. This would serve to maintain current conditions within the riparian corridors in which these headcuts are located. Riparian vegetation would be preserved upstream from the headcut by maintaining an active floodplain and by preserving the water table near the surface of the valley bottom. Sediment would remain within the stream channel above the headcut and instream temperatures would remain cooler due to groundwater interactions.

During construction activities, some bank and bed excavation may be necessary in order to key stabilization structures into the landscape and greatly reduce the probability of failure. These actions would likely result in increased sediment during construction and possibly immediately following the completion of the project. In addition, disturbed lands would also be more susceptible to erosion during high flows after project implementation until riparian vegetation can become reestablished. The average headcut stabilization project would result in the excavation of approximately 30 cubic yards of material. However, because the project would be constructed during low flows, only a fraction of that excavated material, some material located within and adjacent to the wetted channel width, would enter the channel as sediment. In addition, all excavated material would be stored away from the channel and protected so that precipitation events would not erode the material back into the stream. With an average low flow width of three feet and assuming that as much as 5 percent of the material excavated from the stream and adjacent banks would be lost as sediment, each project could result in a ton of sediment entering the stream channel per headcut stabilization project, or a total of one ton of sediment per headcut.

It may be possible to utilize trees present along the riparian area to incorporate into planned structures or logjams. In riparian areas that are fully stocked with conifers, trees up to 21 inches in diameter at breast height may be felled into the stream channel to create a logjam, if that particular channel type would benefit from the presence of large wood. This would help to add roughness to the channel which

would help to reduce velocities and promote sediment deposition. Hardwood riparian vegetation would be left and would likely benefit from the removal of the conifers. While initial stream shading may decrease following the removal of the conifers from the riparian area, the increased growth that would follow from riparian hardwood species would likely surpass the shade offered by the conifers. In addition, the hardwoods would also add a stabilizing root mass to the stream bed and banks as well as providing addition roughness to the channel. This would help to stabilize the channel in the long term and help to prevent future headcuts from occurring while addressing headcuts that are currently present.

Following the completion of a structure, particularly in wet meadow environments, some channel widening may occur just downstream of the project site. This is generally the result of the transition of flow from a hardened surface (rock or log) to a more erosive one (clay or silt banks). However, it is not expected that this channel widening would extend more than a few feet downstream of the structure and would not likely be of any greater extent than the scour hole that is present just below the unaddressed headcut.

Numerous species of invertebrate and vertebrate wildlife would benefit from repairing headcuts. This alternative would stop the progressive destruction of habitat within streams or riparian areas caused by headcuts. Amphibians are more dependent than other species on aspects of these habitats such as off channel wetlands like sloughs and oxbow ponds that are breeding habitat for most species. For the Oregon spotted frog and Columbia spotted frog these off channel areas contain critical overwintering and breeding habitat without which the species could be extirpated.

Cumulative effects that could result from ongoing and future actions within the district such as vegetative treatments on both upland and riparian areas, land development, other river restoration projects, and climate change could affect headcut formation, migration, and stabilization. Some unaddressed headcuts occurring on private land could also migrate onto BLM, resulting in further degradation on public land and additional headcuts that require stabilization.

The amount of vegetative treatments occurring annually on private lands within the district is unknown but many landowners within central and eastern Oregon are in the process of cutting or burning juniper trees. Junipers can often outcompete other native plants for water, nutrients, and sunlight, resulting in a decline in plant diversity and shrub/native grass abundance and an increase in bare ground. Juniper removal, depending on scope, could result in increased infiltration within a watershed and decrease runoff and transpiration. This would result in decreased peak stream flows and increased summer low flows, which, in turn, would result in less erosive stream power that form headcuts and an increase in stabilizing riparian vegetation. These effects would combine with the effects from Alternative 1 and would lessen the overall impact. They would also combine with the effects from Alternative 2, but because the headcut is stabilized, no change in impact would be expected.

Many riparian plantings are also occurring across the district in an effort to reestablish native riparian vegetation. These efforts can help to slow floodwaters as flows exceed channel holding capacity and thus reduce the energy of the system. This would then help to reduce the power of the stream to

initiate and migrate headcuts. In addition, sediment deposited within the riparian vegetation due to slower water velocities and thus lower sediment transport capabilities can result in channel aggradation. These effects would combine with the effects from Alternative 1 and would lessen the overall impact. They would also combine with the effects from Alternative 2, but because the headcut is stabilized, no change in impact would be expected.

Land development throughout the district can affect headcuts by increasing the amount of impermeable surfaces within a watershed which results in greater amounts of runoff during precipitation events. These higher peak flows have much greater energy and can help contribute to the formation and migration of headcuts within a stream channel. The possibilities for future and current development within the district are much too great to list, but can include conversion of farm and ranch land to housing developments, road construction, and any other action that redirects runoff towards a channel and prevents precipitation from infiltrating. These effects would combine with the effects from Alternative 1 and would increase the overall impact. They would also combine with the effects from Alternative 2, but because the headcut is stabilized, no change in impact would be expected.

Stream restoration activities are becoming more commonplace throughout the district as land stewards realize the degraded state of many of the state's streams and rivers and attempt to restore more natural conditions. Some of these examples, within the district, include several projects on Trout Creek, tributary of the lower Deschutes River, Whyhcus Creek, tributary of the middle Deschutes River, and the Middle Fork John Day. These projects can help to complement headcut stabilization efforts that would be occurring. By helping to re-establish a more natural condition, even along a relatively short stretch of stream, the impacts can be felt throughout the watershed. Improved riparian conditions can result in better water quality downstream of a project and a re-established and stable elevation can help prevent future downcutting of the stream above a project. These effects would combine with the effects from Alternative 1 and would lessen the overall impact. They would also combine with the effects from Alternative 2, but because the headcut is stabilized, no change in impact would be expected.

Climate change can also have an effect on the project as well as the future state of many of the districts streams. However, the uncertainty regarding regional change in climate means that it is not currently possible to predict the specific effects of climate change on streams within the planning area. However, shifts in precipitation types and quantities and the resulting changes in landscape vegetation could drastically alter the flow regime of many of the district's rivers and streams.

Summary of effects

Table 1 – Summary of Environmental Effects per Each Project Site

	Alternative 1 (no action)	Alternative 2
Riparian and Aquatic Ecosystems		
In-stream sediment input	78 tons	1 ton
Loss of riparian vegetative communities	0.75 acres	0 acres
Increase in maximum stream temperature	3 °C	0 °C

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Teal Purrington	NEPA Coordinator

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Finding of No Significant Impact

Headcut Stabilization
NEPA Register Number DOI-BLM-OR-P000-2011-0024-EA
US Department of the Interior, Bureau of Land Management
Prineville Field Office, Oregon

Introduction

The Bureau of Land Management (BLM) has completed an Environmental Assessment (EA No. DOI-BLM-OR-P000-2011-0024-EA) that analyzes the effects of one action alternative to improve watershed health district-wide by halting the advancement of headcuts up stream corridors. The alternative proposes a combination of large rock or wood placement and bioengineering methods in order to stabilize the headcuts. Actions could occur on up to 10 headcuts per year but would likely encompass approximately two per year within the district due to budget constraints. The EA is incorporated by reference in this Finding of No Significant Impact (FONSI).

The Council on Environmental Quality (CEQ) regulations state that the significance of impacts must be determined in terms of both context and intensity (40 CFR 1508.27).

Context

The Proposed Action would occur throughout the BLM, Prineville district and would have local impacts on affected interests, lands, and resources similar to and within the scope of those described and considered in the Upper Deschutes Resource Management Plan and Record of Decision (2005), the Brothers / La Pine Resource Management Plan (1989), The John Day Resource Management Plan and Record of Decision (1985), The Two Rivers Resource Management Plan Record of Decision and Rangeland Program Summary (1986), and the Baker Resource Management Plan Record of Decision and Rangeland Program Summary (1989). The actions described represent anticipated program implementation within the scope and context of the RMPs. The treatment of up to 10 headcuts per watershed annually would not have international, national, regional, or state-wide importance not previously considered in the NEPA analysis for these RMPs.

Intensity

We have considered the potential intensity and severity of the impacts anticipated from implementation of a Decision on this EA relative to each of the ten areas suggested for consideration by the CEQ. With regard to each:

1. **Would any of the alternatives have significant beneficial or adverse impacts (40 CFR 1508.27(b)(I)?**

   No**.**

   Rationale: The propose action would impact resources as described in the EA. Mitigations to reduce impacts to the ground were incorporated in the design of the proposed action. These best management practices are outlined in Chapter 2 - Alternatives of the EA. None of the environmental effects discussed in detail in the EA are considered significant, nor do the effects exceed those described in the relevant RMP/EISs.

2. **Would any of the alternatives have significant adverse impacts on public health and safety (40 CFR 1508.27(b)(2)?**

   No**.**

   Rationale: The proposed action is designed to improve riparian habitat by stabilizing active headcuts within BLM administered lands within the Prineville District. There are no known effects to public health or safety.

3. **Would any of the alternatives have significant adverse impacts on unique geographic characteristics (cultural or historic resources, park lands, prime and unique farmlands, wetlands, wild and scenic rivers, designated wilderness or wilderness study areas, or ecologically critical areas (ACECs, RNAs, significant caves)) (40 CFR 1508.27(b)(3)?**

   No**.**

   Rationale: A cultural resource clearance will be completed prior to any restoration activities. Any recommendations therein will be followed. Any resource of concern identified to be at risk from the project activities will be protected from damage or disturbance. Any project implemented within a wild and scenic river or wetland would have beneficial impacts to these areas by preserving the streams connectivity with its floodplain and thus maintaining water quality and riparian vegetation upstream of the headcut. Any project occurring within a designated wilderness or wilderness study area would occur without the aid of mechanical treatments and would ensure that wilderness characteristics are maintained.

4. **Would any of the alternatives have highly controversial effects (40 CFR 1508.27(b)(4)?**

   No**.**

   Rationale: The effects that are expected are heavily documented and studied within the relevant literature and are not highly controversial in nature.

5. **Would any of the alternatives have highly uncertain effects or involve unique or unknown risks (40 CFR 1508.27(b)(5)?**

   No**.**

   Rationale: There are no unique or unusual risks. The many different federal, state, local, and private entities have implemented similar actions in similar areas. The environmental effects are fully analyzed in the EA. There are no predicted effects on the environment that are considered to be highly uncertain or involve unique or unknown risks.

6. **Would any of the alternatives establish a precedent for future actions with significant impacts (40 CFR 1508.27(b)(6)?**

   No**.**

   Rationale: Similar restoration projects have occurred numerous times for many years. There is no evidence that this action has potentially significant environmental effects. This management activity does not commit the BLM to pursuing further actions, and as such would not establish a precedent or decision for future actions with potentially significant environmental effects.

7. **Are any of the alternatives related to other actions with potentially significant cumulative impacts (40 CFR 1508.27(b)(7)?**

   No**.**

   Rationale: The actions considered in the proposed action were considered by the interdisciplinary team within the context of past, present, and reasonably foreseeable future actions. Significant cumulative effects are not predicted. An analysis of the effects of the proposed action is described in the EA.

8. **Would any of the alternatives have significant adverse impacts on scientific, cultural, or historic resources, including those listed or eligible for listing on the National Register of Historic Resources (40 CFR 1508.27(b)(8)?**

   No**.**

   Rationale: The project will not adversely affect scientific, cultural, or historic resources, including those eligible for listing in the National Register of Historic Places. Any cultural or historic resource identified within the project area would be avoided so that the project would not result in any adverse impacts to that resource.

9. **Would any of the alternatives have significant adverse impacts on threatened or endangered species or their critical habitat (40 CFR l508.27(b)(9)?**

   No**.**

   Rationale: Mitigations to reduce impacts to special status species have been incorporated into the design of the proposed action. These best management practices are outlined in Chapter 2 of the EA. Both a wildlife and botanical clearance will be completed prior to any restoration activities. Any recommendations therein will be followed. Any resource of concern identified to be at risk from the project activities will be protected from damage or disturbance.

10. **Would any of the alternatives have effects that threaten to violate Federal, State, or local law or requirements imposed for the protection of the environment (40 CFR l508.27(b)(lO)?**

    No.

    Rationale: The project does not violate any known Federal, State, Local or Tribal law or requirement imposed for the protection of the environment. State, local, and tribal interests were given the opportunity to participate in the environmental analysis process.

Finding

On the basis of the information contained in the EA, the consideration of intensity factors described above, all other information available to us, it is our determination that: (1) implementation of the alternative would not have significant environmental impacts beyond those already addressed in Upper Deschutes Proposed Resource Management Plan and Record of Decision (2005), the Brothers / La Pine Resource Management Plan (1989), The John Day Resource Management Plan and Record of Decision (1985), The Two Rivers Resource Management Plan Record of Decision (1986), and the Baker Resource Management Plan Record of Decision (1989); (2) the alternative would not constitute a major federal action having a significant effect on the human environment. Therefore, an EIS or a supplement to the existing EIS is not necessary and will not be prepared.

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