US Army Corps
of Engineers
Walla Walla District

East Birch Creek
Aquatic Ecosystem Restoration
Pilot Rock, Oregon

Environmental Assessment

DISTRIBUTION STATEMENT A
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Authority: Section 206, 1996 Water Resources Development Act
Corps Project for Aquatic Ecosystem Restoration

DRAFT

May 2001

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The Environmental Assessment addresses the environment impacts for a proposed aquatic ecosystem restoration project in East Birch Creek near Pilot Rock, Oregon. The project provides structures such as J-hooks, cross vanes, and chute cut-offs, and vegetative plantings and fencing, as the basic tools to reduce erosion and promote stream stabilization. Natural stability concept methodology is used to determine the preferred alternative for stream restoration. Impacts to species listed under the Endangered Species Act (Steelhead) are discussed. FONSI and comment response package are included.

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East Birch Creek
Aquatic Ecosystem Restoration

Section 206

Pilot Rock, Oregon

Environmental Assessment

Prepared by
U.S. Army Corps of Engineers
Walla Walla District

In cooperation with
Oregon Department of Fish and Game

May 2001

Summary

This Environmental Assessment addresses the environmental impacts for a proposed aquatic ecosystem restoration project in East Birch Creek near Pilot Rock, Oregon. Historically, measures were taken along the reach to keep the channel from meandering and adjusting laterally to prevent overbank flooding. These measures included construction of dikes and levees, channelization, and rip-rapping are all evident in the proposed project reach. Such interference in natural geomorphic processes disrupts channel patterns, which are normally self-developed and self-maintained. Several alternatives to repair/restore the creek habitat system, based on natural channel design methodology, were evaluated. The most desirable alternative, called the preferred alternative was selected based on function, cost, and impacts to the environment. Adverse impacts to the environment by the actions in the preferred alternative are expected to be minor. Impacts to species listed under the Endangered Species Act are discussed.

Natural stability concept methodology is used to determine the preferred alternative for stream restoration. As presented and depicted on Plate 3, the design represents the maximum stream re-alignment that would be undertaken for this project. The design development may "fine tune" the alignment to preserve existing vegetation and avoid construction difficulties which may result in minor changes. It is anticipated that these changes would result in less stream channel meander and would require less excavation, which would result in less impact to the aquatic and riparian resources. Therefore, this EA considers the environmental impact for the design condition, without "fine tuning", that would have the greatest potential for adverse effect.

The project provides structures such as J-hooks, cross vanes, and chute cut-offs, and vegetative plantings, as the basic tools to reduce erosion and promote stream stabilization. Additional habitat improvement such as cover rocks, rootwads, etc. will be used depending on their incremental benefit, as determined in an economic analysis. Depending on the outcome of the site/tool specific cost/benefit economic analysis, the project may employ additional planting to widen the riparian zone. The maximum case would create the widest riparian buffer possible that would involve planting the entire space between the creek and the project fence installed to keep livestock out of the creek. Any amount of planting above the minimum would provide additional environmental benefit, without adverse environmental impact. Therefore the EA considers the impact of the minimum habitat improvement case, which represents the worst case for adverse affect, while also considering the impact of optional habitat improvement, which represents the maximum habitat improvement case.

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DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA, WASHINGTON 99362-1876

REPLY TO
ATTENTION OF

September 7, 2001

Planning, Programs, and Project
Management Division

Dear Interested Party:

Enclosed is a copy of the final Finding of No Significant Impact (FONSI) for the East Birch Creek Aquatic Restoration project and a copy of the comment response package. A copy of the National Marine Fisheries (NMFS) Biological Opinion dated July 27, 2001 is available upon request. The Biological Opinion is identified as Appendix E.2 (to be added later) in the Environmental Assessment (EA).

The project is located south of Pilot Rock, Oregon and will use bioengineering techniques to construct and restore quality salmonid habitat, natural channel function and associated aquatic, and riparian biological processes in East Birch Creek. The EA addresses the environmental impacts for the proposed aquatic ecosystem restoration project. After close review of the project, and coordination and consultation with the resource agencies, the Walla Walla District Engineer signed the FONSI. Construction is currently scheduled to commence in mid September 2001.

If you have questions or need additional information regarding the project, please contact me at 509-527-7260.

Sincerely,

Carl J. Christianson
Project Manager

Enclosure

FINDING OF NO SIGNIFICANT IMPACT

ECOSYSTEM RESTORATION, SECTION 206
EAST BIRCH CREEK

PILOT ROCK, OREGON
July 2001

The U.S. Army Corps of Engineers (Corps), Walla Walla District, proposes to implement an environmental restoration project along a 1.2 mile (1.6 kilometer) stretch of East Birch Creek near Pilot Rock, Oregon. The purpose of the project is to restore aquatic and riparian habitat throughout the project area. This entails restoring the riparian function in the creek habitat reach, and restoring the geomorphic function of the channel, which will generally mean a narrower, deeper, more meandering channel with more stable, vegetated banks and more diverse in-stream habitat. The project goal is to construct a restoration design that will result in a system that meets specific habitat needs of ESA listed summer-run steelhead, including fish passage, spawning, and rearing; and an improved self-maintaining riparian and creek system that, in the long term, requires little or no maintenance.

The proposed project would include work by the U.S. Army Corps of Engineers (Corps) as authorized by Section 206, of the Water Resources Development Act of 1996, Public Law 104-303. Section 206 requires a non-federal sponsor to cost share projects. Oregon Department of Fish and Wildlife (ODFW) Pendleton District is the non-federal sponsor for this project.

The Corps prepared an Environmental Assessment (EA) to evaluate the potential effects of restoration measures upon environmental resources and upon the project area. The purpose of the EA is to ensure actions and restoration measures proposed as a result of the study meet the requirements of the National Environmental Policy Act (NEPA) of 1969 and subsequent implementing regulations issued by the Council on Environmental Quality (40 CFR 1500) and the Corps' Engineer Regulation 200-2-2. The EA and Draft FONSI were prepared in the Spring of 2001. Adverse impacts to the environment by the preferred alternative are expected to be minor. Impacts to species listed under the Endangered Species Act were considered and are discussed below.

The Planning and Design Analysis (PDA) process for Section 206 projects costing less than $1 million (in Federal funds) was utilized for project planning and design on this project. PDA is a more streamlined process and allows for the EA to be the sole decision document. Although documentation of the design development is less formal than for larger projects, the same planning and design elements are performed, which includes an independent technical review of the design to ensure a quality project.

Historically, measures were taken along the reach to keep the channel from meandering and adjusting laterally to prevent overbank flooding. These measures included construction of dikes and levees, channelization, and rip-rapping which are all evident in the proposed project reach. Such interference in natural geomorphic processes disrupts channel patterns which are normally self-developed and self-maintained. Excessive grazing and removal of brush and trees (e.g. willows, cottonwood) from the riparian zone has reduced native woody species to about 25% of their original coverage and midday shade to about 10% of the wetted channel. The change in alignment, loss of stabilizing riparian vegetation, and sediment load from upstream (caused by livestock grazing, roadway encroachment on Pearson Creek, and a landslide on Pearson Creek) has caused instability in the channel with roughly 70% of banks showing evidence of active erosion. The channel that has developed under these conditions lacks the distribution of riffle and pool habitat that is needed for salmonid rearing.

*The Corps evaluated several alternatives in the EA, including the "no action" alternative. The no action alternative does not meet the objective of the sponsor to improve aquatic and riparian habitat, and would not take any action to help the recovery of the Summer Steelhead (*Oncorhynchus mykiss*) listed under the ESA. Under the "no action" alternative, the damaged condition of the aquatic and terrestrial habitat within the project site would remain. The Corps determined the "no action" alternative would not meet the purpose of the project or satisfy the need to restore portions of habitat already damaged. Although the "no action" alternative was not selected as the preferred alternative, the "no action" alternative would, by default, become the selected alternative should the project not proceed to the construction phase.*

Several alternatives to repair/restore the creek habitat system were evaluated in the EA. Alternatives 1A, 1B, 2, 3 and 4 were eliminated from further consideration based on unacceptable real estate impacts or less than acceptable project performance. The most desirable alternative was Alternative 5, called the preferred alternative, and was selected based on function, cost, and impacts to the environment. To achieve the goals of this project, the Corps considered alternatives for two categories; creek stabilization and habitat improvement.

A different approach was used to consider the components of the alternatives within each category. Based on stream classification, the creek stretch was divided into five reaches. Natural stability concept methodology developed by Rosgen (1996) was used to determine the proper stabilization criteria. Under this methodology, there are four alternatives for accomplishing stream restoration where the stream has eroded to the point that it is no longer connected to its floodplain. Based on stream classification, an alternative was selected for each reach.

Alternative 2 has a stabilization criteria which is to construct the alignment and profile to match the desired stream classification that is constructed within the eroded channel area. Alternative 3 has a stabilization criteria which is to construct a stable stream within a narrow corridor by constructing a type B stream and provide flood prone areas . The preferred alternative, alternative 5, is a combination of these streambank stabilization measures using Alternative 2 criteria for Reach-2 and Alternative 3 criteria for Reach-1, 3, 4 & 5.

An economic analysis was used to determine the extent of habitat improvement. The proposed project will employ the amount of habitat improvement required for erosion control and streambank stabilization. The EA analysis focused on the minimum cost habitat improvement case required to provide erosion control and for streambank stabilization. Additional revegetation and incorporation of cover structures will occur to the extent funding allows, up to the amount identified by the economic alternative analysis providing the lowest cost per amount of habitat produced. The fence will be contiguous with the easement boundary and is expected to provide a project corridor width of approximately 250 feet.

The EA included a complete evaluation including, but not limited to, a US Fish and Wildlife Service (USFWS) Biological Assessment, a National Marine Fisheries Service (NMFS) Biological Assessment, and a Cultural Resource Evaluation. Concurrence letters were received from USF&WS, SHPO and THPO on May 1, May 7, and May 10, 2001, respectively. A Biological Opinion (BO) was received from NMFS on July 27, 2001. The requirements of the above documents have been incorporated into the EA and/or FONSI. The project meets the requirements of the Nationwide Permit #27, Wetland Riparian Restoration and Creation Activities." Therefore an individual Section 401 water quality certification is not required.

The EA was distributed for public review during the period May 25 to June 25, 2001, in which two comments were received. The Oregon Department of Water Resources identified water rights requirements, and if needed to construct the project, well construction requirements. The second comment was from a landowner located downstream of the project regarding water usage, water rights and water temperature. A comment response package that provides the Corps' response to these comments is included as an attachment to the FONSI.

NMFS requested additional information beyond what was in the Corps BA prior to March 18, 2001. It was agreed that ODFW would furnish that additional information in the form of a new BA which was sent by ODFW on May 25, 2001. That BA addressed the joint project between the Corps and ODFW described herein as well as an additional project ODFW is conducting on their own immediately downstream. The Corps understands and intends to adhere to the provisions of the BO as they apply to the joint project only, that being the 1.2 mile reach on the Brogoitti property. NMFS has determined that the project is not likely to jeopardize Middle Columbia River steelhead, or destroy, or adversely modify their habitat. The Corps concurs with the Terms and Conditions in the BO, which implement the Reasonable and Prudent Measures for *steelhead, and will incorporate them into the final project design to protect environmental resources. These measures also meet the requirements of the Sustainable Fisheries Act of 1996 (Public Law 104-267), which amended the Magnuson-Stevens Act for Chinook salmon. The list below summarizes measures to be taken for the project, as outlined in the Terms and Conditions:*

1) *All in-water work will be completed from 1 July to October 31.*
2) *Instream work will be limited to the actions described in the BA requiring instream work.*
3) *A site-specific spill prevention, containment and control plan will be developed and implemented for the project.*
4) *All disturbed areas will be planted with native grasses, shrubs, or trees upon completion of construction. Monitoring to ensure adequate vegetation survival will be implemented, with replanting, irrigation, and manual weeding performed, as needed, during the first two years.*
5) *Best management practices will be implemented to minimize transport of sediment into the stream and to areas downstream from the project site both during and after construction. Turbidity monitoring during and after construction will occur.*
6) *The fish salvage operation will be conducted by qualified ODFW personnel familiar with NMFS electrofish guidelines. Dead, injured, or sick endangered or threatened species will be reported to the NMFS law enforcement office.*
7) *Effective livestock fencing will be maintained throughout the duration of the 25 year riparian easement period.*
8) *A monitoring report will be prepared and submitted to NMFS describing the project's success in meeting the reasonable and prudent measure's terms and conditions, within one year of completing the project.*
9) *ODFW and/or Corps personnel will be on-site for all construction activities.*

Effects of the proposed environmental restoration project are detailed in the Environmental Assessment. Near term environmental disruption due to construction activity will be offset by long- term improvements to the aquatic and riparian habitat. Water quality features such as temperature and sediment content will likely improve within the project area.

Cumulative impacts were evaluated as to the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what other agency or person undertakes the other actions. No negative cumulative impacts were identified and numerous beneficial cumulative impacts are expected. For the environmental restoration measures being proposed under this project, any non-beneficial impacts to water quality, air quality, aesthetics, recreation, aquatic and terrestrial species and habitat due to construction will be minor and short-term.

The EA covers the specifics and details of the stream restoration project. The project has been coordinated with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Oregon Department of Environmental Quality, Oregon State Historic Preservation Office, Oregon Department of State Lands, other concerned state and federal agencies and tribes, affected governments, and the public.

I have taken into consideration the technical aspects of the project, best scientific information available, public comment, and determinations of the EA. Based on this information, I have determined that the overall projected effects of this proposed action are beneficial and, based on the information provided, would not result in significant impacts to the quality of the human environment. Therefore an Environmental Impact Statement is not required for the development of this project.

DATE: 31 July '01

Richard P. Wagenaar
Lieutenant Colonel, Corps of Engineers,
District Engineer

East Birch Creek Section 206

Comment Response Package

Oregon
John A. Kitzhaber, M.D., Governor

Water Resources Department
Watermaster
116 S.E. Dorion Avenue
Pendleton, OR 97801
Phone (541) 278-5456
FAX (541) 278-0287

June 22, 2001

Walla Walla District, Corps of Engineers
Environmental Compliance Section
Attention: Stan Heller
201 N. Third Avenue
Walla Walla, WA 99362

RE: Birch Creek Aquatic Ecosystem Restoration (EA).

Dear Mr. Heller:

Thanks for the opportunity to comment on your proposed project on East Birch Creek.

My comments are concerning any water use. Generally, any diversions of surface water for some use requires a water right ~~prior~~ to the diversion of water. Watering of riparian plantings, for example, by diverting water from the stream requires a water right. Watering of livestock by diverting water from the stream requires a water right unless it meets the exemptions defined in ORS 541.141 (1)(f)(2)(a)(b)(c), copy enclosed.

Watering livestock from groundwater through a well does not require a water right. However, the well needs to meet well construction standards which usually requires the well to be drilled by a licensed and bonded well constructor.

I understand from your document you have not determined the final method you will use to water livestock. I suggest you call me at 541-278-5456 to discuss your plans prior to implementing them. Well construction compliance issues should be addressed to Brian Mayer at the same phone number.

Sincerely,

Tony Justus
Watermaster, Dist. 5

cc: Brian Mayer, Well Construction Specialist
Mike Ladd, NC Region Manager
Tim Bailey, ODFW

land crossed by the proposed ditch, canal or other work;

(F) The time within which it is proposed to begin construction;

(G) The time required for completion of the construction;

(H) The time for the complete application of the water to the proposed use; and

(I) Any other information required in the application form that is necessary to evaluate the application as established by statute and rule.

(b) If for agricultural purposes, the application shall give the legal subdivisions of the land and the acreage to be irrigated, as near as may be.

(c) Except as provided in subsection (2) of this section, if for power purposes, the application shall give the nature of the works by means of which the power is to be developed, the head and amount of water to be utilized, and the uses to which the power is to be applied.

(d) If for construction of a reservoir, the application shall give the height of dam, the capacity of the reservoir, and the uses to be made of the impounded waters.

(e) If for municipal water supply, the application shall give the present population to be served, and, as near as may be, the future requirements of the city.

(f) If for mining purposes, the application shall give the nature of the mines to be served, and the methods of supplying and utilizing the water.

(2) Any person who has applied to the Federal Energy Regulatory Commission for a preliminary permit or an exemption from licensing shall, at the same time, apply to the Water Resources Department for a permit to appropriate water for a hydroelectric project. An applicant for a permit to appropriate water for a new hydroelectric project shall submit to the department a complete copy of any application for the project filed with the Federal Energy Regulatory Commission or other federal agency. If the copy of the federal application is filed with the department at the same time it is filed with the federal agency, at the department's discretion such copy may fulfill the requirements for an application under subsection (1) of this section.

(3) Each application shall be accompanied by any map or drawing and all other data concerning the proposed project and the applicant's ability and intention to construct the project, as may be prescribed by the Water Resources Commission. The accompanying data shall be considered a part of the application.

(4) The map or drawing required to accompany the application shall be of sufficient quality and scale to establish the location of the proposed point of diversion and the proposed place of use identified by tax lot, township, range, section and nearest quarter-quarter section along with a notation of the acreage of the proposed place of use, if appropriate. In addition, the department shall accept locational coordinate information, including latitude and longitude as established by a global positioning system. If the application is for a water right for a municipal use, the map need not identify the proposed place of use by tax lot.

(5) Each application for a permit to appropriate water shall be accompanied by the examination fee set forth in ORS 536.050 (1).

(6) If the proposed use of the water is for operation of a chemical process mine as defined in ORS 517.953, the applicant shall provide the information required under this section as part of the consolidated application under ORS 517.952 to 517.989.

(7) Notwithstanding any provision of ORS 183.310 to 183.550, an application for a permit to appropriate water shall be processed in the manner set forth in ORS 537.120 to 537.360. Nothing in ORS 183.310 to 183.550 shall be construed to allow additional persons to participate in the process. To the extent that any provision in ORS 183.310 to 183.550 conflicts with a provision set forth in ORS 537.120 to 537.360, the provisions in ORS 537.120 to 537.360 shall control. [Amended by 1985 c.673 §27; 1987 c.542 §5; 1989 c.509 §4; 1991 c.735 §32; 1991 c.869 §6; 1993 c.557 §1; 1993 c.591 §2; 1995 c.365 §3; 1995 c.416 §5; 1997 c.446 §1; 1997 c.587 §4]

537.141 Uses of water not requiring water right application, permit or certificate. (1) The following water uses do not require an application under ORS 537.130 or 537.615, a water right permit under ORS 537.211 or a water right certificate under ORS 537.250:

(a) Emergency fire-fighting uses;

(b) Nonemergency fire-fighting training conducted by public fire departments and rural fire protection districts, provided:

(A) The source of the water is existing storage and the use occurs with permission of the owner of the stored water; or

(B) If the source of water is other than existing storage, the use occurs with the prior written approval of the watermaster in the district where the training will take place and subject to any conditions the watermaster determines are necessary to prevent injury to existing water rights and to protect in-stream resources;

(c) Water uses that divert water to water tanks or troughs from a reservoir for a use allowed under an existing water right permit or certificate for the reservoir;

(d) Fish screens, fishways and fish bypass structures, as exempted by rule of the Water Resources Commission;

(e) Land management practices intended to save soil and improve water quality by temporarily impeding or changing the natural flow of diffuse surface water across agricultural lands when storage of public waters is not an intended purpose. Such practices include but are not limited to:

(A) Terraces;

(B) Dikes;

(C) Retention dams and other temporary impoundments; and

(D) Agronomic practices designed to improve water quality and control surface runoff to prevent erosion, such as ripping, pitting, rough tillage and cross slope farming;

(f) Livestock watering operations that comply with the requirements under subsections (2) and (3) of this section;

(g) Forest management activities that require the use of water in conjunction with mixing pesticides as defined in ORS 634.006, or in slash burning;

(h) The collection of precipitation water from an artificial impervious surface and the use of such water; and

(i) Land application of ground water so long as the ground water:

(A) Has first been appropriated and used under a permit or certificate issued under ORS 537.625 or 537.630 for a water right issued for industrial purposes or a water right authorizing use of water for confined animal feeding purposes;

(B) Is reused for irrigation purposes and the period of irrigation is a period during which the reused water has never been discharged to the waters of the state; and

(C) Is applied pursuant to a permit issued by the Department of Environmental Quality under either ORS 468B.050 to construct and operate a disposal system or ORS 468B.215 to operate a confined animal feeding operation.

(2) The use of surface water for livestock watering may be exempted under subsection (1) of this section if:

(a) The water is diverted from a stream or other surface water source to a trough or tank through an enclosed water delivery system;

(b) The delivery system either is equipped with an automatic shutoff or flow control mechanism or includes a means for returning water to the surface water source through an enclosed delivery system; and

(c) The operation is located on land from which the livestock would otherwise have legal access to both the use and source of the surface water source.

(3) If the diversion system described in subsection (2) of this section is located within or above a scenic waterway, the amount of water that may be used without a water right is limited to one-tenth of one cubic foot per second per 1,000 head of livestock. Nothing in this section shall prevent the Water Resources Commission from approving an application for a water right permit for a delivery system not qualifying under subsection (2) of this section.

(4) The Water Resources Department, in conjunction with local soil and water conservation districts, the State Department of Agriculture and the State Department of Fish and Wildlife and any other organization interested in participating, shall develop and implement a voluntary educational program on livestock management techniques designed to keep livestock away from streams and riparian areas.

(5) To qualify for an exempt use under subsection (1)(g) of this section, the user shall:

(a) Submit notice of the proposed use, including the identification of the proposed water source, to the Water Resources Department and to the State Department of Fish and Wildlife at the time notice is provided to other affected agencies pursuant to ORS 527.670; and

(b) Comply with any restrictions imposed by the department pertaining to sources of water that may not be used in conjunction with the proposed activity.

(6) Except for the use of water under subsection (1)(i) of this section, the Water Resources Commission by rule may require any person or public agency diverting water as described in subsection (1) of this section to furnish information with regard to such water and the use thereof. For a use of water described in subsection (1)(i) of this section, the Department of Environmental Quality shall provide to the Water Resources Department a copy of the permit issued under ORS 468B.050 or 468B.215 authorizing the land application of ground water for reuse. The permit shall provide the information regarding the place of use of such water and the nature of the beneficial reuse. [1993 c.595 §3; 1995 c.184 §1; 1995 c.274 §9a; 1995 c.537 §2; 1995 c.752 §7; 1997 c.199 §1; 1997 c.244 §2; 1999 c.335 §1]

Note: 537.141 was added to and made a part of ORS chapter 537 by legislative action but was not added

Response to June 22, 2001 letter from Oregon Department of Water Resources

Comment 1: Your comment is noted. Watering of riparian plantings would be performed using the landowner's existing surface water rights which consist of 0.30 cfs for 24 acres with a 1889 priority date and 0.09 cfs for 7 acres with a 1905 priority date. Given this year's (2001) drought conditions and sensitivity to avoid any unnecessary water usage, limited watering would begin this September and October as plantings are installed during channel work and structure placement. Additional planting will take place in November, but irrigation would not be needed at that time in anticipation of seasonal rainfall. Full-scale irrigation of the project would begin in late May 2002.

Comment 2: Livestock watering is expected to meet the exemption defined in ORS 541.141 (1)(f)(2)(a)(b)(c).

Comment 3: Your comment is noted and a licensed and bonded well contractor would be used to construct a well for livestock watering, if required.

Comment 4: Your comment is noted. Your letter has been forwarded to the ODFW Pendelton office. ODFW will be responsible for any irrigation and livestock watering provisions. Thank you for your comments.

July 13, 2001

Walla Walla District, Corps of Engineers
Environmental Compliance Section
ATTN: Stan Heller
201 N. Third Avenue
Walla Walla, WA 99362

Thank you for the extension on this public comment period. While there are several causes for concern, I'll touch briefly on my main concern.

Since the water level is so critically low already, landowners down stream would be affected by loss of water due to rechannelling and reshaping of the channel. It has not been determined in the EA how much water will be necessary for absorption to occur in newly channelled dry ground; how much water will it take for the large "woody" materials to be absorbed; where will the water come from to fill the "borrow ponds"; does the amount needed exceed the water rights the land owner has; and what alternatives will be in place (if any) to assure land owners down stream that may have older water rights; that there will be no impact or water loss. Also, if the water temperature rises above 75 degrees F., could it in part be from removing so many trees on the project site. Will the agencies involved be subjected to NMFS regulations, or will landowners downstream be shut down from irrigating if water temperatures are degraded.

I would appreciate a response to these concerns.

Thank you.

Trudy Jessen

Response to July 13, 2001 letter from Trudy Jessen

Comment 1: Your comment regarding low water levels this year is noted. The amount of water to wet the reshaped alignment has not been quantified, but is expected to be a small amount. The amount of water initially diverted to wet any new channels will not exceed the landowner's existing water rights, which consist of 0.30 cubic feet per second (cfs) for 24 acres with an 1889 priority date and 0.09 cfs for 7 acres with a 1905 priority date. In most cases, the new channel's final excavation depth would be down to where the soil is nearly or completely saturated. The rewetting of the surface area, including any large woody debris, and reconnection with the groundwater table would be very short in duration, and once re-established, would not continue to be a source of water loss.

Comment 2: Water in the borrow ponds would result from being excavated down to a depth that connects to the water table. The exposed surface area of the ponds would result in a very small loss of water from the system due to evaporation. Seasonal rains would add water to the ponds, and water from the creek would not be used to fill the ponds.

Comment 3: The District 5 Watermaster is responsible for managing the water distribution resulting from water rights. A comment letter was received from the District 5 Watermaster, but was primarily focused on watering of livestock. An information copy of your letter will be provided to the District 5 Watermaster.

Comment 4: A water temperature rise at the site could, in part, be due to tree or vegetation removal at the site. The expectation is that the deeper thalweg will more than compensate for the temporary loss of vegetation. As much as possible, existing vegetation affected by the construction will be transplanted. All newly disturbed banks will be planted with new vegetation, resulting in a net gain of vegetated banks. Thus, if a temperature exceedance were experienced, it would be due to other factors. A NMFS biological opinion was received for the project, and the Corps will follow the reasonable and prudent measures to avoid, mitigate, and offset the adverse impacts of the project on Essential Fish Habitat. One of the primary goals of this project is to reduce, or at a minimum, maintain the water temperature throughout the project reach. The objective of this and similar projects being implemented in the region is to improve habitat conditions for aquatic species, in cooperation with NMFS and other Federal and State agencies, so that additional regulatory requirements or actions would not be necessary. Thank you for your comments.

DRAFT

FINDING OF NO SIGNIFICANT IMPACT

ECOSYSTEM RESTORATION, SECTION 206
EAST BIRCH CREEK

PILOT ROCK, OREGON
May 2001

The U.S. Army Corps of Engineers (Corps), Walla Walla District, proposes to implement an environmental restoration project along a 1.2 mile (1.6 kilometer) stretch of East Birch Creek near Pilot Rock, Oregon. The purpose of the project is to restore aquatic and riparian habitat throughout the project area. This entails restoring the riparian function in the creek habitat reach, and restoring the geomorphic function of the channel, which will generally mean a narrower, deeper, more meandering channel with more stable, vegetated banks and more diverse in-stream habitat. The project goal is to construct a restoration design that will result in a system that meets specific habitat needs of ESA listed summer-run steelhead, including fish passage, spawning, and rearing; and an improved self-maintaining riparian and creek system that, in the long term, requires little or no maintenance.

The proposed project would include work by the U.S. Army Corps of Engineers (Corps) as authorized by Section 206, of the Water Resources Development Act of 1996, Public Law 104-303. Section 206 requires a non-federal sponsor to cost share projects. Oregon Department of Fish and Wildlife (ODFW) Pendleton District is the non-federal sponsor for this project.

The Corps prepared an Environmental Assessment (EA) to evaluate the potential effects of restoration measures upon environmental resources and upon the project area. The purpose of the EA is to ensure actions and restoration measures proposed as a result of the study meet the requirements of the National Environmental Policy Act (NEPA) of 1969 and subsequent implementing regulations issued by the Council on Environmental Quality (40 CFR 1500) and the Corps' Engineer Regulation 200-2-2. The EA and Draft FONSI were prepared in the Spring of 2001. Adverse impacts to the environment by the preferred alternative are expected to be minor. Impacts to species listed under the Endangered Species Act were considered and are discussed below:

The Planning and Design Analysis (PDA) process for Section 206 projects costing less than $1 million was utilized for project planning and design on this project. PDA is a more streamlined process and allows for the EA to be the sole decision document. Although documentation of the design development is less formal than for larger projects, the same planning and design elements are performed, which includes an independent technical review of the design to ensure a quality project.

Historically, measures were taken along the reach to keep the channel from meandering and adjusting laterally to prevent overbank flooding. These measures included construction of dikes and levees, channelization, and rip-rapping which are all evident in the proposed project reach. Such interference in natural geomorphic processes disrupts channel patterns which are normally self-developed and self-maintained. Excessive grazing and removal of brush and trees (e.g. willows, cottonwood) from the riparian zone has reduced native woody species to about 25% of their original coverage and midday shade to about 10% of the wetted channel. The change in alignment, loss of stabilizing riparian vegetation, and sediment load from upstream (caused by livestock grazing, roadway encroachment on Pearson Creek, and a landslide on Pearson Creek) has caused instability in the channel with roughly 70% of banks showing evidence of active erosion. The channel that has developed under these conditions lacks the distribution of riffle and pool habitat that is needed for salmonid rearing.

The Corps evaluated several alternatives in the EA, including the "no action" alternative. The no action alternative does not meet the objective of the sponsor to improve aquatic and riparian habitat, and would not take any action to help the recovery of the Summer Steelhead (Oncorhynchus mykiss) listed under the ESA. Under the "no action" alternative, the damaged condition of the aquatic and terrestrial habitat within the project site would remain. The Corps determined the "no action" alternative would not meet the purpose of the project or satisfy the need to restore portions of habitat already damaged. Although the "no action" alternative was not selected as the preferred alternative, the "no action" alternative would, by default, become the selected alternative should the project not proceed to the construction phase.

Several alternatives to repair/restore the creek habitat system were evaluated in the EA. Alternatives 1A, 1B, 2, 3 and 4 were eliminated from further consideration based on unacceptable real estate impacts or less than acceptable project performance. The most desirable alternative was Alternative 5, called the preferred alternative, and was selected based on function, cost, and impacts to the environment. To achieve the goals of this project, the Corps considered alternatives for two categories; creek stabilization and habitat improvement.

A different approach was used to consider the components of the alternatives within each category. Based on stream classification, the creek stretch was divided into five reaches. Natural stability concept methodology developed by Rosgen (1996) was used to determine the proper stabilization criteria. Under this methodology, there are four alternatives for accomplishing stream restoration where the stream has eroded to the point that it is no longer connected to its floodplain. Based on stream classification, an alternative was selected for each reach.

Alternative 2 has a stabilization criteria which is to construct the alignment and profile to match the desired stream classification that is constructed within the eroded channel area. Alternative 3 has a stabilization criteria which is to construct a stable stream within a narrow corridor by constructing a type B stream and provide flood prone areas . The preferred alternative, alternative 5, is a combination of these streambank stabilization measures using Alternative 2 criteria for Reach-2 and Alternative 3 criteria for Reach-1, 3, 4 & 5.

An economic analysis will be used to determine the extent of habitat improvement. The proposed project will employ the amount of habitat improvement required for erosion control and streambank stabilization. The EA analysis focused on the minimum cost habitat improvement case required to provide erosion control and for streambank stabilization. The project may, depending on the outcome of the cost/benefit economic analysis, employ additional planting to widen the riparian zone. The fence will be contiguous with the easement boundary and is expected to provide a project corridor width of approximately 250 feet. The maximum cost habitat case would create the widest riparian buffer possible that would involve planting the entire space between the creek and the project fence installed to keep cattle out of the creek. Any amount of planting above the minimum would provide additional environmental benefit, without adverse environmental impact.

*The EA included a complete evaluation including, but not limited to, a USFWS Biological Assessment, a NMFS Biological Assessment, and a Cultural Resource Evaluation. The EA was distributed for public review during the period May 16 to June 15, 2001**[provide dates].** Comments received were considered **[and added the following, if necessary]** and are addressed in this FONSI. A comment response package that provides the Corps' response to comments is included as an attachment to the FONSI.*

Effects of the proposed environmental restoration project are detailed in the Environmental Assessment. Near term environmental disruption due to construction activity would be offset by long term improvements to the aquatic and riparian habitat. Water quality features such as temperature and sediment content would likely improve within the project area.

Cumulative impacts were evaluated as to the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what other agency or person undertakes the other actions. No negative cumulative impacts were identified and numerous beneficial cumulative impacts are expected. For the environmental restoration measures being proposed under this project, any non-beneficial impacts to water quality, air quality, aesthetics, recreation, aquatic and terrestrial species and habitat due to construction will be minor and short-term.

This EA covers the specifics and details of the stream restoration project. The project has been coordinated with the U.S. Fish and Wildlife service, National Marine Fisheries Service, Oregon Department of Environmental Quality, Oregon State Historic Preservation Office, Oregon Department of State Lands, other concerned state and federal agencies and tribes, affected governments, and the public.

I have taken into consideration the technical aspects of the project, best scientific information available, public comment, and determinations of the EA. Based on this information, I have determined that the overall projected effects of this proposed action are beneficial and, based on the information provided, would not result in significant impacts to the quality of the human environment. Therefore an Environmental Impact Statement is not required for the development of this project.

DATE: ______________

____

Richard P. Wagenaar
Lieutenant Colonel, Corps of Engineers,
District Engineer

ERATTA SHEET

Date – May 24, 2001

Change	Description	Location	Reason for change
Added one page	SHPO Consultation response letter	Appendix E document #3	Document was received after draft EA was printed and bound.
Added one page	THPO Consultation response letter	Appendix E document #4	Document was inadvertently omitted from the original printing of the draft EA and Table of Contents.

Summary Sheet
CORPS OF ENGINEERS DETERMINATION OF EFFECT
WALLA WALLA DISTRICT
NORTH PACIFIC DIVISION

PROJECT DATA:
NAME: East Birch Creek Aquatic Ecosystem Restoration DATE: 4/6/2001
COUNTY Umatilla
USGS QUADS. Pilot Rock and Sevenmile, Oregon

Enclosures:
Inventory report

Responsible Official:
Wagenaar, Richard P., LTC, EN, Commanding
U.S. Army Corps of Engineers
Walla Walla District
Send Correspondence to Peter Poolman
Chief of Environmental Compliance

For further information, contact Mary Keith 509-527-7256 or John Leier 509-527-7269.

The criteria of effect listed in 36 CFR 800.9 have been applied to the proposed undertaking described in the accompanying materials, to determine the nature of effect, if any, on cultural resources eligible for or listed on the National Register of Historic Places. The paragraph marked below describes the results of our analysis, detailed supporting documentation is enclosed, for your permanent records.

In accordance with 36CFR800.5(b), we have determined that the proposed undertaking will have "NO EFFECT" on any listed or eligible cultural resources. We will retain documentation of this determination and proceed with project implementation as proposed unless you object within 15 days of receipt of this notice.

X In accordance with 36CFR800.5(b) we have determined that the proposed undertaking will have "NO EFFECT" on any listed or eligible cultural resources. An adequate inventory, certified by the District cultural resource specialist, did not discover any listed or eligible cultural resource that may be impacted by the project. We will retain documentation of this determination and proceed with project implementation as proposed unless you object within 15 days of receipt of this notice.

In accordance with 36CFR800.5(d), we have determined that the proposed undertaking will have "NO ADVERSE EFFECT" on any listed or eligible cultural resources. We will document this determination to the Advisory Council on Historic Preservation and proceed with project implementation as proposed unless the ACHP objects within 30 days of receipt of this notice.

In accordance with 36CFR800.5(e), we have determined that the proposed undertaking will have "ADVERSE AFFECT" on cultural resource(s) listed or eligible cultural resources. A description of each affected resource and a description of the project's affects are enclosed. We will proceed with consultation to avoid or reduce these affects.

For SHPO Use

Please indicate your opinion of our determination by marking the appropriate line below, and sign and return this form to us.

X concur

____ do not concur

Signed [signature]

Date MAY 07 2001

Historic Preservation
Oregon State Parks & Recreation
1115 Commercial St. NE Ste #2
Salem, Oregon 97301-1012

NOTED
GILSEN

T2S30E12.1 = 35UM330

Walla Walla District, Army Corps of Engineers

American Indian Tribes and Band Project Review :

"East Birch Creek Aquatic Ecosystem Restoration"

__X__ I concur with the submitted project documentation and recommendation based on the enclosed documentation. The tribe/band along with the Corps retain the right to consult further if new information comes to light.

Comments (optional):

________ I do not concur with the project findings and have the following comments.

Signature: [signature] Date: 5-10-2001

Title/Tribe: Principal Investigator and THPO
CTUIR

Please review attached documents and return responses on this form to :
Cultural Resources Program
201 North 3rd Avenue
Walla Walla, Washington 99362

Or Fax comments to either Mary Keith, or John Leier at (509)-527-7825

John Leier can be reached by phone at (509) 527-7269, and Mary Keith at (509)527-7256 for inquires, or to provide comments.

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA, WASHINGTON 99362-1876

May 25, 2001

Reply To
Attention Of:

Planning, Programs, and Project
Management Division

Dear Interested Party,

Enclosed for your review and comment is the E. Birch Creek Aquatic Restoration Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI). The EA addresses the environmental impacts for the proposed aquatic ecosystem restoration project.

The proposed project is located south of Pilot Rock, Oregon and would use bioengineering techniques to construct and restore quality salmonid habitat, natural channel function and associated aquatic and riparian biological processes in East Birch Creek.

Comments on the EA should be post marked no later than June 25, 2001 to ensure consideration. Please send EA comments by fax to 509-527-7832 attention Mr. Stan Heller, or by mailing to:

Walla Walla District, Corps of Engineers
Environmental Compliance Section
Attention: Stan Heller
201 N. Third Avenue
Walla Walla, Washington 99362

If you have questions or need additional information, please contact Mr. Stan Heller at 509-527-7258.

Sincerely,

Carl J. Christianson
Project Manager; E. Birch Creek Aquatic
Ecosystem Restoration Project

Enclosure

Environmental Assessment
East Birch Creek
Aquatic Ecosystem Restoration

1. INTRODUCTION

This Environmental Assessment (EA) considers the potential impacts of the construction to restore an aquatic ecosystem along approximately 1.2 miles (1.9 kilometers) of East Birch Creek. The proposed project would include work by the Corps of Engineers (Corps) as authorized by Section 206, of the Water Resources Development Act of 1996. Section 206 requires a non-federal sponsor to cost share projects. Oregon Department of Fish and Wildlife (ODFW) is the non-federal sponsor for this project.

The sponsor has demonstrated a strong commitment towards the continued sustained ecological values of the Birch Creek watershed and its resources. This project would be the latest of several that have been completed in the Birch Creek watershed by ODFW as part of their fish habitat restoration program funded by the Bonneville Power Administration.

The sponsor is aware of the cost share, real estate, and operational and maintenance requirements, and is agreeable to the requirements of the Section 206 (WRDA 1996) Aquatic Ecosystem Restoration Program.

This EA is being prepared to determine if an Environmental Impact statement is needed and to meet the requirements of the National Environmental Policy Act (NEPA) of 1969. The NEPA and subsequent implementing regulations promulgated by the Council on Environmental Quality require Federal agencies to evaluate the environmental impacts of proposed Federal actions and prepare written documentation of the analysis. This EA documents whether the action proposed by the U.S. Army Corps of Engineers (Corps) constitutes a "...major Federal action significantly affecting the quality of the human environment..." and whether an environmental impact statement (EIS) is required.

The Planning and Design Analysis (PDA) process, conducted for Section 206 projects costing less than $1 million in total project cost, was utilized for project planning and design on this project. PDA is a more streamlined process, does not require preparation of an Ecosystem Restoration Report (ERR), and allows the EA to be the sole design decision document. Although documentation of the design development is less formal than for an ERR, the same planning and design elements are performed, which includes an independent technical review of the design to ensure a quality project. The project design was a collaborative effort between the Corps, its contractor, and ODFW.

1.1 Location

The proposed project reach of East Birch Creek is located on the Brogoitti property that fronts East Birch Creek Road in Umatilla County, Oregon approximately 8 miles (12.9 km.) southeast of the town of Pilot Rock. The project work would be located in Township 2 North, Range 32 East, Section 12 (Pilot Rock) and T 2 N, R 33 E, Sec 7 (Sevenmile Creek) and is at about 2300 feet (750 meters) elevation in the northeastern part of the state (Plate 1). The vicinity map is shown on Plate 2.

1.2 Purpose and need

The purpose of this project is to:
a) restore the riparian function of the creek habitat reach, and
b) restore the geomorphic function of the channel, which would generally mean a channel with more stable, vegetated banks and more diverse instream habitat.

Summer steelhead (*Oncorhynchus mykiss*) use the proposed project reach for spawning and rearing. The restoration design plan would be based largely on habitat requirements for the lifestages for this species. However, a wide range of other aquatic and terrestrial species would benefit from this project.

A healthy, viable riparian zone is an essential component of this project. Riparian vegetation not only directly contributes to stream biological productivity and fish habitat quality, but also provides a buffer between the terrestrial system and the aquatic ecosystem. Effective restoration of riparian vegetation is pivotal to achieving restoration benefits and ensuring long-term stability of the reach.

Natural channel dynamics in East Birch Creek have been "controlled" to some extent in order to accommodate land uses, first introduced by European settlers. Measures are commonly taken to keep the channel from meandering and adjusting laterally to prevent overbank flooding. These measures included construction of dikes and levees, channelization, and riprapping, which are all evident in the proposed project reach. Interference in natural geomorphic processes disrupts channel patterns, which are self-developed and self-maintained.

East Birch Creek has been altered to allow for irrigation diversions. The land within the project area has been developed for livestock ranching and agricultural use. This practice resulted in crowding of the stream to one side of the valley to make more room for the fields. This action probably occurred early in the century. Additionally, residents upstream of and within the project area have constructed numerous flood-fighting structures (i.e. dikes, barbs, gravel removal from the channel bed, etc.) to protect the structures on their properties.

The alignment of the channel has been grossly altered due to development and to reduce flooding. Excessive grazing and removal of brush and trees (e.g. willows, cottonwood) from the riparian zone has reduced native woody species by an estimated

25% of their original coverage and midday shade by an estimated 10% of the wetted channel. The change in alignment, loss of stabilizing riparian vegetation, and sediment load from upstream (caused by livestock grazing, roadway encroachment on Pearson Creek, and a landslide on Pearson Creek) has caused instability in the channel with roughly 70% of banks showing evidence of active erosion. The channel that has developed under these conditions lacks the distribution of riffle and pool habitat that is preferred for salmonid rearing (i.e. 50% of each).

The existing Birch Creek channel is largely run (i.e. glide) habitat with a small amount of riffle habitat and only 5-10 m^2 of high quality pool habitat in the proposed restoration reach. The changes in alignment and geomorphic character (i.e. increased width to depth ratio) along with irrigation withdrawals has resulted in sections of the channel being without adequate surface flow in some sections during the irrigation season. The channel is devoid of large wood and there is little potential for future recruitment due to lack of existing riparian vegetation. The homogeneous nature of the channel results in little instream diversity and little cover (<5%).

1.3 Goals & Objectives

The project goal is to design and construct a restoration project that would result in:
1) a system that meets specific habitat needs of Endangered Species Act (ESA) listed summer steelhead, including fish passage, rearing, and spawning,
2) an improved self-maintaining riparian and creek system that, in the long term, requires little or no maintenance.

In order to accomplish this goal, the following objectives were identified by the study team at the beginning of this effort and are not listed in order of importance.

- Increase pool frequency, shade, riparian habitat, channel grade stability and amount of large woody debris in the project reach;
- Reduce erosion and pass bedload through the reach;
- Improve channel complexity and sinuosity;
- Stabilize portions of the channel with active head cutting;
- Provide a flood prone area having the capacity to pass the 50 year event, which is 1498 cubic feet per second (cfs) or 42.42 cubic meters per second (cms) and channel section and profile dimensions that promote system stability;
- Accommodate the irrigation intake point;
- Provide for a consolidated, low-flow channel for the 1.5 to 2 year event;
- Stabilize the channel banks within the project to reduce sediment load and nutrient loading;
- Accommodate existing tree locations to the maximum extent possible;
- Accommodate various flow locations and directions at the project entrance;
- Provide a design that would not increase the risk of flooding for the existing structures (house, barns, etc.) when compared to the no action condition;
- Provide alternative means to water livestock.

The use of bioengineering techniques would be utilized to the extent practicable to restore salmonid habitat quality, reduce unnatural bank erosion, restore natural channel function and associated aquatic and riparian biological processes. This approach would involve development of plans for erosion resistant stream restoration techniques using primarily natural fluvial processes and natural materials. Specific principles that would be utilized are summarized as follows:

- Develop designs that take advantage of the natural hydrologic and sediment movement characteristics of the drainage;
- Develop designs that enhance and ultimately capitalize on the stabilizing effect of healthy native riparian vegetation;
- Reestablish natural channel geometry and balance energy and sediment transport to the point that natural channel adjustments are gradual and are more typical of a stable system;
- Use natural materials such as large wood and rock for channel and bank stabilization in high-energy areas.

1.4 Constraints

The following constraints were identified by the study team at the beginning of this effort and are not listed in order of importance. Universal constraints for all projects, such as funding, are not listed.

- In-stream work window for construction to protect aquatic species, including ESA-listed species;
- Ability to gain the necessary easement(s);
- Type of construction materials, such as concrete;
- Maintain channel capacity to handle flood events;
- Risk of project being damaged by high-water event.

1.5 Adjacent Property

During the 1998 in-water work window (July-October), using Bonneville Power Administration funds, ODFW constructed an aquatic habitat restoration project downstream from the project site. Final vegetative planting was completed in the spring of 1999. Invasive weed abatement and a monitoring program, including annual photo point assessment and in-stream temperature collection are currently underway. Project objectives and techniques employed are generally the same as those planned for this project.

1.6 Real Estate

The Oregon Department of Fish and Wildlife (ODFW) is the non-Federal sponsor for this project. The project is along an approximately one-mile stretch of East Birch Creek, located on the Brogoitti property, fronting East Birch Creek Road in Umatilla County, Oregon. The project location is identified in Section 1.1 and the project site, identified on Plate 7, comprises approximately 37 acres (15 square hectometers). The purpose of the project is to restore riparian function and habitat of the creek reach and restore the geomorphic function of the channel. This would be accomplished by realigning and reshaping the channel and profile in certain areas, and installing stabilizing structures, vegetation, streambank erosion protection, and fencing.

An aquatic ecosystem restoration easement is required to provide right of way in, on, and across the property owner's land. The term of the easement would be 25 years. The easement would allow ODFW, as the grantee, to construct, operate, and maintain the project. Prior written consent of the grantee is required for constructing structures or performing grazing or agricultural activities within the improvement easement property. The easement boundary is shown on Plate 8.

The project would also require temporary construction easements for certain borrow and stockpile areas. Access for construction and O&M efforts at the upper and lower ends of the project boundary, as well as on the existing access road to the house and associated structures, would be accomplished by road rights-of-way, that would coincide with the term of the easement approved by Corps headquarters. There are no existing structures providing flood protection for the house or outbuildings. The restoration project would be designed to not increase the risk of flooding to these structures.

The project reach does not have any known mineral deposits of commercial value, nor is there any known presence of hazardous material. Also, no relocations of facilities are anticipated, and there would be no displacements or resettlements under Public Law 91-646 (Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended).

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2. DESCRIPTION OF REACHES AND RESTORATION MEASURES

The following description of environmental restoration work is organized to coincide with locations denoted on Plate 3, which shows the reach boundaries for the proposed restoration project. Air photography from 1994 was used as a background for the plates to provide points of reference and general features to assist in developing the restoration design. The existing stream alignment is shown on the plates, and deviates from the alignment that existed in 1994, which may be interpreted from vegetation patterns in the photo.

The proposed project on East Birch Creek is located approximately 4,000 feet (1200 meters) below the confluence with Pearson Creek. Prior to 1956 (based on air photographs dating from 1956) the stream had been confined to a relatively straight channel and moved to make more room for larger fields. The thalweg has an overall slope of approximately 0.018 ft/ft and is incised approximately 6-9 feet (2-3 meters) into the broad valley floor. A few short reaches of the stream provide good habitat and significant lengths of the stream have vegetation that are beginning to be established on the bars. The characteristics of the existing stream vary over the length of the project. Table 2.1 (on the following page) summarizes the major stream classification characteristics of the intermediate reaches of the stream based upon natural stability concept methodology (Rosgen 1996).

2.1 Geomorphic Description of Reaches

The first project reach (Reach-1) is the upper approximately 800 feet (250 meters) of the existing stream. Reach-1 has many characteristics typical of the steeper mountain streams (type A and B streams based on Rosgen classification system) although the valley slope, valley type, etc. would typically result in a meandering type of stream (type C based on Rosgen). The present cross section geometry is typical of B type streams, and the present sinuosity is typical of A type streams. The stream is connected to the ancestral floodplain at the upper end of the project. However, within a few hundred feet (50 meters), the thalweg is eroded downward and is disconnected from the ancestral floodplain.

Reach-1 contains large gravel bars that move during high flows, head cutting, unstable banks and alignment problems (see Photograph 1), and lengths of channel where the thalweg is degraded. Most of Reach-1 has shrubs and trees lining the banks and most of the reach is shaded by canopy (see Photograph 2). In the last part of Reach-1, the tree and other vegetation roots have protected the banks from excessive erosion, unlike the first part of the reach. Also, the second part of Reach-1 is relatively straight and narrow (the bankfull width is only 25 ft (8 m) in this area) and the velocities associated with the reduced cross section and straight channel have effectively transported any sediment on through this area. This transport of sediment has possibly allowed the vegetation to remain in tact while other portions of the project have problems with large bars and erosion of the banks. While this area does not have aggrading problems, the streambed is down cutting, and the channel is more than 8 feet (2.5 m) deep. Other than the cover provided by the vegetation, there is little habitat (stream is a straight, narrow channel with uniform section).

Reach-2 includes the next approximately 1500 feet (450 meters) of the existing stream and exhibits many of the typical characteristics of a meandering stream located within alluvial valleys (type C stream based on Rosgen classification system).

The cross section geometry is typical of C type streams, although, the streambed is incised below the valley floor by 6-9 feet (2-2.5 meters). The stream has recreated its own flood prone area within the incised channel. The stream meander pattern/sinuosity is altered by the ranching and agricultural uses and has a pattern typical of type B streams (straightened rather than meandering). Similarly to the first reach, this portion of the stream would be expected to have a meander pattern typical of a C type stream, but the land use has confined it within a narrow belt. Reach-2 contains large gravel bars that move during high flows (see Photograph 3), head cutting, unstable banks, and alignment problems. Trees and large shrubs are intermittent within this reach and may be positioned at the edge of the incised area at a large distance from the stream edge.

Reach-3 consists of the next approximate 1500 feet (450 meters) and has a C type cross-section geometry. Reach-3 would normally have the meander pattern typical of C type streams, but there is substantial structural development (house, sheds, bridge, etc.) adjacent to the stream confining the stream to a narrow band. For approximately half of this reach length, the stream is confined by bedrock along the left bank. The stream is relatively straight and sediment appears to be effectively transported through Reach-3 (see Photograph 4). The boulders and cobbles are beginning to form an armor layer over the thalweg and vegetation is covering/stabilizing the bars.

The existing stream can contain the 100-year flood within the present channel for approximately 70 percent of its length, but goes overbank in Reach-3, just upstream of the developed area near the bridge and houses. In the vicinity of the bridge, the channel is capable of passing the 50 year flood flow, by a small margin and with ideal conditions (specifically debris does not obstruct flow under the bridge). Unfortunately, the bridge abutments protrude into the main channel and the prevalence of existing debris nearly ensures debris jams and flooding during a 50-year event.

Reach-4 includes the next approximately 800 feet (250 meters). There are a variety of cross-section types within Reach-4 that vary from type B, C, to Da (multi threaded). Reach-4 has more sinuosity than other portions of the project, but the meanders are unstable with several 90-degree bends and chute cut-offs progressing at several locations. Reach-4 also contains large gravel bars that move during high flows (see Photograph 3), head cutting, and unstable banks. The streambed within Reach-4 is 8-10 feet (2.5-3 meters) below the ancestral floodplain and the flood prone area is incised.

Table 2.1: Stream Classification

Stream Classification for Existing East Birch Creek Channel										
	Cross Section Location									
	Reach-1 (first half)	Reach-1 (middle of reach)	Reach-1 (last half)	Reach-2	Reach-3	Near End of 3 and Near Start of 4	Reach-4 (first half)	Reach-4 (last half)	Reach-5 (first half)	Reach-5 (last half)
Level I Analysis										
Valley Type	VIII	VIII	VIII	VIII	VIII	VIII	VIII	VIII	VIII	VIII
Cross Section	B based on Entrench = 1.31-1.55 & W/D = 21 - 38	No Match based on Entrench = 3.22 & W/D = 11.24	B based on Entrench = 1.46 - 2.57 & W/D = 11.32 - 17	C based on Entrench = 2.34 - 4.23 & W/D = 12.85 - 28.53	C based on Entrench = 2.27 - 4.48 & W/D = 12.28 - 25.18	B based on Entrench = 1.77 & W/D = 49.23	C based on Entrench = 2.86 - 2.96 & W/D = 20.39 - 23.01	Da based on Entrench = 6.17 & W/D = 15.69	B based on Entrench = 2.26 - 1.45 & W/D = 45.34 - 30.55	C based on Entrench = 3.44 - 5.20 & W/D = 19.12 - 14.12
Plan-View										
Thread Form	Single Thread	Single Thread	Single Thread	Single Thread	Single Thread	Single Thread	Single Thread	Multi Thread	Single Thread	Single Thread
Sinuosity	1.08	1.11	1.10	1.02	1.05	1.01	1.29	1.53	1.01	1.01
Meander width ratio	No meander pattern	No meander pattern	No meander pattern	2.8 = B type (avg. width = 34.26 ft, belt width = 96 ft)	No meander pattern	No meander pattern	No meander pattern	No meander pattern	No meander pattern	No meander pattern
Channel Slope	0.018	0.024	0.014	0.018	0.016	0.015	0.017	0.018	0.017	0.018
Bed Feature										
Level II Analysis										
Entrenchment Ratio										
Range	1.31 - 1.55	3.22	1.46 - 2.57	2.34 - 4.23	2.27 - 4.48	1.77	2.86 - 2.96	6.17	2.26 - 1.45	3.44 - 5.20
Average	1.44	3.22	2.015	3.28	3.34	1.77	2.91	6.17	1.855	4.32
Width Depth Ratio										
Range	21 - 38	11.24	11.32 - 17	12.85 - 28.53	12.28 - 25.18	49.23	20.39 - 23.01	15.69	45.34 - 30.55	19.12 - 14.12
Average	28.14	11.24	14.16	19.62	17.34	49.23	21.7	15.69	37.945	16.62
Sinuosity										
Channel Materials										
Pebble Count D50 (mm)	n/a	46	n/a	46	52 - 60	n/a	70	n/a	n/a	42
Bed Sieve Analysis D50 (mm)		42	42	34	39-34		27			38

Reach-5 contains the final approximate 500 feet (150 meters) of the project. Reach-5 varies between type B and type C cross section geometry. This portion of the streambed is 7-8 feet (2 meters) below the ancestral floodplain. The stream meander pattern/sinuosity is altered by the ranching and agricultural uses and has a pattern typical of type B streams (straightened rather than meandering) but, would be a class C stream in undisturbed situations (indicated by valley type, valley slope, etc.). Much of this reach is approaching a stable condition. The boulders and cobbles are beginning to form an armor layer over the thalweg and vegetation is covering/stabilizing the bars (see Photograph 5).

Photo 1 - 90-Degree Bends (Reach-1)

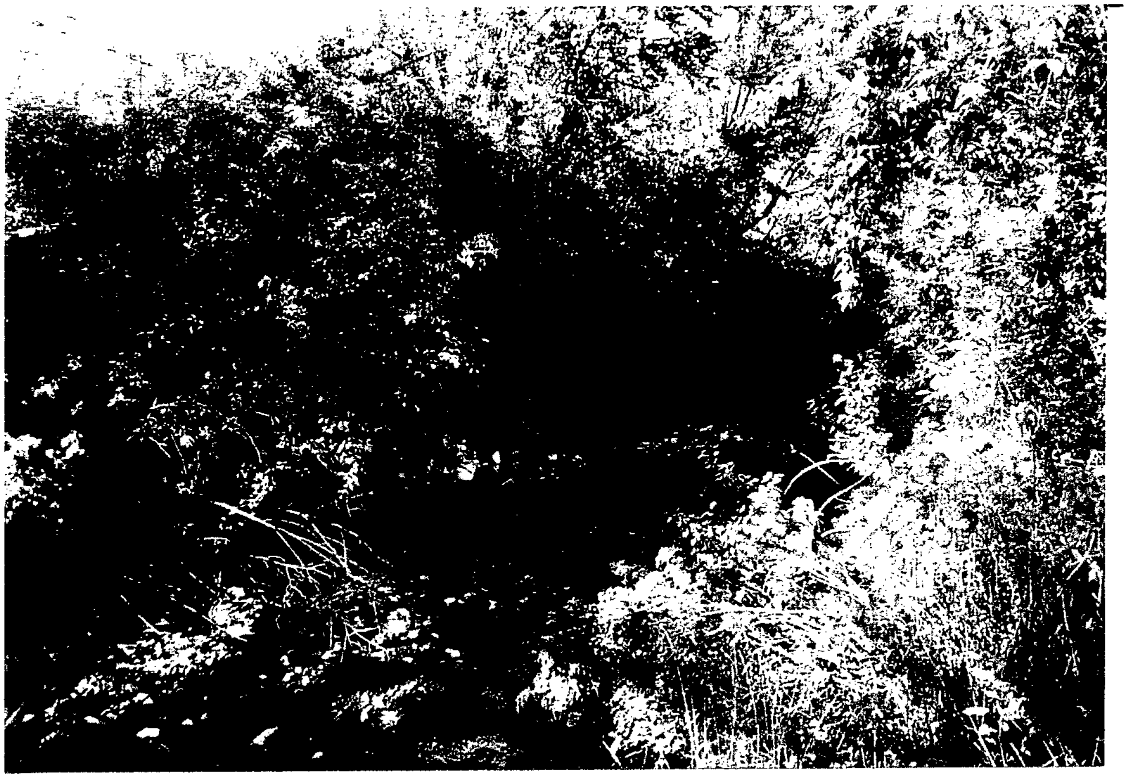

Photo 2 - Vegetation Intact with Downcut Streambed (Reach-1)

Photo 3 - Large Bars (Reach-2)

Photo 4 – Stable Transport of Sediment Load (Reach-3)

Photo 5 - Vegetation Reestablished and Streambed Armoring (Reach-5)

2.2 Description of Structural Restoration Measures

The following is a list of restoration measures (tools) under consideration for the proposed project.

- **Rock entrance control structure** - a rock control structure that funnels the upstream flow into the project in a way that precludes the stream from meandering outside of the entrance of the project. It would be constructed at the project entrance, as well as a deflector berm that would contain any upstream flows that get out of bank in the vicinity of the upstream end of the project.

- **Deflector Berm** - contains flows that get out of bank and have the potential to bypass around the project and create an undesired channel. The berm would be constructed of random earth materials and located at a distance of 30 - 100 ft back from the edge of the stream. This feature ties into the entrance control structure. The berm would be between 2 to 5 feet in height, 5 to 20 feet in width with a, bank slope of 1 v on 2 h.

- **J-hook with chute cutoff** - a rock structure that extends upstream at an angle of between 20 - 30 degrees from the outside bank and crosses approximately 2/3 of the way across the stream. The structure would be keyed below the riverbed sufficiently to avoid problems with scour and under-cutting. The J-hook rock size may vary from 2.5 ft to 3.5 ft in diameter. Structure width would be approximately 1.5 times the rock size. Chute-cutoff riprap would consist of material ranging in size from D50 (50% of the material is less than or equal to the size) 0.5 to 2 feet. The J-hook reduces the shear stress at the outside edge of a bend. This structure reduces erosion of the bank and provides grade control for the thalweg. A pool forms in the area adjacent to the structure.

- **Rock cross vane** - a rock structure that extends upstream at an angle of between 20 - 30 degrees from both banks and extends across the entire length of the stream. They would be constructed of boulders placed to form a modified upstream "V." This is best described as an upstream "V" minus the apex that is replaced with a straight sill situated perpendicular to the thalweg. The limbs of this modified "V" would be tied into the bank to prevent end cutting and footer rocks would be buried to prevent undercutting. The configuration of the structure would act to direct the entire range of stream flows away from the bank and reduce near-bank erosion zones and velocities. The reduced velocity zones would become a depositional area for finer bedload and suspended sediments, creating suitable conditions for vegetative recovery. Dimensions and rock size would be similar to the J-hook. The cross vane provides grade control and directs the flow back towards the center of the channel. Erosion is reduced along the banks and grade control is provided for the thalweg. A pool forms in the area adjacent to the structure. This structure would stabilize the channel by dissipating energy, controlling gradient, and maintaining sediment transport. The structure benefits fishery habitat by scouring a large, high quality pool in the zone where overflow converges, providing channel diversity, providing cover, capturing fine sediment, and providing a stable area at the shoreline for riparian vegetation to grow. The height of the structure above the channel bed would determine the depth and size of the pool it creates. A more defined thalweg would also result in deeper surface flow during the dry part of the year.

- **Rock vane** - a rock structure that extends upstream at an angle of 20 - 30 degrees from the outside bank. They extend across about two-thirds of the width of the channel. Dimensions and rock size would be similar to the J-hook, except that the rock vein structures would not hook back downstream. The vane reduces the shear stress in the vicinity of the bank, which reduces erosion. The pool that gets created is generally smaller than the one created by a J-hook structure.

- **Grade control structure** - a rock structure that crosses the stream and provides grade control for the thalweg.

- **Bank layback** - a bank excavated to provide a stable slope. The slope would vary depending upon the channel section required to provide adequate flood prone area. Slopes may vary from nearly flat to 50% slope (1 v on 2 h). Several areas contain near vertical banks that are from 5 to 15 feet in height. These areas will be aggressively revegetated to reduce erosion. Laying back the banks is necessary to reduce erosive energy at high flows and prevent further sediment loading from bank erosion, which is detrimental to fishery habitat. The intent from a hydraulic perspective is to create a bigger channel cross section that would reduce erosive pressure on the bottom during flood events. The revegetation would provide shade, large wood recruitment, and in-stream cover (*e.g.*, underbank and overhanging vegetation).

- **Rock sill bank protection** - a rock structure installed along the inside bank of the curve to form a wall against cutting across the meander. Sills would be constructed in areas where there is a risk that the stream may cut across the meander. The sill is keyed below the riverbed to avoid problems with scour and under-cutting. The rock size may vary from 8 inches to 3 feet in diameter.

- **Bank stabilization** - a variety of actions to stabilize an actively eroding bank including installing rock at the outside edge of curves and at other potentially erodable locations and have a stabilizing effect as a result of effective energy dissipation and deflection of high velocity flows away from the bank. Supporting under-cut trees with rock, flattening unstable slopes, removing debris dams, removing gravel bars, etc. are also included as bank stabilization (rock size may vary from 6 inches to 3 feet in diameter). Bank stabilization benefits fishery habitat by scouring a high quality pool around the end of the bank stabilizing structure; provides large woody debris, and channel complexity; reduces sediment; and provides a stable area along the bank for dense riparian vegetation growth.

- **Channel realignment** - a new channel section excavated outside of the existing channel prism. New channel construction consists of forming the new meanders that align with the existing channel to create a natural and stable geometry. The realignment meets the project objective of increasing sinuosity, which creates more aquatic habitat. The location of the meander channel is designed to minimize the impact on the existing vegetation. The section and profile design are based upon typical restoration calculations, which is developed from surveyed sections and profiles from a reference reach located near to the project and on stable portions of the existing stream observed within the project.

- **Channel reshaping** - reshaping (by excavation and filling) the thalweg and banks in portions of the stream where the new alignment coincides with the alignment of the existing channel. The section and profile design are based on typical restoration calculations. This includes construction of pools at the edge of the adjacent bank on the outside edge of bends and shaping point bars to form the bankfull channel and flood prone area. Additionally, this would shape the pool, glide, riffle, and run reaches.

- **Toe stabilization** - rock placement (armoring) at the toe of the bank to reinforce against local erosion. Toe stabilization would be constructed in some portions of the existing stream with minor change to the existing section and profile. The D50 rock size for this work would vary in size from 8 inches to 3 feet.

- **Footer boulder** - similar to toe stabilization, except that larger rock is required to resist higher stream shear stress.

- **Fill area** - an abandoned channel or low area within the flood prone area where excess material would be placed. Material excavated from the new channel section, which can not be economically hauled or used in other areas of the project, would be placed in fill areas and then revegetated.

- **Debris removal area** - an area where an extensive debris jam exists within the channel, consisting primarily of wood materials. The debris would be removed from the channel area and reutilized or disposed of. Wood material of adequate size may be strategically placed as large wood debris to provide fish cover. Debris may also be used to protect plantings and provide wildlife cover. Disposal may include burning all or some of the debris on-site within the staging or stockpile areas.

- **Gravel bar removal** - the removal of unstable gravel bars that exist within or immediately adjacent to the bankfull area. These bars will be removed for stability purposes and used as fill in other areas of the project.

- **Rootwad** - a large tree root and trunk anchored by cables to a dead-man located away from the bank. The rootwad is installed along the bank of the stream to provide cover and to create scour pools where the root projects into the stream flow.

- **Excess material spoil area** - an area where excess material from new channel excavation would be disposed outside of the flood prone area. Generally, this would be material that cannot be economically hauled and used in other areas of the project.

- **Pond / Borrow area** - an area excavated below the surface to the groundwater table to obtain soil to construct the channel reshaping. The borrow area would fill with groundwater for a portion or all of the year. The size and ultimate number of borrow areas would depend upon the quantity of fill material actually required. Borrow areas may vary from 50 ft to 200 ft in diameter and depth may vary from 1 to 8 feet. The ponds would be designed and constructed in a manner that would protect steelhead from being stranded in the ponds during low flow conditions, and the Corps would consult with NMFS on a suitable design and location.

- **Removal of existing barb** - the removal of the rock material used to construct an existing barb and salvaged for use in the cross vanes, J-hooks, and other structures for the project.

- **Revegetation** - installation of erosion control fabric, reseeding of disturbed areas with a mix of native graminoids, and extensive revegetation with native woody vegetation (live stakes and bare root) would be incorporated into much of the project area. The fabric would reduce sediment releases to the stream when higher flows return to the system prior to vegetation establishment. Only native woody plant species would be used in the revegetation for this project. The exact composition of the trees used in the project would be dependent upon the availability of these species. Actual vegetative planting would be done in the fall or early spring of the construction year (*i.e.,* when these plants are dormant). Follow-up measures, such as watering during the first summer, would be done to optimize survival of newly planted vegetation.

- **Fencing** - would exclude livestock from the stream and adjacent riparian zone and would protect new plantings, stream banks, and structures. An alternate water source would need to be developed. The options include:
  1) use one of the borrow ponds outside of the riparian zone
  2) develop springs or
  3) dig shallow hydraulically connected springs, or wells off-stream, outside of the buffer.

  Springs would be developed by digging a shallow trench that connects hydraulically to subsurface flows and collects them for delivery to a trough. The shallow wells would be constructed by drilling down to the unconfined aquifer and requires a solar powered water pump, some plumbing and a tank. Approximately five sources would need to be created, and the exact locations and selected method(s) have not been determined.

- **Rock cover structure** - a rock structure that forms a scour pool around the base of the rock. The pool provides a hiding and resting area for fish.

- **Floating log cover structure** - a structure comprised of a log buried into the bank, projecting out into the stream. The log would provide overhead cover for fish.

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3. IDENTIFICATION OF ALTERNATIVES

The following section describes the alternatives that were considered during the development of this project. The "no action" alternative is presented first, with the other alternatives following that would require action to be taken.

3.1 No Action Alternative

The "no action" alternative would involve leaving the creek in its current condition. This alternative would not meet the objective of the sponsor, and would not take any action to help the recovery of the Mid-Columbia Steelhead listed under the ESA. It is assumed that actions such as allowing grazing in the riparian zone, allowing livestock in the streambed for watering, manipulating the stream to maintain irrigation, withdrawals, etc., would continue to negatively effect the East Birch Creek aquatic ecosystem. No action would not provide for environmental restoration of riverine systems, which is part of the Corp's existing mission.

3.2 Stream Restoration Alternatives

The evaluation of the restoration alternatives is based on natural stability concept methodology that proposes four different approaches for accomplishing stream restoration for situations in which the stream has eroded to the point that it is no longer connected to its floodplain. These alternatives are listed and defined below.

1. **Construct alignment and profile matching the desired stream classification that is connected with the original floodplain**;
   For this alternative, the river system is in a "stable" configuration, which means the natural processes of erosion and channel forming have slowed and the quantity of sediment transported has decreased. The valley slope, landform, riverbed materials, etc. are typically associated with a slightly entrenched, meandering, riffle/pool channel with well developed floodplains.
   1A would raise the stream to its original grade based on its current alignment.
   1B would construct an entirely new channel down the central portion of the valley.

2. **Construct alignment and profile matching the desired stream classification that is constructed within the eroded channel area (not connected to original floodplain)**;
   As with alternative 1, a slightly entrenched, more meandering, riffle/pool channel is constructed. The difference is that, due to the magnitude and depth of the incised channel, the functional flood prone areas are

constructed within the limits of an incised channel, but the river system is not connected to the original floodplain.

3. **Construct alignment and profile of a stable stream within a narrow corridor by constructing a type B stream and provide flood prone areas**;
For this alternative, the stream alignment is controlled by physical limitations imposed on the stream (such as hill embankments, entrenched channels, etc.). Functional flood prone areas are provided within the narrow corridor, but the river system is not connected to the floodplain. Riffles and pools are present but are positioned where the existing alignment, physical features, and habitat dictate.

4. **Heavily reinforce the current stream alignment and profile with structures that lock the stream into a permanent position**;
The alignment and profile for this alternative is the result of physical limitation and, to a large degree, accommodation of adjacent land use for flood protection. Typically, the channel is heavily riprapped to ensure the protection of adjacent property and the alignment is relatively straight. The river system is not connected to the floodplain and generally does not contain functional flood prone areas. Riffles and pools are present, but are positioned with respect to the physical features and flood control objectives, and often not where existing alignment and habitat would dictate. As a result of the heavy structuring, the design does not appear natural nor blend in with a natural setting.

5. **Hybrid combination of two or more of the alternatives**;
The alignment and profile for this alternative would be the result of a combination of alternatives. This alternative would exist where the existing channel is not well suited to any one of the alternatives along the entire reach. This condition would most likely occur for alternatives 2 and 3 where the alternative is best suited for a narrow corridor or incised channel. But a case could be made for any combination of the four alternatives listed above, depending on the existing condition of the stream, and surrounding physical features and restrictions.

3.3 Habitat Improvement Option

The proposed project would employ, at a minimum, the amount of habitat improvement required for basic erosion control and streambank stabilization. Additional aquatic or riparian habitat benefits can be achieved by constructing floating log covers; rock cover structures; additional (more than needed for basic stabilization) rootwads, cross vanes, and J-hooks; and additional plantings to widen the riparian zone.

An economic incremental cost analysis will be used to determine which of these habitat improvements provide the most improvement per additional increment of cost. The analysis uses an interest rate of 6.375% per annum and a 25-year project life. The selection of additional habitat improvements, beyond the structures required for stabilization, will be selected based on the economic analysis.

The maximum case for additional planting to widen the riparian zone would create the widest riparian buffer, equal to the easement boundary, which would involve planting the entire space between the creek and the project fence installed to keep livestock out of the creek. Any amount of planting above the minimum would provide additional environmental benefit, without adverse environmental impact. The EA is based on the maximum habitat improvement case, in order to address the maximum potential for impact. The maximum habitat improvement case does not create an adverse environmental condition. An adverse environmental condition would only exist if less than the minimum amount of plantings required for basic erosion control and streambank stabilization were provided.

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4. ALTERNATIVES ANALYSIS

The Corps considered both stream restoration alternatives and habitat improvement options in the alternatives analysis to achieve the goals of this project. Natural stability concept methodology was used in the determination of stream restoration alternatives. An economic analysis will be used to determine the amount of habitat improvement that could be cost effectively added in addition to that required for basic bank stabilization and erosion control.

4.1 Evaluation of Short and Long-Term Impacts

Short term and long term impacts for each alternative are identified in Tables 4-1 and 4-2. A brief description of each alternative is contained in Section 4.2. Each table contains a matrix of alternatives verses the resources and other categories identified in Chapter 5.

Short-term impacts are defined as impacts to resources and other categories that are expected to exist during and immediately following construction activity. Some short-term impacts may persist for 2-3 years until vegetation becomes well established. These include disturbances to:

- the aquatic and riparian communities, including wildlife and T&E species;
- physical properties, utilities, and cultural resources - due to new excavation activity;
- water quality; air quality - due mostly to the amount and duration of construction equipment;
- aesthetics - due to disruption of natural areas during construction, and incomplete establishment of vegetation post-construction; and
- transportation – due mostly to amount of construction-related traffic.

Long-term impacts are defined as impacts, positive and negative, that are estimated to persist once the vegetative community approaches a mature state, which would be a minimum 10-years after construction through the life of the project.

Impact Evaluation Conclusion – by analyzing Tables 4-1 and 4-2, and comparing them together, the following conclusions can be made:

- The No Action alternative will continue to influence negative impacts mostly due to continued bank erosion, increased entrenchment, and other unstable channel characteristics, both in the short and long-term.

- Cultural resources exhibit short and long-term negative impacts for all alternatives due to varying amounts of ground disturbance from excavation or erosion.

Table 4-1
Short Term Impacts

Alternatives	100 Year Floodplain	Aquatic	Riparian	Wildlife	Threatened & Endangered Species	Cultural Resources	Water Quality	Air Quality	Aesthetics	Recreation	Transportation	Utilities
No Action	NC	low	low	low	low	low	low	NC	low	NC	NA	NA
1A Raise grade	high	high	high	high	med	low	high	med	med	NC	low	low
1B Construct new channel	high	high	high	high	high	high	low	med	high	NC	med	low
2 Construct to match stream classification	NC	med	med	med	low	med	med	low	low	NC	low	NC
3 Construct within narrow corridor	NC	low	low	low	low	low	low	low	low	NC	low	NC
4 Heavily reinforce existing stream alignment	+med	high	high	high	high	low	high	med	high	NC	low	NC
5 Hybrid of alternatives 2 and 3	NC	med	low	low	low	med	med	low	low	NC	low	NC

Legend

+high	High positive impact
+med	Medium positive impact
+low	Low positive impact

NC	No Change
low	Low negative impact
med	Medium negative impact
high	High negative impact

Table 4-2 Long Term Impacts

Alternatives	100 Year Floodplain	Aquatic	Riparian	Wildlife	Threatened & Endangered Species	Cultural Resources	Water Quality	Air Quality	Aesthetics	Recreation	Transportation	Utilities
No Action	NC	-high	-high	-high	-high	-med	-med	NC	-med	NC	NC	NC
1A Raise grade	-high	+high	+high	+high	+high	-low	+high	NC	+high	NC	NC	NC
1B Construct new channel	-high	+high	+high	+high	+high	-high	+high	NC	+high	NC	NC	NC
2 Construct to match stream classification	NC	+high	+high	+high	+high	-med	+high	NC	+high	NC	NC	NC
3 Construct within narrow corridor	NC	+med	+med	+med	+med	-low	+high	NC	+med	NC	NC	NC
4 Heavily reinforce existing stream alignment	+med	-high	-high	-high	-high	-low	-low	NC	-high	NC	NC	NC
5 Hybrid of alternatives 2 and 3	NC	+high	+high	+high	+high	-med	+high	NC	+high	NC	NC	NC

Legend

+high	High positive impact
+med	Medium positive impact
+low	Low positive impact

NC	No Change
-low	Low negative impact
-med	Medium negative impact
-high	High negative impact

- Alternatives 1A, 1B, 2, 3, and 5 show varying amounts of positive impacts for aquatic and riparian communities, water quality and aesthetics.

- Alternative 4 shows negative impacts because this alternative, for the most part, would keep the channel disconnected from the floodplain.

- Alternatives 1A and 1B would potentially produce the highest level of environmental benefits in the long-term. However, due to the amount of construction that would be necessary to achieve these alternatives, the cost is prohibitively out of the sponsor's reach, and not acceptable to the landowner.

- Alternative 5, which tailors alternatives 2 and 3 to appropriate reaches of the project site, produces a high level of environmental benefits achievable, at a cost acceptable to the sponsor, and with a channel configuration and associated conditions agreeable to the landowner.

4.2 Screening of Alternatives

Several of the alternatives are not viable alternatives, and are excluded from further evaluation. The discussion provided below identifies the rationale used for screening and excluding these alternatives.

Alternative 1 *Reconstruct the stream on the original flood plain*
is not well suited to any of the reaches because of the amount of grade control required to reconnect the stream to its ancestral floodplain. Moving the stream from its incised location below the valley floor to a position on top of the floor would improve the natural function of the stream but would result in more extensive and more frequent flooding of property and structures. During the 100-year flood event, the floodwater would cover the entire valley bottom. Moving the stream to a position on top of the valley floor would raise the groundwater elevation that would in turn support a more varied and wider riparian zone. Alternative 1 can be divided into two sub-alternatives 1A and 1B.

Alternative 1A would raise the stream to its original grade based on its current alignment. This alternative would be impractical to construct, unstable, and cost prohibitive.

Alternative 1B would construct an entirely new channel down the central portion of the valley. The channel through the valley center approach is not feasible for four reasons:

1) constructing a new channel and flood prone area through the middle of the ranch and fields is objectionable to the property owner because of the loss of the use of the land;
2) construction of a new alignment would abandon most of the shade canopy and large vegetation that exists along the existing stream alignment; and,
3) the new channel would have a design capacity for a 50-year event (1498 cfs; 42.42 cms) and any larger flood event would result in out of bank flooding that would

inundate a larger area than the current channel. For example, the existing stream can contain the 100-year discharge within the present channel for approximately 70 percent of its length (goes overbank just upstream of the developed area near the bridge and houses). Whereas a new channel through the center of the valley would have extensive flooding over the valley during a 100-year discharge event. This larger pattern of flooding for events greater than the 50-year event creates a greater liability concern.

4) While implementation of this alternative would result in a highly desirable stream condition, the magnitude of near-term environmental impacts that would occur during construction would be the highest of any of the four action alternatives. It would also be a significantly more costly alternative to implement, and likely exceed the sponsors cost-sharing capability.

Therefore Alternatives 1A and 1B, for the reasons provided are not considered a viable alternative and is excluded from further evaluation.

Alternative 2 *Construct a significantly more meandering stream within the incised channel* is suitable for use on Reach-2, which is shown on Plate 3. Creating a stream with more meanders within the incised channel will provide a more naturally functioning flood plain. The flood prone area adjacent to the main channel would be widened and lowered so that flooding of this area occurs on a frequent interval similar to a natural flood plain. Also, the groundwater will be closer to the surface of the flood prone area during the low water time of the year and will sustain a more diverse riparian zone. While this alternative improves the natural function of the flood plain within the incised channel, it is not as extensive as the flood plain potentially provided by Alternative 1.

The increased meandering will tend to decrease the gradient and result in higher water surface during flood events. Additionally, the meanders widen the incised channel in some locations. If enough meandering were introduced, the water surface would be sufficiently raised to over flow the incised channel. The excavation of the main channel and the flood prone areas would be performed so that the excavation to increase capacity balances the decrease in gradient caused by additional meanders. By balancing the amount of meandering and the excavation, this alternative will not decrease the channel capacity. The existing bridge and debris blockages will not change over-bank flooding, as described for the existing condition. This alternative uses cross vanes, J-hooks, and chute cut-off structures and vegetation to provide grade control and protect banks from erosion. This should prevent some of the headcutting, bank failures, and unstable gravel bar movement that contribute to the channel blockages and flooding.

Construction of a C type meander geometry can be accomplished within the existing flood prone area for approximately 80% of this reach (only a small portion would require excavation beyond the incised banks). The stream restoration also involves reshaping the channel cross-section and profile to a stable C type configuration. Structures would be used to stabilize the channel until the large vegetation is reestablished.

However, Alternative 2 is not well suited for Reach-1, 3, 4, and 5 because of limits on the land available for the belt width (such as proximity of houses, sheds, fields, etc.) which would not be acceptable to the landowner. Consequently this alternative would sacrifice vegetation and would not be acceptable to the sponsor who desires to save and utilize existing shrubs and trees. Therefore this alternative is not considered a viable alternative and is excluded from further evaluation.

Alternative 3 *Construct a stable B type stream within the incised channel* is suitable for use on Reach-1, 3, 4, and 5 (the remainder of the project) because the existing Birch Creek channel is incised 5 - 8 ft below the valley plain in most of the project area. This alternative improves the natural function of the flood plain within the incised channel by widening and lowering the flood prone area. The improvements are similar to Alternative 2 but will not be as extensive as provided by Alternative 2. The issues with flooding are similar to Alternative 2. A design for Alternative 3 will not decrease the channel capacity of the incised channel. The existing bridge and debris blockages will not change over-bank flooding, as described for the existing condition.

This alternative involves reshaping the channel cross-section and profile to a stable B type configuration with a flood prone area within the present alignment (some minor adjustments to the alignment would be required). By balancing the amount of meandering and the excavation, this alternative will not decrease the channel capacity. Structures such as cross vanes, J-hooks, and rootwads would be used to stabilize the channel. This should prevent some of the headcutting, bank failures, and unstable gravel bar movement that contribute to the channel blockages and flooding. Structures would be used to stabilize the channel until the large vegetation is reestablished.

However, Alternative 3 is not a desirable alternative for Reach-2 because the B type stream alignment would result in fewer meanders and less habitat than the amount that would be developed using Alternative 2. Consequently this alternative would not maximize the potential for environmental benefit and therefore would not completely achieve the sponsor's restoration goals. Therefore, this alternative is not considered a viable alternative and is excluded from further analysis.

Alternative 4 *Heavily reinforce the current stream alignment and profile* is not well suited for any of the reaches because it is typically structure intensive and provides less habitat improvement relative to the other alternatives. Although the stream would be stabilized, it would have a less natural appearance due to the extensive use of structural riprapping, and would lose considerable functionality without a flood prone area.

This alternative would require more channel shaping and structure installation, which creates additional unnecessary environmental impact, and would provide less habitat benefit. It would also create significant environmental impacts both near- and long term by precluding development of vegetation over a significant portion of this stretch of stream, lessening overall channel capacity, increasing water velocity thereby contributing to negative impacts downstream, and providing little to no beneficial habitat features. Potentially, this alternative could provide ideal hydraulic conditions and reduce flooding relative to the existing condition.

Therefore Alternative 4 is not considered a viable alternative and is also excluded from further evaluation.

4.3 Alternatives Carried Forward

The following alternative was not screened out, and is carried forward for further analysis and evaluation in Chapters 5 and 6.

Alternative 5 is the combination of Alternatives 2 and 3 where the application of the alternatives is best suited to the existing geomorphic condition. Reach-2 is best suited for Alternative 2 for construction of a C type stream configuration, where the alignment is not restricted by physical limits and a meander alignment can be constructed. Reach-1, 3, 4, and 5 are best suited for Alternative 3 for construction of a B type stream configuration, where physical limits impede the stream, due to hillsides and deep incision.

By balancing the amount of meandering and the excavation, this alternative will not decrease the channel capacity, nor increase the footprint of 100-year floodplain, when compared to the existing condition. Structures such as cross vanes, J-hooks, and rootwads would be used to stabilize the channel. This should prevent some of the headcutting, bank failures, and other erosion that contribute to the channel blockages and flooding. Structures would be used to stabilize the channel until the large vegetation is reestablished.

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5. EXISTING CONDITIONS AND AFFECTED ENVIRONMENT

This section is divided into 6 parts; physical characteristics, environmental resources, cultural resources, human resources, transportation and utilities. Each part identifies the environmental impact of the alternative considered for further analysis.

5.1 Physical Characteristics

The proposed project area is an approximately 1.0 mile (1.6 km.) reach located entirely on the Brogoitti property which lies on both sides of East Birch Creek between river mile 8.0 and river mile 9.5 (river km 12.9 and river km 15.2). The construction area boundary, including stockpile and parking areas, is shown on Plate 7 and consists of approximately 37 acres (15 square hectometers) distributed along both sides of the one-mile creek stretch.

It is located 8 miles (12.9 km.) southeast of the town of Pilot Rock on the East Birch Creek Road, in Umatilla County, Oregon (Township 2 south, Range 32 east, Sections 11 and 12). The town of Pendleton is located approximately 18 miles (29 km.) to the north of the proposed project site.

This site is within the Columbia Basin physiographic province that covers an extensive area south of the Columbia River between the Cascade and the Blue Mountains (Franklin and Dyrness, 1973). The region is generally semi-arid. Precipitation over the basin, upstream of the project site, averages approximately 28 inches (71 cm) annually, and the temperature averages about 52^0 F. (11.1^0 C). The existing streambed material consists of primarily gravel with sand and silt matrix.

The East Birch Creek has a basin area of approximately 55 square miles (142 square kilometers) for the portion above California Gulch (California Gulch is just below the end of the project). Johnson Creek is a significant tributary to East Birch Creek, which has a basin area of approximately 6 square miles (15.5 square kilometers) and enters at a point partway through the project. The upper end of the basin that feeds East Birch Creek has a maximum elevation of approximately 5000 feet (1524 meters) and the project is located between the elevations of 2330 and 2230 feet (710 and 680 meters).

The existing stream is entrenched 5 to 8 feet (1.5 to 2.5 meters) below the valley floor. In areas where the stream position has not moved significantly during the past 40 years, the width of the incised channel is approximately 43 feet (13 meters). In areas where the stream has migrated within the bounds imposed upon it, the stream has abandoned old channels (which may be partially filled with sediments) and carved new main channels. The width of the incised section in these areas may be up to 200 feet (61 meters) wide with the smaller main channel contained within it.

United States Geological Survey (USGS) Open File Report 81-909 was utilized to determine the East Birch Creek flood flow frequency curve. The following data was utilized to compute this curve, using the applicable equations found on page 24 (Kjelstrom 1981):

Drainage Area (DA): 55 square miles (142 square kilometers)
Mean Annual Precipitation (MAP): 28 inches (71 centimeters)
Basin Mean Altitude (ALT): 4009 feet (1222 meters)
Skew Value Used: 0.0
The with and without project curves are shown on the floodplain boundary map, Plate 8.

Under optimum hydraulic conditions, the existing channel has the capacity to contain the 100-year discharge (1771 cfs; 50.15 cms) for much of its length. There are several locations where flooding beyond the limits of the incised channel occurs, even under optimum conditions, where several acres (1 square hectometer) are relatively lower in elevation and would be flooded. Also, an existing bridge (see plate 6), located in the vicinity of the existing house and structures, encroaches on the stream's carrying capacity and causes flooding. However, the optimum hydraulic conditions needed to pass the 100-year discharge may rarely exist under normal flood conditions. Several debris blockages are present within the existing channel and would block flows and result in flooding beyond the limits of the incised channel. Additionally, headcuts, bank failures and unstable gravel bars are present in the existing stream, and during a 100 year discharge, would feed large quantities of sediment into the flows which may deposit at downstream locations and block flows at that location, and could result in flooding beyond the limits of the incised channel.

The blockages and overbank flooding events are difficult to predict, but have been observed for relatively frequent events (such as a 20 year flood event). Although, in theory, much of the channel may have the carrying capacity for the 100 year discharge, there may be wide spread flooding due to debris blockages, bank failures, gravel bar mobilization, and deposition that act to impede flow.

The Umatilla County in which the project is located, participates in the National Flood Insurance Program. But, the project is relatively remote and no base flood elevations have been calculated and no floodway has been determined for East Birch Creek, which is unnumbered as "A zone".

Land use practices and channel modifications have resulted in physical changes that have degraded habitat quality to a considerable extent. Habitat degradation has resulted primarily from:

A. removal of riparian vegetation,
B. disruption of natural geomorphic processes,
C. alteration of stream flows,
D. increased sediment input.

The following is a discussion of each of these broad impacts:

A. Removal of riparian vegetation -- Prior to the advent of modern land management practices in the 1900's, undisturbed riparian zones existed along most streams in the Umatilla River basin. The value of these riparian zones cannot be overstated. Riverine and terrestrial ecosystems are linked, being separated only by a riparian zone. Because of the close connection between the stream and its drainage basin, land uses and management practices such as grazing, timber harvest, or road and bridge construction have profound effects on the stream ecosystem.

Riparian areas serve as a buffer and very effectively moderate the negative effects of land use practices on the aquatic ecosystem. Riparian vegetation provides logs and branches that shape channel morphology, retain organic matter, and provide essential cover for salmonids. As trees mature and fall into or across streams their large mass helps to control the slope and stability of the channel and they help create high-quality pools and riffles. Natural recruitment of large woody material from the riparian zone is obviously reduced by the reductions in riparian woody vegetation. This situation is aggravated by intentional removal of logs and root wads, which are perceived by landowners and local residents as impediments to flow that cause flooding. Indeed trees in streams are important and often essential for maintaining stream stability (Platts 1991). Riparian vegetation root systems stabilize stream banks and maintain undercut banks that offer prime salmonid habitat.

Although no historic quantitative stream physical habitat data exists for East Birch Creek it is highly probable that it has been dramatically altered as a result of the destruction of its riparian zone. Resultant fish habitat impacts are generally summarized by:

- less instream cover associated with large organic debris, bank undercutting, overhanging vegetation, and surface turbulence;
- fewer slack-water pockets/pools associated with large organic debris;
- reduced instream depth/velocity/substrate diversity;
- reduced energy input from detritus;
- reduced intergravel flow resulting from increased sedimentation, which equates to reduced stream productivity and fish reproductive success;
- higher water temperature resulting from reduced shading.

Large woody debris, along with water depth, water turbulence, large-particle substrates, undercut banks, overhanging riparian vegetation, and aquatic vegetation provide cover for salmonids. Fish abundance in streams is correlated with the abundance and quality of cover. When large woody debris is removed from a stream, the surface area, number, and size of pools decreases and the water velocity increases. Brush, like trees, builds stability in vegetative mats and sod banks that reduce surface erosion and mass wasting of streambanks. In some situations, the root systems of native grasses and other plants trap sediment to help rebuild damaged banks. During flood events, water moving at high velocity transports large amounts of sediment within streams. As it rises up and then over its banks, it flattens flexible streambank vegetation such as willows and grasses into mats that hug the stream edge causing sediments to settle out and become part of the bank. At present, only a fraction of the riparian trees providing shade to East Birch Creek remain. Riparian vegetation forms a protective canopy that helps maintain cool stream temperatures in summer. The effect of the lack of shading is elevated temperatures throughout the basin that appears to be a critical limiting factor in terms of fish habitat quality.

B. Disruption of natural geomorphic processes -- Natural channel dynamics in East Birch Creek as well as most other stream channels in the country have been "controlled" to some extent to accommodate land uses introduced by European settlers. Measures are commonly taken to keep the channel from meandering or otherwise adjusting laterally and to prevent overbank flooding. These measures can include construction of dikes and levees, channelization, and riprapping, which are all evident in the proposed project reach. Interference in natural geomorphic processes disrupts channel patterns which are self-developed and self-maintained. Stream channel patterns, morphology, and other features are determined by the laws of physics which are directly tied to fundamental variables including width, depth, velocity, discharge, slope, channel roughness, sediment load, and sediment size (Leopold et al 1964). A change in any one of these variables results in commensurate adjustments that are manifest in the form of lateral channel migration and attendant higher than normal rates of bank erosion, abnormal channel degrading and aggrading, channel encroachment on riparian vegetation, increased flooding with lower magnitude base flows, increased sedimentation, and substrate material size shifts.

Although no historic quantitative channel morphology data exists for the East Birch Creek it is likely that it is very different today than it was prior to settlement by Europeans. The most obvious differences are probably:
a) the channel is less sinuous,
b) the width/depth ratio is higher,
c) there is less pool habitat and more run habitat,
d) mean sediment particle size is smaller with a substantially higher proportion of sand and silt and associated cobble embeddedness,
e) the stream channel is more entrenched.

C. Alteration of stream flows -- Diversion of stream flow for irrigation purposes has resulted in reduced flow in the East Birch Creek during the irrigation season, which is generally the period May through October. Dewatering is most evident when the wetted area of the channel is reduced during the irrigation season.

The most obvious effects of May-October stream flow reductions on fish habitat are as follows: a) reduced volume of habitat, b) reduced depth, c) increased temperature, d) increased concentration of total dissolved solids (e.g. salts, nutrients, etc).

D. Increased sediment input -- Ongoing erosion of the stream banks contributes to the bedload and sediment is transported into the project area from upstream. Upstream of the project, particularly on Pearson Creek, the stream is choked with gravel bars and a landslide contributes large quantities of sediment.

Stream systems that are geomorphically balanced have a sinuosity, gradient, and channel geometry that allow them to transport the quantity of sediment that is received as a result of erosion of the drainage area under a natural flow pattern. If, for any reason, the sediment transport capability is diminished, sediment will accumulate in the channel, first becoming obvious as an inside meander point bar.

The most evident effects of sedimentation on fish habitat in East Birch Creek are as follows:

- a reduced amount of pool habitat;
- a high degree of cobble imbeddedness, resulting in lower stream productivity and lower salmonid reproductive success;
- an increase in bank erosion and encroachment on riparian vegetation due to forced lateral channel adjustment.

In summary, conditions in the proposed restoration reach are significantly degraded as a result of the impacts described above.

<u>Environmental Impacts of the Alternative Carried Forward</u>

The proposed restoration efforts should have no observable and measurable impact on the local physical characteristics or geology.

The proposed actions would have a positive impact to the existing bank slopes and the streambed. The existing bank slopes consist of alluvial and colluvial deposits consisting of silts and gravels. The erosion of the existing banks has been a significant source of stream sediment and suspended particles that are fluvially deposited in low velocity environments downstream. Some of the existing erosion has also resulted in unstable slopes that are further susceptible to mass movement due to sliding. The proposed project would reduce the erosion by providing more stable geometry, stabilization structures, and long term vegetation.

5.2 Environmental Resources

The proposed project area contains both aquatic and riparian habitat. Although each type of habitat is different, they are also dependent on each other. Some species live only in one habitat or the other, while some mammals and amphibians use both. Each type of habitat will be discussed separately in the following two sections.

5.2.1 Aquatic Resources

East Birch Creek is a fork of Birch Creek, a headwater tributary of the Umatilla River, which empties into the Columbia River. The creek within the proposed project area has experienced degradation of aquatic resources since the advent of intensive grazing/farming activity near the creek. The natural fluvial action of the creek channel was altered when riparian areas were drained and converted to agriculture/grazing. At this time, the creek was channelized and dikes were constructed to prevent overbank flooding. The straightening of the channel contributed to both aquatic and hyporheic zone degradation.

The hyporheic zone is the saturated zone composed of drainable substrate that stores and transports water in the interstitial spaces for supply to stream flow. Channelization of the creek may have affected the hyporheic zone by decreasing it, thereby decreasing the macroinvertebrates that inhabit the zone and provide part of the food source for various fish species, including steelhead listed as threatened under ESA. Other aquatic degradation consists of a high width-to-depth ratio of the creek, increased water velocities, partial loss of the riparian zone, and disturbance of stream productivity.

This reach is an important spawning and rearing area for summer run steelhead trout. The Umatilla stock of summer steelhead was designated part of the Mid-Columbia Evolutionarily Significant Unit (ESU) by National Marine Fisheries Service (NMFS) when it listed steelhead stock as "Threatened" under the Endangered Species Act.

The race of summer-run steelhead that occurs in the East Birch Creek drainage enters the Columbia River on its spawning in-migration between March and October. Spawning occurs in mid-elevation tributaries, including East Birch Creek, in the spring following the adult in-migration. The peak in spawning activity is during the January through May time period. Intergravel flow, that delivers high oxygen levels and carries away waste, is critical for egg survival. Upon emergence, which occurs by July, fry utilize instream cover such as cobble interstitial spaces to avoid predators. As they increase in size they gradually move into different habitat types and utilize a variety of food items and cover types. During rearing, juveniles require large, deep, low velocity pools with abundant cover. The availability of quality pool habitat is often a limiting factor for this life stage. Summer-run steelhead juveniles usually rear for two years in natal streams and begin their seaward migration downstream, with the first spring freshets.

Many aquatic species live in East Birch Creek. Fish species include steelhead, resident rainbow trout, lamprey, sculpins, and various minnows. Common aquatic insects in the creeks are mayflies, caddisflies, dragonflies, and stoneflies.

<u>Environmental Impacts of the Alternative Carried Forward</u>

The rock weirs would be installed in a manner and configuration consistent with fish passage criteria. In part, the criteria for weirs is that they be placed approximately 50 feet (15 meters) apart, with each consecutive weir 1 foot (0.3 meters) lower in elevation than the preceding weir. Rock weirs, cross vanes, and J-hooks spacing would be based on stream restoration calculations, but no closer than 50 feet (15 meters) apart, which would create a slope no greater than 2 percent (1 v 50 h). The end sill of these structures would not be more than 1/2 foot above the thalweg of the stream. Channel bed and banks would be stabilized using a combination of large rock, woody debris and vegetative plantings. These features would provide:

- gradient control to prevent further downcutting;
- slack water to reduce flow velocities in the near-bank erosion zone;
- enhanced fish habitat through the development of low-velocity zones for resting and cover areas;
- development of a proper thalweg which would provide for adequate flow depth during low-flow periods;
- a system that directs high velocity flow vectors toward the center of the channel and away from the near-bank to reduce erosion.

All aquatic species with in the project boundary are potentially affected by the project actions. Impacts to aquatic organisms in East Birch Creek would be expected in locations where significant in-stream work planned during the in-water work season, from July 1 to October 31, 2001. Construction, which will realign or reshape nearly the entire 1.2 mile reach, is planned during the in-water work season to minimize impacts on aquatic species. Impacts to species would be expected to be short, having no lasting adverse effects. The impacted areas are expected to recover as vegetation and stream conditions recover, similar to the recovery observed and monitored at the nearby ODFW project. Migration of organisms from undisturbed areas within the project, and from upstream and downstream regions, would support the aquatic species recovery. Overall, project actions would improve migration corridors, spawning habitat, rearing habitat, invertebrate habitat, and overall aquatic ecosystem function of the creek.

5.2.2 Riparian Resources

Riverine and terrestrial ecosystems are linked, being only separated by a riparian zone. Wildlife is generally abundant close to riparian corridors. Riparian areas serve as a buffer and effectively moderate the negative effects of the land use practices. Riparian vegetation provides logs and branches that shape channel morphology, retain organic matter, and provide cover habitat for species. Trees in streams are important and often essential to maintaining stream stability (Platts, 1991). Riparian vegetation root systems stabilize stream banks and maintain undercut banks. Brush, like trees, builds stability in vegetation mats and sod banks that reduce surface erosion. Streamside vegetation needs to be vigorous, dense, and have enough species diversity that it can form layers over the ground.

<u>Environmental Impacts of the Alternative Carried Forward</u>

Few impacts to riparian resources are expected. No wetland habitat will be lost. From 10 to 50 trees would be removed, several which would be large cottonwoods, and adjacent vegetation would need to be removed for construction of the project. Removal of this vegetation would be limited to after July 1 to reduce impacts to nesting birds. Riparian habitat with mature cottonwoods occurs both upstream and downstream from the project site, so overall impacts are minimal. Construction noise and activities would temporarily disturb the immediate area.

The fill material required for project construction would be provided primarily from required channel excavation. Some of the larger gravel bars adjacent to the stream may be borrow sources, if required. Additional borrow areas would be located in areas that would fill with water and become ponds after construction is completed. As many as five ponds may be created. The approximate size and location of the proposed borrow areas that may become ponds are shown on Plates 3 and 4.

Construction work area, vehicle access points, and stockpile areas are shown on Plate 7. As work progresses along the length of the project, construction equipment would be parked in the vicinity of the stockpile areas. Approximately 14 stockpile areas are anticipated with the average size of a stockpile area being 100 ft x 100 ft (30 m x 30 m). The total stockpile surface area is approximately 3.2 acres (1.3 square hectometers) and locations are shown on Plate 7. All disturbed surfaces would be reseeded upon completion of the project.

Only native woody plant species would be used in the revegetation for this project such as willow (*Salix spp.*), red osier dogwood (*Cornus stolonifera*), cottonwood (*Populus spp.*), and alder (*Alnus spp.*). In 1997, ODFW contracted for a vegetation survey for all of Birch Creek. The report identifies a complete list of native plant species for native plant species selection (ATEC 1998). The exact composition of the trees used in the project would be dependent upon the availability of these species. Actual vegetative planting would be done in the fall or spring of the construction year, when these plants are dormant. ODFW would oversee the planting to ensure minimal adverse impact to riparian habitat. Follow-up measures, such as irrigation during the first summer and weed removal, would be taken by the sponsor to optimize survival of newly planted vegetation.

Root wads and other large woody debris (LWD) placed on instream gravel bars would result in recruitment of vegetation on those bars. The project design also allows for natural dynamic stream processes to occur on the site that would eventually result in natural recruitment and succession of riparian and floodplain vegetation. Restoration efforts would entail installing riparian and floodplain revegetation. During construction, vegetation protection identified in Appendix B would be implemented at these sites to ensure minimal impacts to existing native vegetation.

5.2.3 Wildlife

Wildlife expected to occur in the vicinity of the proposed project area are birds, amphibians, reptiles, and mammals. Birds include various waterfowl, songbirds, migratory birds, wading birds, and raptors. Ruffed grouse, turkey, kingfisher, quail, ring-necked pheasant, swallows, sparrows, woodpeckers, ducks, hawks, and owls are most common. Amphibians that may be found in the area are treefrogs, leopard frogs, and bull frogs. Reptiles include the northern sagebrush lizard, western rattlesnake, and bull snake.

Mammals common to the area include white-tailed deer, coyote, raccoon, mink, mule deer, muskrat, beaver, skunk, bats, various small rodents, and occasionally bobcat, black bear, and cougar.

The riparian habitat provides a traveling, resting, and foraging corridor for various species of wildlife. Mammals, birds and other wildlife may inhabit riparian corridors for part of the year, or year round. A list of species identified by USFWS for the project area with special status of "species of concern" is found in Appendix A.

Environmental Impacts of the Alternative Carried Forward

Wildlife use of the area during construction would not be impacted to any significant extent. No construction, except for possible revegetation, would take place from November 1 through March 15 to limit impacts to bald eagles. Tree removal would occur after July 1 to reduce impacts to nesting birds and would not require USFWS notification. Wildlife would be temporarily impacted by noise and other construction work activities. The normal reaction of wildlife to this type of disturbance is avoidance of the area, at least temporarily. Some wildlife would become habituated to the noise and activity and remain in the area. The proposed actions would improve wildlife habitat. Re-establishment of the riparian vegetation along the shoreline of the creek would restore and enhance wildlife habitat use by various types of wildlife. The establishment of a more diverse vegetative cover would provide enhanced habitat for wildlife by providing shade, nesting and thermal cover, cover from predators, nutrients in the direct form of plant matter, and food in the form of insects and other invertebrates. Minor impacts to wildlife may occur during the construction period and during annual inspection/ maintenance. These impacts would be short term and should have no lasting adverse effects.

5.2.4 Threatened and Endangered Species

The following threatened and endangered species list was obtained from the U.S. Fish and Wildlife letter dated June 7, 2000 FWS Reference 1-7-00-SP-405, and updated on November 21, 2000 and is included in Appendix A. For species of concern and additional details, also see Appendix A.

Federal Threatened and Endangered Species Listing for Area:

ENDANGERED - None

THREATENED - Bald eagle *(Haliaeetus leucocephalus)*
Steelhead - Middle Columbia River (*Oncorhynchus mykiss*)

PROPOSED - None

CANDIDATE - Washington ground squirrel *(Spermophilus washingtoni)*

Bald eagles (*Haliaeetus leucocephalus*) were listed as threatened under the Endangered Species Act on February 14, 1978 by the US Fish and Wildlife Service. Bald eagles are large raptors that are primarily associated with riparian habitat. The bald eagle is a bird of aquatic ecosystems. It frequents estuaries, large lakes, reservoirs, major rivers, and some seacoast habitats. However, such areas must have an adequate food base, perching areas, and nesting sites to support bald eagles. In winter, bald eagles often congregate at specific wintering sites that are generally close to open water and that offer good perch trees and night roosts. Bald eagle habitats encompass both public and private lands.

Bald eagles primarily eat fish, but will scavenge for any readily available food source including carrion. In the Columbia River basin, bald eagles feed primarily on fish and waterfowl. The attraction to waterfowl has occurred in the last few decades due to the impoundment of large portions of the Columbia and Snake Rivers. The slackwater has attracted a host of waterfowl during the winter. The Birch Creek drainage used to have fairly large anadromous fish runs. Since the settlement of the area by Euroamericans, fish runs have been reduced to a fraction of their original levels.

The bald eagle is an uncommon winter resident in the project area. Records of sightings within the geographic area have occurred between November and April. Several factors determine whether bald eagles are attracted to a riparian area. One factor is food supply. The second factor is large trees for perching, roosting, and nesting. A few bald eagles may be found along the Birch Creek drainage, especially at impoundment areas during the winter. The primary wintering season for bald eagles is November 1st through March 15th. Although some bald eagle nesting has been occurring in the Columbia basin, none has been documented in the Birch Creek drainage.

In the area of East Birch Creek bald eagles are only a winter visitor. Winter eagle use of this area is very sporadic. There are no nests reported in Umatilla County (Marshall 1996). There is not much of a prey base in this area so winter use is considered low density (Marshall 1996). Personal communication with the ODFW Pendleton office determined that bald eagle use of the East Birch creek area remains low, as stated in the 1996 report. Bald eagles are sometimes seen scavenging on deer killed on the roads. There are no waterfowl or fish congregation areas to attract eagles for long periods of time or in large numbers.

Environmental Impacts of the Alternative Carried Forward

The project would establish a more continuous riparian corridor along the creek for bald eagles. This would provide additional perching and possibly nesting habitat in the future. The riparian buffer changes would also improve conditions for eagle prey such as salmonids and small mammals.

The existing stream channel has native cottonwood and shrubs growing near the stream channel in isolated clumps. The work to open up the old stream channel in this area may impact some of the existing trees and shrubs. Open areas would be planted with native poplars, willow, dogwood, and alder. Though some mature native vegetation would be removed during project construction, this should be compensated by the restoration effort. The restoration effort would also establish vegetation in the open areas between clumps of cottonwood and brush. This would eventually establish a more continuous riparian buffer along this stretch. From 10 to 50 trees would be removed, several which would be large cottonwoods, and adjacent vegetation would need to be removed for construction of the project. However, many other mature cottonwoods are located both up and downstream from the project site. This may have a small effect on the number of large roosting trees for bald eagles. Removal of trees would be limited to after July 1 to reduce impacts to nesting birds. Mature tree removal would be avoided in all areas possible to facilitate the completion of the project.

Work is planned during the traditional winter use period, November 1st to March 15th. In-channel construction would be limited to the summer low-precipitation period (July 1 to October 31) in order to reduce the likelihood of adverse effects on threatened steelhead. Non in-channel construction activity such as revegetation after October 31 would require prior approval from ODFW. ODFW personnel would be overseeing the native planting activity that would occur between November 1 and March 15, and would therefore be onsite to monitor for Bald Eagle activity in the area. As a result of work continuing at the project site into the traditional winter use period, eagles would probably avoid the work area.

Potential impacts to Bald Eagles are discussed in greater detail in the Biological Assessment found in Appendix C. Consultation with USFWS is ongoing. Since the project work itself may impact eagles through construction activity or the removal of marginal perching habit, a biological determination was made of "*may affect, but is not likely to adversely affect* " bald eagle populations and their habitat. Over the long term, the effect of the restoration work would improve bald eagle habitat and improve their prey base.

Steelhead - Middle Columbia River (*Oncorhynchus mykiss*)

Mid-Columbia Steelhead were listed as threatened under the Endangered Species Act in March 1999 by the National Marine Fisheries Service (NMFS). Adult steelhead return to their natal streams from December through May to spawn. After spending one or two years rearing in the area, juveniles begin their outmigration to the ocean in April and May when flows are usually higher than average. Optimal steelhead habitat is characterized by clear, cold water with complex cover including large woody debris and boulders. Periodic low flow, flood control measures, irrigation diversions, and habitat destruction limit both adult and juvenile steelhead survival. The upper incipient lethal temperature for adult rainbow/steelhead is 25°C (77°F) (Raleigh *et. al.* 1984)

Rainbow/steelhead trout are found in East Birch Creek year-round. This reach is also an important spawning area for summer run steelhead. The Umatilla stock of summer steelhead was designated part of the Mid-Columbia Evolutionarily Significant Unit (ESU) by National Marine Fisheries Service (NMFS) when it listed that stock as "Threatened" under the Endangered Species Act.

The race of summer steelhead that occurs in the East Birch Creek drainage enters the Columbia River on its spawning in-migration between March and October. Spawning occurs in mid-elevation tributaries, including East Birch Creek, in the spring following the in-migration. The peak in spawning activity is during the January through May time period. Survival from egg through emergence is most affected by waste removal and oxygen supply to the eggs/embryos/sac fry, which require reasonably clean gravel allowing adequate intergravel flow. Upon emergence, which occurs by July, fry utilize in-stream cover such as cobble interstitial spaces to avoid predators. As they increase in size they gradually move into different habitat types and utilize a variety of food items and cover types. During rearing, juveniles require large, deep, low velocity pools with abundant cover. The availability of quality pool habitat is often a limiting factor for this life stage. Summer steelhead juveniles usually rear for two years in natal streams and begin their seaward migration downstream with the first spring freshets.

Environmental Impacts of the Alternative Carried Forward

Potential impacts to all life forms (adults, juveniles, fry and egg) of summer-run steelhead are discussed in greater detail in the Biological Assessment (BA) found in Appendix D. The BA identifies management actions that would be taken to minimize impacts to the stream and riparian habitat related to steelhead. Because juvenile steelhead can be found in East Birch Creek throughout the entire year, the determination in the BA is *may affect, likely to adversely affect* steelhead or their habitat. Consultation with NMFS is ongoing.

In-channel construction would be limited to the in-water work window (July 1 to October 31), which coincides with the summer low-precipitation period, in order to reduce the likelihood of adverse effects on spawning, incubation, rearing, and migration of summer-run steelhead and resident rainbow trout. Construction outside the in-water work window would require prior approval from ODFW and NMFS. Passage for anadromous salmonids would be maintained at all times. Short-term blockage of passage for specific construction elements would require previous approval from ODFW and NMFS.

The largest expected direct effects to steelhead are from the capture and relocation of juveniles. All fish within areas where the stream channel will be relocated will be captured with nets and/or electro-fishing methods to protect them from the construction effort. Trained biologists with ODFW will perform this task. In-water construction work could have direct effects to steelhead if all of the juveniles or fry are not completely removed from a work area. Capture and relocation efforts will be performed to remove as many individuals as possible from the areas specified above. However it is likely that not all of the individuals will be recaptured or survive relocation, especially fry. Hence the reason for the "may affect; likely to adversely affect" biological assessment determination.

Indirect effects related to water temperature could occur. A minimal amount of shade may be lost, which could slightly increase the stream temperature in the short term. However, the new channel will be consolidated into a narrower deeper channel that will likely lead to cooler stream temperatures in the short and long term, and would likely offset any increase due to loss of shade. Overbank flooding into the borrow ponds near the channel could also indirectly effect steelhead after high flow events if they were to become stranded in the ponds and not relocated back to the stream. Effects associated with possible leaks in heavy equipment are possible, but the chances of effects occurring will be minimized using specific management actions listed in Appendix B.

This project in addition to the completed project just downstream will provide a positive cumulative effect for steelhead. Revegetation and fencing efforts will allow a well-developed riparian zone that will provide long term benefits to steelhead. Efforts will be taken to minimize any negative impacts. After the project is constructed, negative effects would be reduced as vegetation reestablishes, providing increased shade and cover to the stream.

Washington ground squirrel *(Spermophilus washingtoni)* – this species is identified in Appendix A as a candidate for listing. The estimated number of individuals at the project site would be expected to be small. No known sightings have occurred in the project area." If any were located on the site, construction activity could injure or displace individuals, or otherwise impact their habitat. Caution will be taken to monitor for the presence of Washington ground squirrels, in conjunction with Bald Eagles monitoring, and if observed, the appropriate steps would be taken."

Other Species of Concern

Pacific Lamprey (Lampetra tridentata) - reside within the project area, but are expected in small numbers. Fish capture and relocation efforts during construction is planned, however, a small number (if any) may fail to be safely relocated.

5.2.5 Water Quality

Efforts would be taken to minimize in-water work that would affect water quality. Construction activities would be conducted in non-water areas for new channel segments that are outside the existing channel and would not affect turbidity since the work is not in the water. Turbidity levels in the creek would increase for short time periods in construction areas when the channel is rerouted to the non-water excavation areas, and where structures are installed and in-water excavation and replacement of fill material is performed in the channel.

Fluctuating turbidity levels of up to an estimated 50 NTU's (Nephelometric Turbidity Unit) above background are anticipated. The increased turbidity level should return to normal soon after excavation ceases or the channel is rerouted through a new segment. The construction period is anticipated to occur over a three-month period and the activities causing elevated turbidity levels would be distributed throughout this period. Impacts to water clarity and color would be directly related to the period of increased turbidity. Slight changes to these characteristics may occur along with the increased turbidity. Levels should return to normal immediately following completion of the construction activity. These impacts should be minimal.

This project meets the conditions of Nation Wide Permit #27 Stream and Wetland Restoration Activities, which is certified by the State of Oregon (ODSL). Ordinarily, Oregon Division of State Lands requires a permit for fill or removal in excess of 50 cubic yards, or any amount in essential indigenous anadromous salmonid habitat, which both apply. The sponsor would be required to obtain all necessary local and state permits.

The Oregon Regional General Permit is issued by the U.S Army Corps of Engineers, Portland District in association with Section 404 of the CWA. The following turbidity condition was included in the water quality certification issued by Oregon Department of Environmental Quality on June 21, 2000. Compliance with this condition ensures that actions authorized by the Regional General Permit do not violate state water quality standards. The work should not cause the turbidity of affected waters to exceed 10% over natural background turbidity as measured 100 feet (30 meters) downstream of the fill site. For project sites with a gradient of 2% or greater (discernible gradient break), the turbidity standard can be exceeded for a maximum of 2 hours (limited duration) per 24 hour period provided all practicable control measures have been implemented. After two hours of turbidity standard exceedance, work would be discontinued and resumed the next day. Along the length of the valley, the slope of the thalweg varies from 0.016 to 0.024 ft/ft (1.6 to 2.4 percent). Practicable control measures are identified in Appendix B entitled Measures to Avoid and Minimize Adverse Project Effects during Construction.

Monitoring for turbidity would occur during active in-water work periods at 2-hour intervals. Monitoring points shall be at:

- an undisturbed site (representative background) 100 feet (30 meters) upstream from the fill or discharge site;
- 100 feet (30 meters) downstream from the fill or discharge site;
- at the fill or discharge site.

Light penetration might be reduced during the period of increased turbidity. No impacts are expected because of this change in the light penetration level. Dissolved oxygen levels should not be affected by the proposed actions. Constant flow helps to stabilize dissolved oxygen levels. Constant flow and absence of stagnant water should limit the growth of pathogens. No problems from pathogens are anticipated. No measurable effects on nutrient concentrations are expected.

No leachable metals or organic toxicants are expected to be present in the excavated or fill material. In the absence of laboratory samples, there is no outward evidence of stressed vegetation, or unnatural or industrial land use near the creek that would suggest samples should be taken. Naturally occurring metals may exist in excavated or fill materials.

The creek is a low alkaline, soft water stream. The land drained by the creek above the project area generally consists of soils composed of loess with weathered basalt and loess with silty clay loam underlain by gravels. Conductivity levels could elevate slightly during the increased turbidity period. No change to the pH, hardness, or alkalinity is expected. Material used as backfill material would come from the site.

The 50-year event flowrate is 1498 cfs (42.42 cms). Minimum flow in East Birch Creek during late summer is estimated to be less than 2 cfs (0.5 cms).

During the summer of 1995, water temperature in East Birch Creek reached a high of 75.4°F (24.1°C) on August 5 for 2 hours. The measurement site is located approximately 250 yards downstream of the project site using a RYAN instruments TempMentor data recorder. All other temperatures recorded in 1995 were below 75.0°F (23.9°C). The temperatures recorded in 1995 were typical of the temperature regime observed at the measurement station over the past 10 years.

East Birch Creek is on Oregon's DEQ 303(d) list for temperature. In the long term, when replanted vegetation is more fully matured, this project should improve the temperature characteristics of the stream.

Environmental Impacts of the Alternative Carried Forward

Because of the low habitat value of the stream in its current condition, the impacts of the construction activity should have a negligible impact on the coldwater aquatic environment. Water quality along East Birch Creek should see an improvement when the riparian corridor develops and cattle are excluded from the channel. The proposed riparian corridor would provide shading that would help keep water temperatures lower. The riparian corridor and proposed bank treatments would help reduce sediments or high turbidity due to bank erosion.

In the short term, by adding meanders without vegetation, and by damaging creek vegetation during construction activity, the project could degrade the temperature characteristics of the creek slightly. The narrower and deeper channel would likely offset these temperature increases due to loss of shade, thereby creating a net lower temperature. Therefore, increase of the depth to width ratio would mitigate for loss of vegetation in the short term.

If abandoned or buried hazardous waste or pesticides were discovered during construction, it would be managed in accordance with RCRA or CERCLA requirements, as applicable. Construction activity in that location would be stopped until an environmentally protective solution was put in place to prevent further spread or migration of the contamination.

5.2.6 Air Quality

The air quality in the Pilot Rock area is good because of the adequate air circulation and the lack of nearby urbanization. Periods of low air quality can stem from wheat stubble field burning, wind blown dust, or wintertime temperature inversions that trap pollutants close to the ground. Prevailing winds come from the south. They are generally light, but occasional damaging windstorms occur. Average wind speeds range from 4 to 6 miles per hour (6.4 to 9.6 km per hour).

Environmental Impacts of the Alternative Carried Forward

During construction, dust control measures may be necessary. No roads will be constructed. However repeated trips by construction equipment may create fugitive dust. If dry conditions cause dust to become a problem, dust control measures such as water spray from a tank truck would be implemented. The operation of trucks and other equipment that generate emissions would occur during construction. Routine maintenance or maintenance after a flood event may also generate a small amount of emissions from vehicles and equipment. These emissions are expected to have a minimal impact on air quality.

5.3 Cultural Resources

East Birch Creek lies in the historic homeland of the Cayuse people and within the ceded lands of the Confederated Tribes of the Umatilla Indian Reservation. Families of the native peoples, such as those of the Cayuse and Umatilla bands, used the East Birch Creek drainage for thousands of years, right into modern times. The traditional lifeway of the Cayuse people required seasonal travels throughout their homeland, from low to high elevation areas, to harvest culturally significant foods, medicines, and other materials. Landforms and landscapes along with resource places and seasonal conditions determined how, when and where families traveled, acquired resources and participated in inter-group activities at certain meeting places. As people traveled into different environments and other homelands they acquired and processed resources for the journey back to their camps and/or villages. Trade and alliances with other peoples were in part supported through the medium of what they harvested and acquired during their annual subsistence rounds. The native name of East Birch Creek translates into the English language as "lost".

Both East Birch Creek and its tributary, Johnson Creek, likely provided access routes and as well as resource destinations for native peoples. East Birch Creek itself remains a reliable water resource for people. Although modern agricultural practices have helped reduced the size of the project's riparian habitat and diminished the abundance of native species, a variety of culturally significant species are present along East Birch Creek including several berry species, pacific lamprey, steelhead, deer and blue heron. Beginning in the historic period, the terraces of East Birch Creek have been used for agricultural production and the steep canyon walls for livestock grazing. Along the length of the drainage bottom are historically recent homes and ranches of non-Indian people. The Tribal Historic Preservation Office (THPO) for the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) reviewed and concurred with the project documentation.

Under the National Historic Preservation Act, a federal agency is required to identify cultural resources and assess a proposed project's effects on them when agency participation and/or federal funds are involved. See Section 6.1.1 NHPA for details on coordination with the SHPO. Cultural resources are understood to be the remains of past human activities and/or places held culturally significant by traditional community(ies) greater than 50 years in age. There has never been a systematic cultural resources inventory of the East Birch Creek drainage and no known cultural properties have been documented in the vicinity of the proposed undertaking.

The current cultural resources review of the project area involved a systematic survey of the entire project area as depicted in Plate 7. A prehistoric/early modern site was found immediately adjacent to the project and a prehistoric period feature within the project. An isolated historic artifact was also found within the project area. The historic period resources appear to fit within the historic theme of family ranch enterprises, which continues today on the same property. The prehistoric proposed resource appears to represent prehistoric resource acquisition/processing themes. Such cultural resources may offer insights into past habitat conditions, use of local resources and the actual activities of peoples.

Environmental Impacts of the Alternative Carried Forward

Monitoring of the project will occur for the ground disturbing activities that could expose and/or impact cultural properties that were not discovered through the archeological field survey. None of the documented cultural resources would be affected by proposed project activities.

5.4 Human Resources

Construction noise and activities would minimally affect local residents and those passing by. Construction would take place only during daylight hours. The natural topography slopes very gently in the area, so unsightly erosion should be minimal. The project design near the house and other structures would not increase the risk of flooding during a 50-year flood event, when compared to the no action alternative.

5.4.1 Aesthetics/Visual Quality

The project site is in a rural valley and located approximately 1/8 mile from the two lane East Birch Creek Road. East Birch Creek flows toward Pilot Rock from the surrounding Blue Mountains. The creek is surrounded by private property that limits public access and recreational opportunities. Trees and lush greenery along the creek contrast the dry, open surroundings. The specific proposed site location consists of a fenced pasture on both sides of the creek with livestock having access to the creek, trees and shrubs along the creek, one house and several outbuildings, and a private bridge that crosses the creek near the house.

Environmental Impacts of the Alternative Carried Forward

The qualities that make the area appealing would be expected to be improved as a result of the project, and since the creek is set back away from the road, construction work would not be unsightly. The excavated areas would be planted with native grasses to conceal the construction work. The excavation work would blend into the surrounding landscape, and would employ typical stream restoration methods that rely primarily on natural materials. The riparian vegetative plantings, when mature, would enhance the visual quality of the project area.

5.4.2 Recreation

The Project site is entirely on private property and does not provide for public outdoor recreation opportunities.

In the nearby vicinity, warm temperatures and low precipitation during the summer attract many visitors to the area. Some of the activities people enjoy are fishing, hunting, and hiking, and in some cases, swimming in the creek.

Environmental Impacts of the Alternative Carried Forward

Recreationists would not be expected to experience any significant sport impediment because all of the proposed actions would take place on private property that is not open to public use.

5.5 Transportation

East Birch Creek Road is the main transportation route immediately adjacent to the proposed project. Plate 2 shows the local transportation routes in the area. Heavy truck traffic would increase during the construction period. Approximately 1200 to 2000 cubic yards of construction material would be hauled to the site. This would result in 150 to 250 truckloads, at 8 cubic yards per truck.

Environmental Impacts of the Alternative Carried Forward

Traffic delays and inconvenience to the public is expected to have a minimal impact. Short-term minor traffic or noise impacts may be experienced by the residents of the house on the property due to work performed near the house, or vehicle traffic that would travel on the road located near the residence. No impact to the structure is anticipated. Only short-term minor traffic or noise impacts may be experienced by the adjacent landowners and no impact to their structures is anticipated.

5.6 Utilities

Existing public utilities in the project area are an overhead electric transfer line near the house and near the upstream end of the project (near the irrigation intake). It is not expected that the overhead power lines would need to be relocated. Clearance under the power lines may be an issue and would be addressed in the project design phase of the project. There is also an underground electrical line running from the house to the bridge. This underground line would need to be relocated.

A water source for livestock would be excluded by the fencing constructed to protect the stream and adjacent riparian zone. An alternate water source would need to be developed. The options include:

1) use one of the borrow ponds outside of the riparian zone
2) develop springs or
3) dig shallow hydraulically connected springs, or wells off-stream, outside of the buffer.

Springs would be constructed by digging a shallow trench that connects hydraulically to the creek. The shallow wells would be constructed by drilling down to the unconfined aquifer and requires a solar powered water pump, some plumbing and a tank. Approximately five sources would need to be created, and the exact locations and selected method(s) have not been determined.

An irrigation intake exists near the upper portion of the reach (Plate 4 – not shown). A cross vane will be installed at the proper location and elevation to form a pool from which the irrigation water will be removed.

Environmental Impacts of the Alternative Carried Forward

Relocation of utilities is expected to have a minimal impact. All of the alternate water source methods would not pose adverse environmental impact, and are preferable methods when compared to the existing method of watering livestock directly from the stream. The cross vane and pool for the irrigation intake would be incorporated into the stream restoration design. The intake would be screened to minimize adverse impact to endangered and threatened aquatic species.

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6. CUMULATIVE EFFECTS

The National Environmental Policy Act and the Council on Environmental Quality regulations require Federal agencies to consider the cumulative impacts of their actions. Cumulative impacts are defined as the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what other agency or person undertakes the other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR 1506.7).

The cumulative effect factors considered for this project includes ecosystem components and past, present, and reasonably foreseeable future actions. The proposed ecosystem restoration project would have localized specific terrestrial and aquatic habitat effects within the project area. Overall and broad reaching benefits to the larger riverine system however would be minimal.

Other past actions contributing to the degraded Birch Creek ecosystem include grazing/farming practices along the creek banks, roadway development, altered drainage areas, and construction of residences along the creek. These actions occurred in a piecemeal fashion over the course of several decades. The cumulative result of this activity has caused a more straightened channel for a significant amount of the stream's reach. The straightened channel has skewed the sediment budget and most likely increased the displacement of gravels downstream. The straightening has also caused the current channel downcutting with vertical banks that continually erode resulting in increased river turbidity and loss of riparian vegetation.

A similar ODFW project is constructed immediately downstream of the proposed Corps project site. The project included channel re-alignment, placement of rock barbs, rootwads, toe rock, and vegetation in an effort to re-stabilize the bank, improve aquatic and riparian habitat, and provide for sediment transport passage though the system. The ODFW project was started in the summer of 1998 and was completed in spring of 1999. Currently, the vegetative plantings are still immature. ODFW is planning another stream restoration project directly downstream from their existing project.

This project, which would be constructed immediately upstream of the existing project, would serve as an incremental improvement to significantly assist in the restoration effort for the creek. Having three contiguous restoration projects increases the biological benefits in a cumulative fashion. As local landowners monitor and assess the results and success of these projects, similar efforts may be conducted in the future, further adding to the cumulative restoration effort.

The cumulative effects of both projects with immature vegetation, in their early stages post-construction, are unlikely to create any significant detrimental impacts. The remaining undisturbed and newly planted vegetation, together with habitat located both up and downstream of the project sites, should provide adequate habitat to support the existing aquatic and riparian species. Once the vegetation matures for these two projects, they would combine to provide a longer, continuously vegetated reach of East Birch Creek resulting in synergistic aquatic and riparian habitat benefits as a result of these design features.

A small amount of riparian trees would be removed, but would be mitigated as per replanting recommendations from the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the Oregon Department of Fish and Wildlife. The project would result in a net increase in riparian vegetation.

Erosion measures are in place at the downstream site. Therefore any major flood event should not trigger a cumulative erosion effect downstream of the projects. Each project is designed to provide bank protection, flood capacity, and reduce the creek's energy. These factors make cumulative detrimental flood impact unlikely.

For the environmental restoration measures being proposed under this project, any non-beneficial impacts to water quality, air quality, aesthetics, recreation, aquatic and terrestrial species and habitat due to construction would be minor and short-term. Cumulative impacts considered to be positive are improved water quality through reduced velocities and stabilization of the channel, reduced erosion and loss of vegetation, opportunity for the reestablishment of riparian habitat, and creation of additional habitat for steelhead and other aquatic and terrestrial species.

7. Preferred Alternative

Based on the existing conditions and affected environment discussion provided in Section 5 for the alternative considered for further analysis, Alternative 5 is suited to the stream's existing geomorphic condition, does not create adverse environmental or cumulative impact, is the least expensive to build, and meets the sponsor's and landowners requirements. In summary, the preferred alternative consists of the following attributes:

1) realigning Reach-2 for a C type meander geometry, reshaping the channel and profile, and installing stabilizing structures and vegetation would help stabilize that reach;
2) reshaping the channel and profile to a B type channel and installing stabilizing structures and vegetation to help stabilize the rest of the stretch (Reaches 1, 3, 4, and 5);
3) habitat improvement which includes that required for streambank erosion control protection by using erosion control fabric, reseeding disturbed areas with a mix of native graminoids, revegetating with native woody vegetation, and fencing the entire stretch to keep livestock away from the creek and protect new plantings and structures;
4) providing fencing to protect riparian habitat and an alternative means to water livestock.
5) Providing a hydraulic design that would not increase the risk of flooding for the existing structures (house, barns, etc.) when compared to the no action condition.

Much of the habitat improvement should develop over time as the result of a stable stream. However, the structures and the channel reshaping would provide some limited amount of immediate habitat benefit. This project would, at a minimum, accomplish the stabilization work previously described so that a long-term habitat improvement is realized.

Additional aquatic or riparian habitat benefits can be achieved by constructing floating log covers, rock cover structures, converging roller eddy structures, and additional (more than need for just stabilization) rootwads, cross vanes, and J-hooks. An incremental cost analysis will be used to determine which of these habitat improvements provide the most improvement per additional increment of cost. The selection of habitat improvements, beyond the structures required for stabilization, will be selected based on the incremental cost analysis.

The preferred alternative design, as presented and depicted on Plate 3, represents the maximum stream re-alignment that would be undertaken for this project. During the plans and specifications phase, the alignment may be "fine tuned" to preserve existing vegetation and avoid construction difficulties which may result in minor changes. It is anticipated that these changes could result in slightly less stream channel meander and would require less excavation, which would result in less impact to the aquatic and riparian resources. Therefore, this EA considers the environmental impact for the design condition that would have the greatest potential adverse effect.

Recommended structural restoration measures for the preferred alternative are summarized below.

- 1 rock entrance control structure with deflector berm
  - (at project entrance)
- 85 total structures comprised of
  - 15-55 J-hooks with chute cutoffs
  - 10-28 rock cross vanes
  - 8-10 rock vanes
- 6-12 grade control structures
- 300-600 ft of bank lay-back (90-180 m)
- 40-60 ft of rock sill bank protection (12-18 m)
- 4000 ft of bank stabilization (1200 m)
- 2700-3200 ft (800-1000 m) of channel realignment (new channel)
- 2100-2600 ft (640-790 m) of existing channel reshaping
- 100-1000 feet (30-300 m) of stabilization of toe
- 600 feet (180 m) of footer boulders
- 3-5 fill areas
- 3-6 debris removal areas
- 2-5 gravel bar removal areas
- 10-50 rootwads
- 2-5 ponds (borrow areas)
- 1 excess material spoil area
- 4-10 existing barbs removal
- Revegetation
- Fencing
- Spring(s) and/or shallow well(s) development for livestock watering

8. PROJECT COST AND SCHEDULE

The project cost would be shared between the Corps and the local sponsor at a 65/35 percent split. Part of the sponsor's cost includes all real estate costs. The local sponsor is also responsible for operation and maintenance of the project after construction completion, which would include invasive weed abatement, and periodic monitoring, such as photo point assessment, and stream temperature monitoring. The results of this monitoring will be used to fine-tune the stream geometry to ensure efficient transport of sediment through the project reach and dynamic equilibrium of the stream system. This work may include removal of excess sediments, repair of structures, and addition of new structures. Maintenance activities are expected to be minimal.

The following list identifies the milestones for the project design and construction schedule.

Milestone Action	Date
Conceptual Plan Design	Mar-Dec 2000
Plans and Specifications	Jan-May 2001
Draft EA complete	May 2001
EA complete	Jun 2001
Advertise & Award	Jun-Jul 2001
Construction (in-stream)	Jul-Oct 31, 2001
Project Completion (vegetation planting)	May 1, 2002

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9. ENVIRONMENTAL REVIEW REQUIREMENTS

9.1 Federal Statutes

1. **National Historic Preservation Act, As Amended** (16 USC 470-470t, 110) and **National Environmental Protection Act** (16 USC 4321). **Oregon Archaeological Protection Act** (House Bill 2440), **Archeological Sites and Objects** (ORS 358.905/955) and **Indian Graves and Protected Objects** (ORS 97.740).

As required under Section 106 of the National Historic Preservation Act, the Corps is coordinating with the Oregon SHPO, and other interested parties. A report describing these findings will be submitted to the Oregon State Historic Preservation Office and the Tribal Historic Preservation Office (THPO) of the CTUIR (Confederated Tribes of the Umatilla Indian Reservation) for their review. The THPO for the CTUIR reviewed and concurred with the project documentation. The Corps has determined that the construction of this project would *not affect* known cultural resources located in the proposed project area, and is requesting concurrence with the determination from the Oregon SHPO. If any historical or cultural artifacts are found during construction, work would stop immediately and the State Historic Preservation Officer would be notified. Project activities within the Area of Potential Effect (APE) shall be monitored and intermittently inspected by a professional archeologist.

2. **Clean Air Act, As Amended** (42 USC 7401, et seq.)

The project would comply with the Clean Air Act, as amended. The operation of construction vehicles and equipment would cause only temporary and minor effects on the quality of air. Dust would be kept at a minimal level with the aid of dust control measures. A stationary mobile water sprinkling system(s) or unit(s) may be used to provide dust control. No chemical dust control agent would be used. As a requirement of Section 309 of the Clean Air Act, this EA would be provided to the EPA for their review and comment.

3. **Clean Water Act, As Amended** (33 USC 1251 et seq.)

Section 404 of the Clean Water Act requires evaluation of activities involving discharges of dredged or fill material into waters of the United States. The placement of structures identified in Section 2 of this document would be subject to the requirements of the Clean Water Act. This project would meet the requirements of Nationwide Permit (NWP) number 27, Stream and Wetland Restoration Activities. It reads "...Activities in waters of the United States associated with the restoration of former non-tidal wetlands and riparian areas, the enhancement of degraded wetlands and riparian areas, and creation of wetland and riparian area." NWP #27 is certified by the Oregon DEQ, therefore a Section 404(b)(1) evaluation and a Section 401 certification are not required. This project has been coordinated with the Corps of Engineers Portland regulatory office.

4. Endangered Species Act of 1973, as Amended (16 USC 1531-1544)
The Corps prepared two Biological Assessments (BA) that evaluate the effects of this project to species listed on the Endangered Species List. An updated species of concern list is dated November 21, 2000 is found in Appendix A. The US Fish and Wildlife Service and the National Marine Fisheries Service biological assessments are contained in Appendices C and D respectively. In USFWS BA, Corps has determined that the project *may affect, but is not likely to adversely affect* any of the listed species (Bald eagles). In the NMFS BA, the steelhead determination is *may affect, likely to adversely affect*. Consultations with the US Fish and Wildlife Service and the National Marine Fisheries Service are underway. The Corps is seeking their concurrence with its impact determinations.

5. National Environmental Policy Act (NEPA) (42 USC 4321 et seq.)
This EA has been prepared pursuant to the requirements of NEPA. No significant impacts have been identified in the EA. If no significant impacts are identified during the public review process, an Environmental Impact Statement (EIS) would not be required. If an EIS is not required, full compliance with NEPA would be achieved once the Finding of No Significant Impact (FONSI) is signed.

6. Wild and Scenic Rivers Act (16 USC 1278 et seq.)
East Birch Creek is not included on the Wild and Scenic Rivers inventory, according to the National Wild and Scenic Rivers System, December 1, 1992 and its 1998 updates, published by the Department of the Interior and the Department of Agriculture, Forest Service. The information is also shown on their web site at http://www.nps.gov/rivers/wildriverslist.html#or.

7. Migratory Bird Treaty Act and Migratory Bird Conservation Act
(16 USC 701-715)
The proposed project would be conducted in such a manner that migratory birds would not be harmed or harassed. The proposed work would be outside the nesting season for most birds. Riparian vegetation suitable for nesting would be avoided, where possible. Any tree removal would be limited to after July 1 to reduce impacts to nesting birds. Where nesting vegetation is removed, adequate riparian vegetation for nesting sites exists upstream and downstream from the project site. Increased vegetative planting would mitigate for riparian vegetation that is removed.

8. Fish and Wildlife Coordination Act, as Amended
(16 USC 661 et seq.)
The proposed project is a Federal water resources development project. The project has been coordinated with the US Fish and Wildlife Service through telephone conversations. The USFWS has determined a Coordination Act Report is not required for this project and would provide comments, if any, to this EA during the public review comment period as the means to comply with the Act. The project is in compliance with this act.

9. Federal Water Project Recreation Act, as Amended
(16 USCA 4612 et seq.)

The Federal Water Project Recreation Act (P.L. 89-72), as amended, requires that full consideration is given to opportunities for fish and wildlife enhancement in investigating and planning Federal water resources projects. The proposed project is a small ecosystem restoration project with the primary purpose of enhancing aquatic and riparian habitat. The project does not provide opportunities for public recreation, as the project and surrounding lands are privately owned.

10. Rivers And Harbors Act (33 U.S.C. 403)

The Rivers and Harbors Act of 1899 prohibits the construction of any bridge, dam, dike, or causeway over or in navigable waters of the United States in the absence of Congressional consent and approval of the plans by the Chief of Engineers and the Secretary of the Army. This act is not applicable to the proposed project because none of these structures would be constructed as part of the project and because none of the waters are considered navigable.

11. Watershed Protection and Flood Prevention Act, as Amended
(16 U.S.C. 1001 et seq.)

The Watershed Protection and Flood Prevention Act, Public Law 83-566, is commonly known as the Small Watershed Program. USDA-Natural Resources Conservation Service (NRCS) administers this program. The program authorizes Federal assistance to local organizations for planning and carrying out projects in watershed areas for conservation and use of land and water and flood prevention. This project is not a product of the Small Watershed Program and therefore this act is not applicable to this project.

12. Farmland Protection Policy Act (7 U.S.C. 4201, et seq.)

The Farmland Protection Policy Act (Public Law 97-98, Sec. 1539-1549) requires identification of proposed actions that would affect any lands classified as prime and unique farmlands. The proposed project would not affect farmland classified as prime and unique.

13. The Resource Conservation and Recovery Act (RCRA)
(42 USC 6901 et seq.)

RCRA was enacted in 1976 to address the issue of how to safely manage and dispose of municipal and industrial waste, regulate underground storage tanks (USTs) that store petroleum or hazardous substances, establish a system for managing solid (primarily nonhazardous) waste, including household waste, and set forth the framework for EPA's comprehensive waste management program. No abandoned waste has been observed during project site visits. If abandoned or buried hazardous waste or pesticides were discovered during construction, it would be managed in accordance with RCRA or CERCLA requirements, as applicable. Contractor hazardous materials and waste would be managed in accordance with RCRA requirements. The project is in compliance with this act.

9.2 Executive Orders

1. **Executive Order 11988, Floodplain Management**, May 24, 1977

The objective of Executive Order 11988, is to ensure avoidance to the extent possible of any adverse impacts, short and long term, associated with the occupancy and modification of the base floodplain whenever there is a practical alternative. See Section 5.1 Physical Characteristics for a description of the existing floodplain condition.

The Umatilla County in which the project is located, participates in the National Flood Insurance Program. East Birch Creek is listed as an unnumbered "A zone". This project has a remote location and no base flood elevations or floodway has been identified for East Birch Creek, until this study.

For the unnumbered "A zone" case, federal regulation 44 USC 60.3(b) requires:

- notification of the adjacent communities and the State coordinating office,
- submittal of copies of notification to the administrator, and
- ensure that the flood carrying capacity within the altered or relocated portion of the stream is maintained.

Plan drawings including cross-sections and a station-by-station breakdown of excavation and fill has been provided to Umatilla County Planning Department and the Floodplain Coordinator for Oregon. Copy of this notification has been provided to FEMA Region 10. The excavation and fill within the project reach is approximately 14,600 cy. (11,100 m^3) and 13,500 cy. (10,300 m^3), respectively. An analysis was performed that showed the proposed design does not decrease the carrying capacity of the base floodplain. The floodplain boundary map is shown on Plate 8.

The project is consistent with the objective of Executive Order 11988 because it does not decrease the carrying capacity of the base floodplain as shown on Plate 8. The project is intended to improve stream conditions for fish and restore some of the natural function of the floodplain. Therefore, the project is in compliance with the Executive Order.

2. **Executive Order 11990, Protection of Wetlands**, May 24, 1977

The purpose of this project is to restore/enhance aquatic and riparian habitat. No wetlands would be impacted by this project.

9.3 Executive Memorandums

CEQ Memorandum dated August 11, 1980; Analysis of Impacts on Prime and Unique Agricultural Lands in Implementing NEPA.

No prime or unique farmland would be impacted by this project. Access routes would not cross farmlands classified as prime and unique.

9.4 State and Local Permits

The sponsor is responsible for all required state and local permits. Some of those permits may include a Removal and Fill Permit from Oregon's Division of State Lands. If the project requires excavating for ponds, which leave borrow pits, an Oregon Water Resources Department permit may be required. The Project meets the requirements of NWP#27 which is certified by the State of Oregon, and therefore meets the Section 401 and 404(b)(1) requirements.

A water right is not required for the livestock watering well provided the well is less than 14 feet (4 m) deep. A water right is also not required for the livestock watering springs provided they are not in a "channel" or do not run off the property onto another property.

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10. CONSULTATION AND COORDINATION

This aquatic habitat restoration project has been coordinated with applicable agencies including the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the Environmental Protection Agency, the Oregon Department of Fish and Wildlife, the Oregon State Historic Preservation Office, the Oregon Division of State Lands, the Oregon State Historic Preservation Office, and the Tribal Historic Preservation Office of the CTUIR (Confederated Tribes of the Umatilla Indian Reservation). Additionally, the EA has been distributed to interested Federal and State agencies, groups, local governments and the public for review and comment.

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PLATES

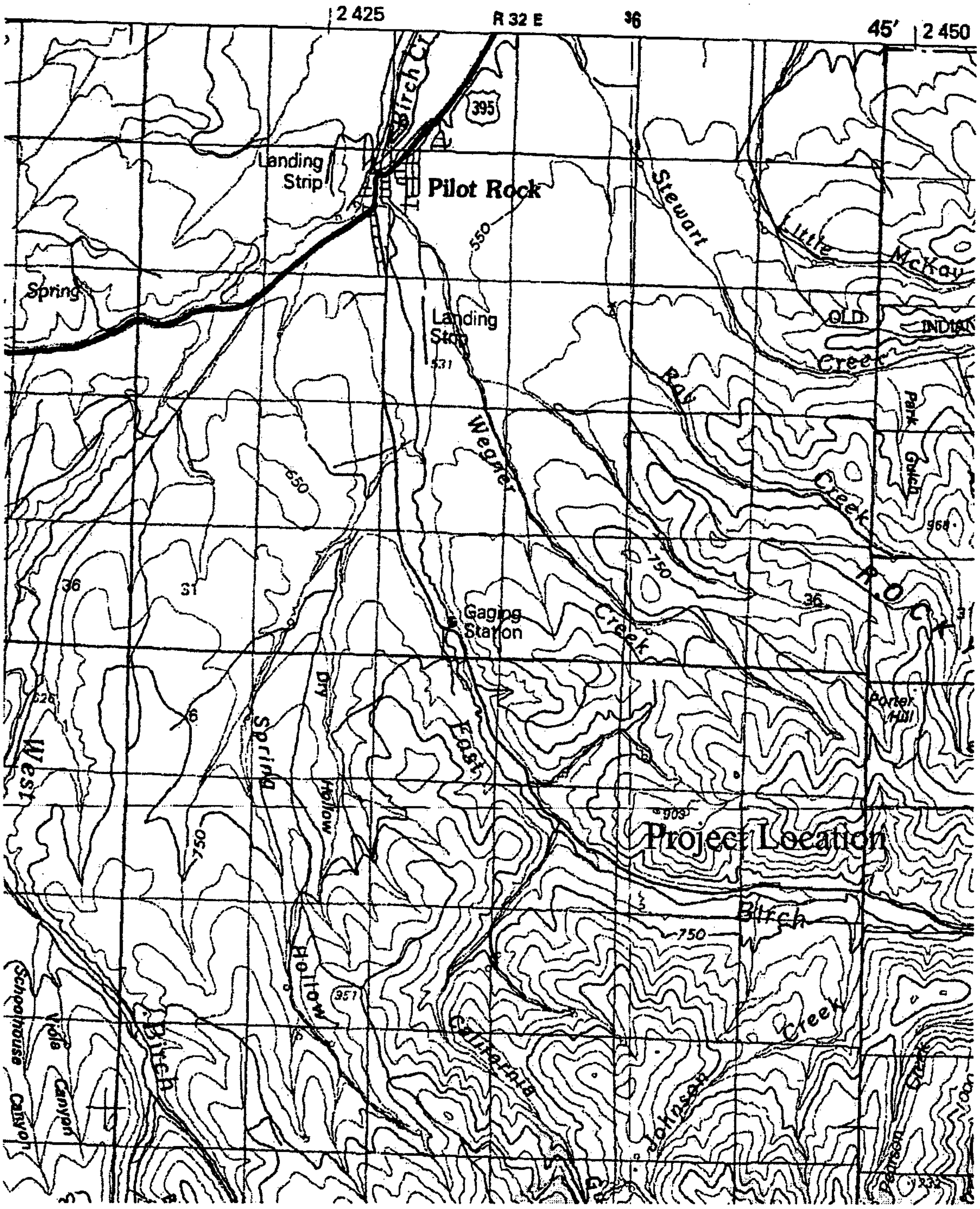

Plate 1- East Birch Creek 206 Project Location.
(note topographic elevations are in meters)

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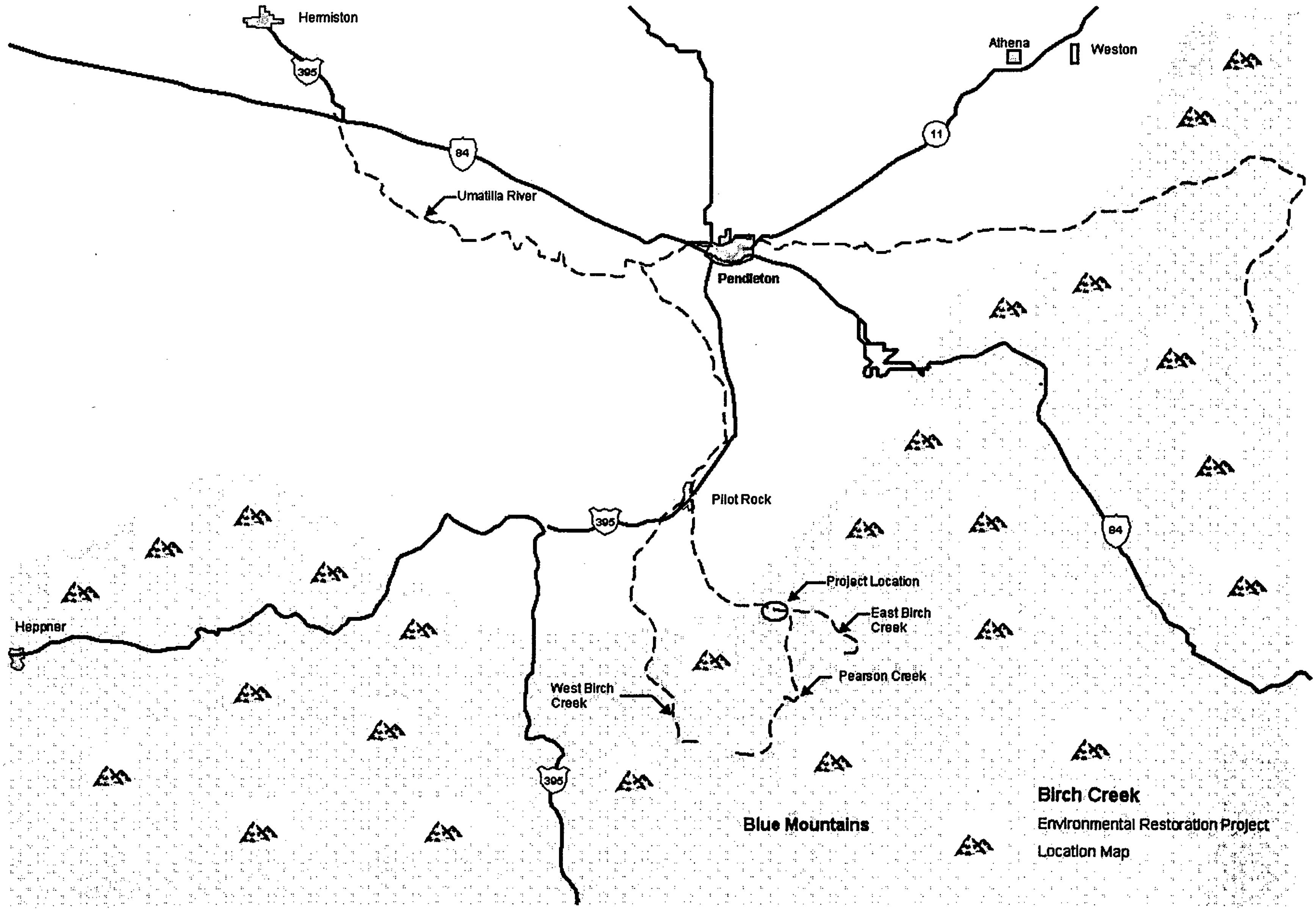

Plate 2 - East Birch Creek 206 Project Vicinity Map.

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Reconnection for Irrigation
Place Boulders At
Potential Erosion Locations
Alignment Control Structure
Remove Debris
Existing Bar
Gravel Bar
Remove Existing Bar
Existing Head Cut
Remove Grave
Pond/Ba
Dike Removal/Borrow Area
Grade Control to Prevent
Further Thalwag Downcutting
& Footer Boulders At Eroded
Locations. Alignment Retained.
To Preserve Existing Trees.
Reshape Channel Bottom
To Not Be Flat.
Remove Debris
Remove Debris
Form Bench Against Hi
Plate 4 - Birch Creek Environmental Re
Plan Drawing (sheet 1 of 3)
Cut-Off

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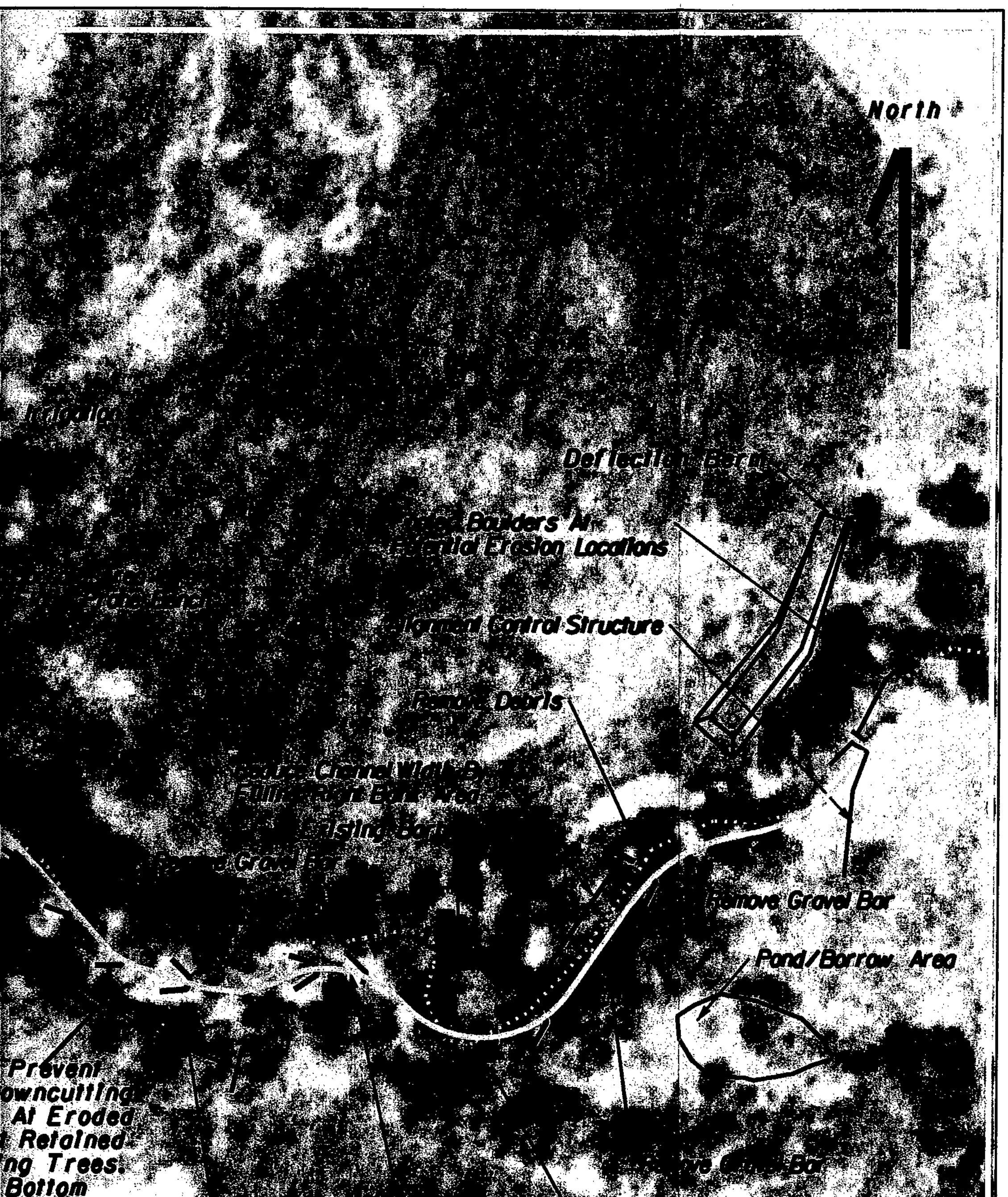

Environmental Restoration
Plan Drawing (sheet 1 of 3)

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Plate 5 - Birch Creek Environmental Restoration Plan Drawing (sheet 2 of 3)

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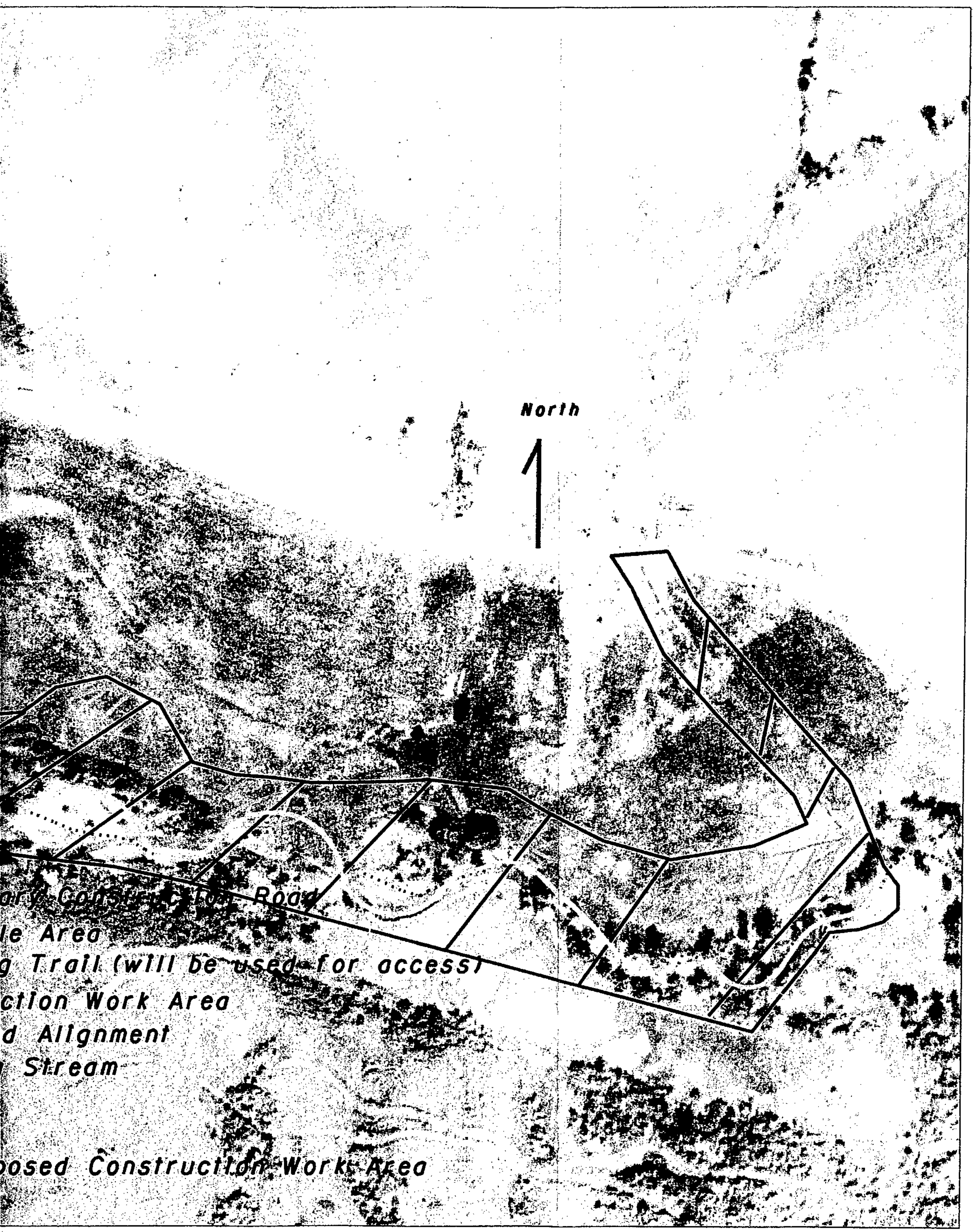
(1)

Plate 6 ... Birch Creek Environmental ... Plan Drawing (sheet 3 ...


North
Remove Existing Barbs
Pole
Pole
Irrigation Diversion
Riser for

...\EBirchCr\Design\bir4_19.dgn 05/20/01 02:09:55 PM

Plate 7 - Proposed Construction Work Area


North
Road
le Area
g Trail (will be used for access)
ction Work Area
d Alignment
Stream
posed Construction Work Area

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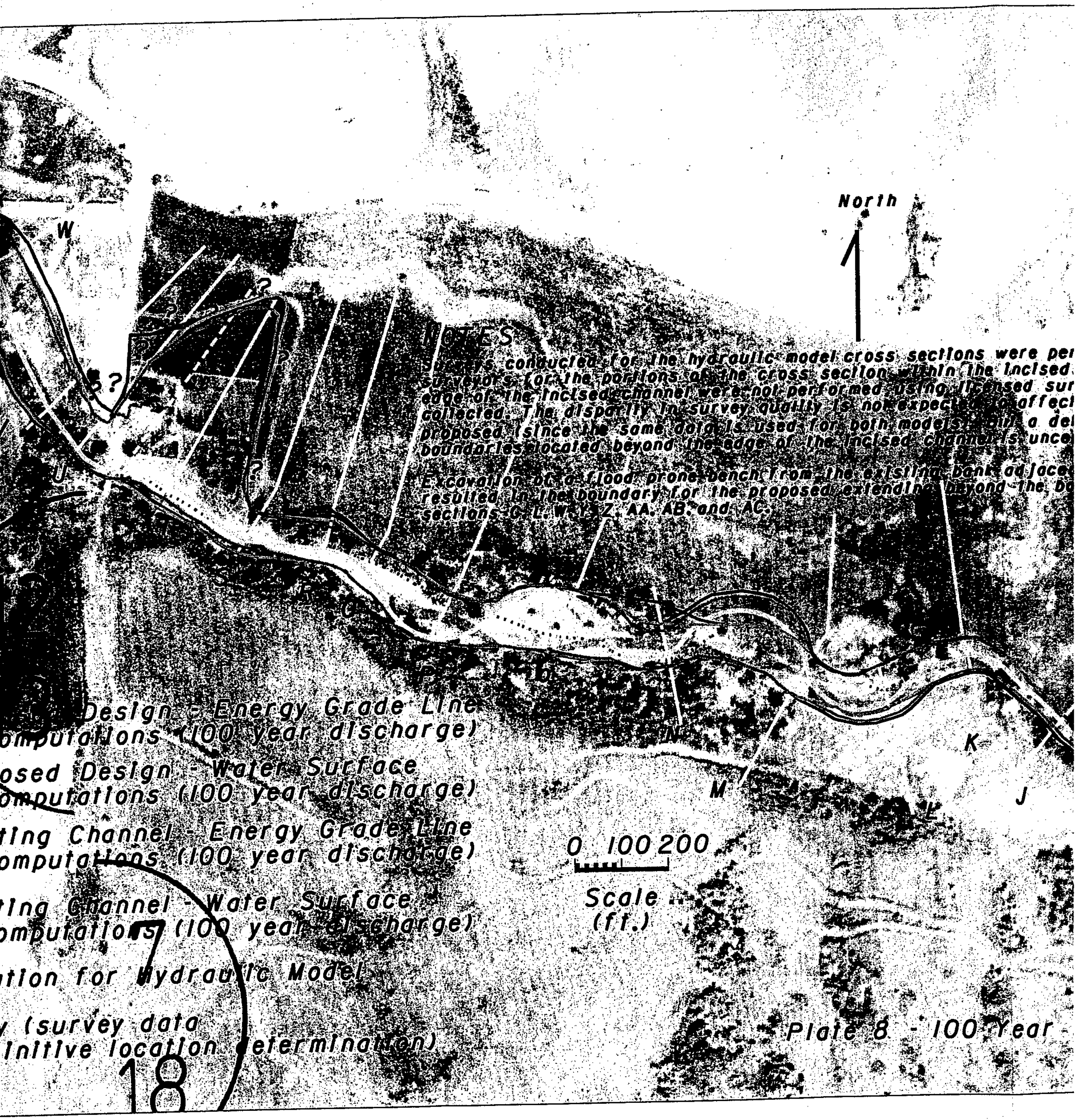

North
NOTES
Surveys conducted for the hydraulic model cross sections were per
surveyors for the portions of the cross section within the incised
edge of the incised channel were not performed using licensed sur
collected. The disparity in survey quality is not expected to affect
proposed (since the same data is used for both models) but a de
boundaries located beyond the edge of the incised channel is unce
Excavation of a flood prone bench from the existing bank adjace
resulted in the boundary for the proposed extending beyond the b
sections G, L, W, Y, Z, AA, AB, and AC.
Design - Energy Grade Line
omputations (100 year discharge)
osed Design - Water Surface
omputations (100 year discharge)
ting Channel - Energy Grade Line
omputations (100 year discharge)
ting Channel - Water Surface
omputations (100 year discharge)
tion for Hydraulic Model
y (survey data
initive location determination)
0 100 200
Scale
(ft.)
Plate 8 - 100 Year -
W
U
K
J
M
L
N

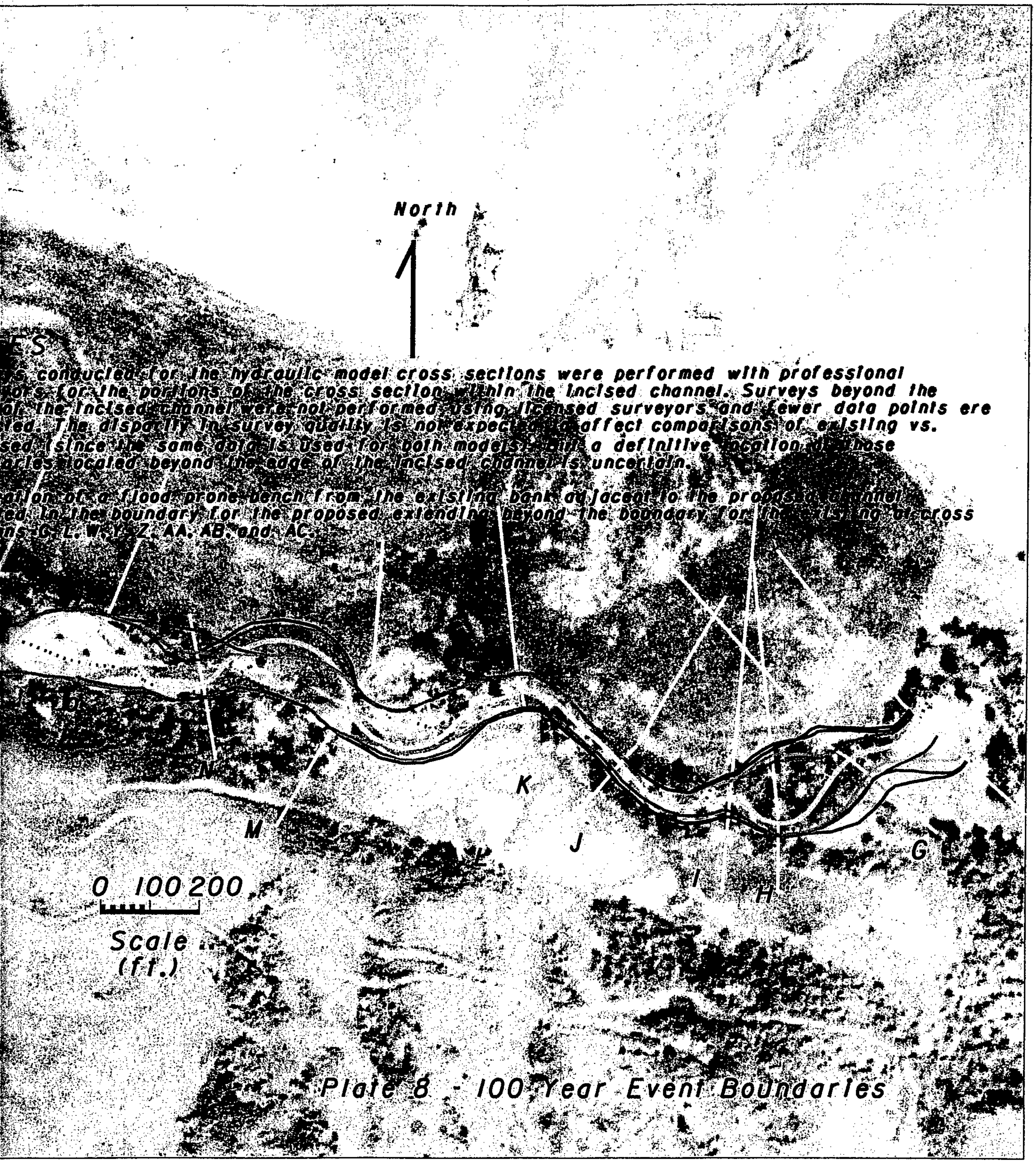


Plate 8 - 100 Year Event Boundaries

APPENDIX A

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CANDIDATE SPECIES AND SPECIES OF CONCERN THAT MAY OCCUR WITHIN THE EAST BIRCH CREEK STREAM RESTORATION PROJECT AREA

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CANDIDATE SPECIES AND SPECIES OF CONCERN THAT MAY OCCUR WITHIN THE EAST BIRCH CREEK STREAM RESTORATION PROJECT AREA
1-7-00-SP-405
(Updated 11-21-00)

LISTED SPECIES[1/]

Birds

Bald eagle	*Haliaeetus leucocephalus*	T

Fishes

Steelhead (Middle Columbia River)[2/]	*Oncorhynchus mykiss*	**T

PROPOSED SPECIES

None

CANDIDATE SPECIES

Washington ground squirrel	*Spermophilus washingtoni*

SPECIES OF CONCERN

Mammals

Pale western big-eared bat	*Corynorhinus (=Plecotus) townsendii pallescens*
Pacific western big-eared bat	*Corynorhinus (=Plecotus) townsendii townsendii*
Small-footed myotis (bat)	*Myotis ciliolabrum*
Long-eared myotis (bat)	*Myotis evotis*
Long-legged myotis (bat)	*Myotis volans*
Yuma myotis (bat)	*Myotis yumanensis*

Birds

Western burrowing owl	*Athene cunicularia hypugea*
Ferruginous hawk	*Buteo regalis*

Amphibians and Reptiles

Northern sagebrush lizard	*Sceloporus graciosus graciosus*

Fish

Margined sculpin	*Cottus marginatus*
Pacific lamprey	*Lampetra tridentata*
Interior redband trout	*Oncorhynchus mykiss gibbsi*

Plants

Laurence's milk-vetch	*Astragalus collinus* var. *laurentii*

Foonotes

(E) - Listed Endangered   (T) - Listed Threatened   (CH) - Critical Habitat has been designated for this species
(PE) - Proposed Endangered   (PT) - Proposed Threatened   (PCH) - Critical Habitat has been proposed for this species

Species of Concern - Taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

(CF) - Candidate: National Marine Fisheries Service designation for any species being considered by the Secretary for listing for endangered or threatened species, but not yet the subject of a proposed rule.

** *Consultation with National Marine Fisheries Service required.*

1/ *U. S. Department of Interior, Fish and Wildlife Service, December 31, 1999, Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12.*

2/ *Federal Register Vol. 64, No. 57, March 25, 1999, Final Rule - Middle Columbia and Upper Willamette River Steelhead*

APPENDIX B

MEASURES TO AVOID AND MINIMIZE ADVERSE PROJECT EFFECTS DURING CONSTRUCTION

MEASURES TO AVOID AND MINIMIZE ADVERSE PROJECT EFFECTS DURING CONSTRUCTION

These measures should be implemented to avoid and minimize potential adverse effects on riparian vegetation and aquatic resources that occur in the streams affected by the project. These measures include preparing a Quality Assurance Plan (QAP) project specific supplement that includes vegetation protection, storm water pollution prevention that includes erosion and sediment control, toxic materials control and spill response; and identifies construction period limits for threatened fish and wildlife protection. The QAP would also identify site monitoring, record-keeping requirements, equipment access route descriptions, proactive compliance strategy, and management actions for non-compliance. The construction contractor(s) would be responsible to adhere to the QAP.

Vegetation Protection

Best management practices (BMPs) will be provided in the QAP supplement to address vegetation protection during construction. If water is pumped from the creek to water replanted vegetation, the pump would have a screened intake to prevent harming juvenile fish.

Storm Water Pollution Prevention

The construction of the project is subject to storm water quality regulations established under the National Pollutant Discharge Elimination System (NPDES), described in Section 402 of the federal Clean Water Act. Non-stormwater discharges from construction sites would be avoided or minimized. The primary elements of a StormWater Pollution Prevention Plan (SWPPP) are:

- A description of site characteristics, including runoff and streamflow characteristics and soil erosion hazard, and construction procedures;
- Guidelines for proper application of erosion and sediment control BMPs, including vegetative and structural practices, which are to be delineated on a topographic map;
- Description of measures to prevent toxic materials spills; and
- Description of construction site housekeeping practices.

The SWPPP also specifies that the extent of soil and vegetation disturbance be minimized by control fencing or other means, and that the extent of soil disturbed at any given time also be minimized. The storm water pollution prevention measures will be contained in the QAP supplement, and must be retained at the construction site.

Erosion and Sediment Control Plan

Stormwater pollution prevention includes measures to minimize erosion and sediment movement into the stream. Increased sediment input to the stream has the potential to adversely affect aquatic species and their habitat. Erosion and sediment control measures would be included in the QAP supplement. Erosion and sediment control measures would require the contractor to:

- Conduct all construction work in accordance with site-specific construction plans that minimize the potential for sediment input to the stream;
- Identify with orange construction fencing all areas that require clearing, grading, revegetation, or recontouring, and minimize the extent of areas to be cleared, graded, or recontoured;
- Grade spoil sites to minimize surface erosion and apply erosion control measures as appropriate to prevent sediment from entering water courses or the stream channel, to the extent feasible;
- Mulch disturbed areas as appropriate and seed and plant with appropriate species as soon as practicable after disturbance; and
- Avoid operating equipment in flowing water by using temporary cofferdams or some other suitable diversion to divert channel flow around the channel and bank construction area.

Toxic Materials Control and Spill Response

Stormwater pollution prevention includes measures to prevent toxic material spills. Such spills have the potential to adversely affect aquatic species. A toxic materials control and spill response plan that regulates the use of hazardous materials, such as petroleum-based products (fuel and lubricants for equipment) and other potentially toxic materials associated with project construction would be prepared and implemented by the selected contractor(s). The QAP supplement would include measures to:

- Establish a spill prevention and countermeasure plan before project construction that includes strict onsite handling rules to keep construction and maintenance materials from entering the river;
- Clean up all spills immediately and notify agencies of any spills and cleanup procedures;
- Locate staging and storage areas for equipment, materials, fuels, lubricants, solvents, and other possible contaminants outside the rivers normal high-water area, and a distance of greater than 300 feet (90 m) from the creek;
- Remove vehicles from the creek's normal high-water area, and a distance of greater than 300 feet (90 m) before refueling and lubricating; and
- Avoid operating equipment in flowing water.

Construction Work Window

Construction is planned for the in-water work season from July 1 to October 31, 2001 to minimize impacts on aquatic species. Removal of this vegetation would be limited to after July 1 to reduce impacts to nesting birds. Actual vegetative planting would be done in the fall, winter, or spring of the construction year, when plants are dormant. ODFW would be overseeing the planting operation, if performed outside the in-water work window, to ensure minimal impact to threatened species.

APPENDIX C

BIOLOGICAL ASSESSMENT (USFWS)

EBIRCHBA-1-2/PM-PD-P/HELLER/N DRIVE

December 4, 2000

Planning, Programs, and Project (1165-2-26a)
Management Division

Mr. Kemper McMaster, Supervisor
Attention Diana Hwang
U.S. Fish and Wildlife Service
Oregon State Office Ecological Service
2600 SE 98th Avenue, Suite 100
Portland, Oregon 97266

Dear Mr. McMaster:

Pursuant to Section 7(c) of the Endangered Species Act, we request your review and informal consultation on the action described in the biological assessment below and concurrence on our *"May Affect But Is Not Likely To Adversely Affect"* determination for bald eagles for the proposed project. A separate consultation is being performed with the National Marine Fisheries Service for steelhead trout (*Oncorhynchus mykiss*). Project construction work is scheduled to begin in July of 2001.

1. **Project**:

   East Birch Creek
   Umatilla County, Oregon
   Section 206 Environmental Restoration
   Oregon--Second Congressional District

2. **Location**:

   The proposed project reach of East Birch Creek is located on the Briogotti property which fronts East Birch Creek Road in Umatilla County, Oregon approximately 8 miles (12.9 km.) south of the town of Pilot Rock. The project work would be located in T 2 N R 32 E, Sec 12 (Pilot Rock) and T 2 N, R 33 E, Sec 7 (Sevenmile Creek). The vicinity and project location maps are shown on Figures 2 & 3 respectively.

3. **Description of Proposed Project:**

   a. Background.

East Birch Creek is a fork of Birch Creek, a headwater tributary of the Umatilla River, which empties into the Columbia River. The proposed project area is an approximately 1.2 mile (1.9 km.) reach located entirely on the Briogotti property, which lies on both sides of East Birch Creek between river mile 8.0 and river mile 9.5 (river km 12.9 and river km. 15.2). It is located 8 miles (12.9 km.) south of the town of Pilot Rock on the East Birch Creek Road, in Umatilla County, Oregon (Township 2 south, Range 32 east, Sections 11 and 12). The town of Pendleton is located approximately 18 miles (29 km.) to the north of the proposed project site.

This site is within the Columbia Basin physiographic province that covers an extensive area south of the Columbia River between the Cascade and the Blue Mountains (Franklin and Dyrness, 1973). The region is generally arid to semi-arid with precipitation averaging about 12 inches (30.5 cm) annually, and temperature averaging about 52^0 F. (11.1 C.).

Historically, this reach was an important spawning and rearing area for summer run steelhead trout. The Umatilla stock of summer steelhead was designated part of the Mid-Columbia Evolutionarily Significant Unit (ESU) by National Marine Fisheries Service (NMFS) when it listed that stock as "Threatened" under the Endangered Species Act.

The race of summer steelhead that occurs in the East Birch Creek drainage enters the Columbia River on its spawning in-migration between May and October. Spawning occurs in mid-elevation tributaries, including East Birch Creek, in the spring following the adult in-migration. The peak in spawning activity is during the January through May time period. Survival from egg through emergence is critical and is most affected by waste removal and oxygen supply to the eggs/embryos/sac fry, which requires reasonably clean gravel allowing adequate intergravel flow. Upon emergence, which occurs by July, fry utilize instream cover such as cobble interstitial spaces to avoid predators. As they increase in size they gradually move into different habitat types and utilize a variety of food items and cover types. During rearing, juveniles require large, deep, low velocity pools with abundant cover. The availability of quality pool habitat is often a limiting factor for this life stage. Summer steelhead juveniles usually rear for one year in natal streams and begin their seaward migration downstream, as yearling, with the first spring freshets.

Land use practices and channel modifications in the project area have resulted in physical changes that have degraded habitat quality to a considerable extent. Habitat degradation has resulted primarily from:

A. removal of riparian vegetation,
B. disruption of natural geomorphic processes,
C. alteration of stream flows,
D. increased sediment input.

The following is a brief discussion of each of these broad impacts:

A. Removal of riparian vegetation -- Prior to the advent of modern land management practices, undisturbed riparian zones existed along most streams in the Umatilla River basin. The value of these riparian zones cannot be overstated. Riverine and terrestrial ecosystems are linked, being separated only by a riparian zone. Because of the close connection between the stream and its drainage basin, land uses and management practices such as grazing, timber harvest, or road and bridge construction have profound effects on the stream ecosystem. Riparian areas serve as a buffer and very effectively moderate the negative effects of land use practices on the aquatic ecosystem. Riparian vegetation provides logs and branches that influence channel morphology, retain organic matter, and provide essential cover for salmonids. As trees mature and fall into or across streams their large mass helps to control the slope and stability of the channel and they help create high-quality pools and riffles. Natural recruitment of large woody material from the riparian zone is obviously reduced by the reductions in riparian woody vegetation. This situation is aggravated by intentional removal of logs and root wads, which are perceived by landowners and local residents as impediments to flow that cause flooding. Indeed trees in streams are important and often essential for maintaining stream stability (Platts 1991). Riparian vegetation root systems stabilize stream banks and maintain undercut banks that offer prime salmonid habitat.

Large woody debris, along with water depth, water turbulence, large-particle substrates, undercut banks, overhanging riparian vegetation, and aquatic vegetation provides cover for salmonids. Fish abundance in streams has been correlated with the abundance and quality of cover. When large woody debris is removed from a stream the surface area, number, and pool size decrease and the water velocity increases. Brush, like trees, builds stability in vegetative mats and sod banks that reduce surface erosion and mass wasting of streambanks. In some situations, the root systems of native grasses and other plants trap sediment to help rebuild damaged banks. During flood events, water moving at high velocity transports large amounts of sediment within streams. As it rises up and then over its banks, it flattens flexible streambank vegetation such as willows and grasses into mats that hug the stream edge causing sediments to settle out and become part of the bank. At present only a fraction of the riparian trees providing shade to East Birch Creek remains. Riparian vegetation forms a protective canopy that helps maintain cool stream temperatures in summer. The effect of the lack of shading is elevated temperatures throughout the basin that appears to be a critical limiting factor in terms of fish habitat quality.

Although no historic quantitative stream physical habitat data exists for East Birch Creek it is highly probable that it has been dramatically altered as a result of the destruction of its riparian zone. Resultant fish habitat impacts are generally summarized by:

- less instream cover associated with large organic debris, underbank cutting,
- overhanging vegetation, and surface turbulence,
- fewer slack-water pockets/pools associated with large organic debris,
- reduced instream depth/velocity/substrate diversity,
- reduced stream productivity resulting from reduced energy input from detritus,
- reduced intergravel flow (=reduced stream productivity and fish reproductive success) resulting from increased sedimentation,
- higher water temperature resulting from reduced shading.

B. Disruption of natural geomorphic processes -- Natural channel dynamics in East Birch Creek as well as most other stream channels in the country have been "controlled" to some extent to accommodate land uses introduced by European settlers. Measures are commonly taken to keep the channel from meandering or otherwise adjusting laterally and to prevent overbank flooding. These measures can include construction of dikes and levees, channelization, and riprapping which are all evident in the proposed project reach. Interference in natural geomorphic processes disrupts channel patterns which are self-developed and self-maintained. Stream channel patterns, morphology and other features are determined by the laws of physics which are directly tied to fundamental variables including width, depth, velocity, discharge, slope, channel roughness, sediment load, and sediment size (Leopold et al 1964). A change in any one of these variables results in commensurate adjustments that are manifest in the form of lateral channel migration and attendant higher than normal rates of bank erosion, abnormal channel degrading and aggrading, channel encroachment on riparian vegetation, increased flooding with lower magnitude base flows, increased sedimentation, and substrate material size shifts.

The most obvious differences in the stream physical habitat are probably: a) the channel is less sinuous, b) the width/depth ratio is higher, c) there is less pool habitat and more run habitat, d) mean sediment particle size is smaller with a substantially higher proportion of sand and silt and associated cobble embeddedness.

C. Alteration of stream flows -- Diversion of stream flow for irrigation purposes has resulted in reduced flow in the East Birch Creek during the irrigation season, which is generally the period late June through October. Dewatering is most evident when the wetted area of the channel is reduced during the irrigation season.

The most obvious effects of June-October stream flow reductions on fish habitat are as follows: a) reduced depth, b) elevated temperature, c) concentration of total dissolved solids (e.g. salts, nutrients, etc).

D. Increased sediment input -- Stream systems that are geomorphicly balanced have a sinuosity, gradient, and channel geometry that allow them to transport the quantity of sediment that is received as a result of erosion of the drainage area under a natural flow pattern. If, for any reason, the sediment transport capability is diminished, sediment would accumulate in the channel, first becoming obvious as an inside meander point bar.

The most evident effects of sedimentation on fish habitat in East Birch Creek are as follows:

- a reduced amount of pool habitat,
- high degree of cobble imbeddedness resulting in lower stream productivity and lower salmonid reproductive success,
- increased bank erosion and encroachment on riparian vegetation due to forced lateral channel adjustment.

In summary, conditions in the proposed restoration reach are significantly degraded as a result of the impacts described above. The alignment of the channel has been grossly altered due to efforts to develop irrigation and to prevent flooding. Excessive grazing and removal of brush and trees (e.g. willows, cottonwood) from the riparian zone has reduced native woody species to about 25% of their original coverage and midday shade to about 10% of the wetted channel. The change in alignment along with the loss of stabilizing riparian vegetation has caused instability in the channel with roughly 70% of banks showing evidence of active erosion. The channel that has developed under these conditions lacks the distribution of riffle and pool habitat, which is needed for salmonid rearing (i.e. 50% of each). The existing Birch Creek channel is largely run (i.e. glide) habitat with a small amount of riffle habitat and only 5-10 m^2 of high quality pool habitat in the proposed restoration reach. The changes in alignment and geomorphic character (i.e. increased width:depth ratio) along with irrigation withdrawals have resulted in sections of the channel being without adequate surface flow in some sections during the irrigation season. The channel is devoid of large wood (<50 pieces), and there is little potential for future recruitment from existing riparian vegetation. The homogeneous nature of the channel results in little instream diversity and little cover (<5%).

b. Ecosystem Restoration.

The use of bioengineering techniques would be utilized to the extent practicable to restore salmonid habitat quality, reduce unnatural bank erosion, restore natural channel function and associated aquatic and riparian biological processes in East Birch Creek. This approach would involve development of plans for erosion resistant stream restoration treatments using primarily natural fluvial processes and natural materials. Specific principles that would be utilized are summarized as follows:

- Develop designs that take advantage of the natural hydrologic and sediment movement characteristics of the East Birch Creek drainage.

- Develop designs that enhance and ultimately capitalize on the stabilizing effect of healthy native riparian vegetation.

- Reestablish natural channel geometry and balance energy and sediment transport to the point that natural channel adjustments are gradual and more acceptable to riparian landowners.

- Use natural materials such as large wood and rock for channel and bank stabilization in high-energy areas.

c. Riparian Habitat Restoration.

A healthy, viable riparian zone is essential for this aquatic ecosystem restoration project. Riparian vegetation not only directly contributes to stream biological productivity and fish habitat quality but also provides a buffer between the terrestrial system and the aquatic ecosystem. Effective restoration of riparian vegetation is pivotal to achieving restoration benefits and ensuring long term stability of the reach. Restoration of riparian function is one of the primary goals of this project.

d. Aquatic Habitat Restoration.

The other primary goal of the proposed environmental restoration work in East Birch Creek is to restore geomorphic function of the channel which would generally mean a narrower, deeper, more meandering channel with more stable, vegetated banks and more diverse instream habitat. This would result in a self-maintaining system that meets specific habitat needs of ESA listed summer steelhead. Summer steelhead use the proposed project reach for spawning and rearing, therefore, our restoration plan would be based largely on habitat requirements for these lifestages.

e. Method of Determining Benefits Resulting from Environmental Restoration Work.

The primary benefits of this environmental restoration work would be derived from improvements to East Birch Creek aquatic and riparian habitat. Habitat improvements were lumped into six general benefit categories.
Benefits were initially expressed in conventional units such as area in square meters and then converted to habitat units (HU) which take into account limiting factors and are based on best professional judgement.

f. Rationale for Formulating Final Recommendations.

General criteria for most of the essential physical habitat attributes for steelhead spawning and rearing are available in the form of the U.S. Fish and Wildlife Service's Habitat Suitability Index (HSI) models (USFWS, 1984). These criteria would be used as a general guide in evaluation of options available in development of a final restoration plan.

Habitat variables that would be directly influenced by the proposed restoration work include:

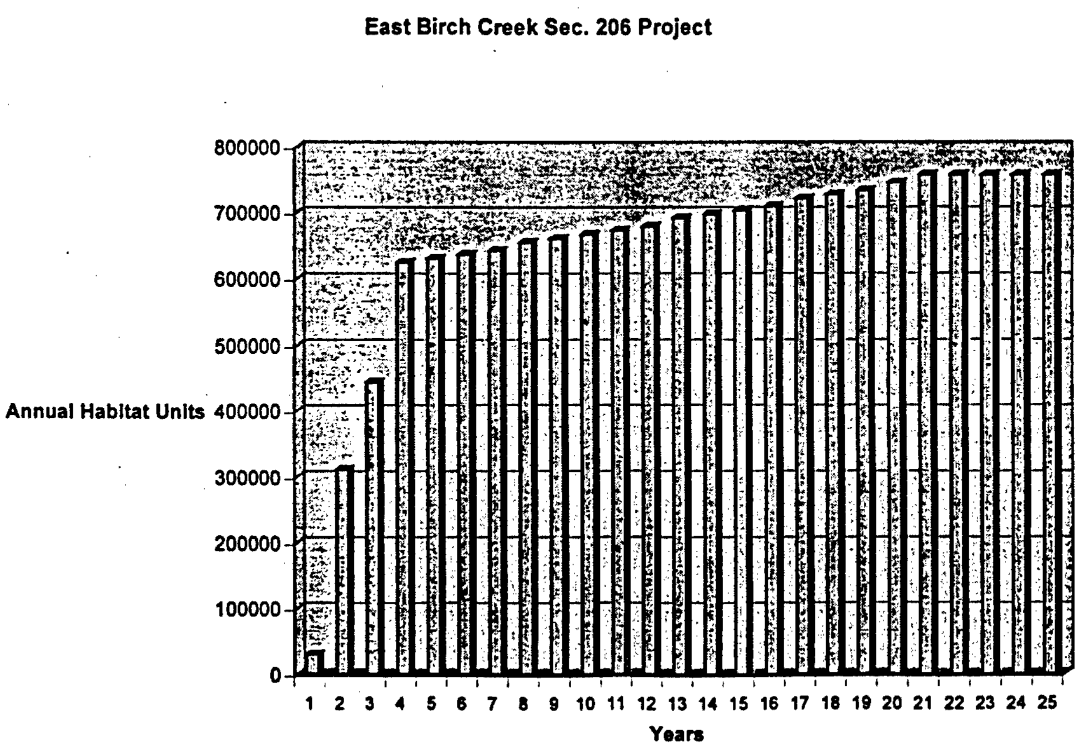
- average thalweg depth
- amount of instream cover
- number of pools
- quality of pools
- substrate particle size distribution
- % riffle fines
- average maximum temperature
- average water velocity
- average gravel size in spawning areas
- % streamside vegetation (as a source of allocthonous material)
- % streamside vegetation (and rock as erosion control)
- amount of midday shade

To refine the list of specific measures and formulate a final restoration plan for the East Birch Creek restoration reach the Corps would rely heavily on the bioengineering approach and design to restore important ecosystem function to the extent this can be done without compromising flood damage to private property. This involves collecting essential geomorphic, hydrologic and hydraulic metric data for the study reach in order to understand the fluvial processes of the channel. An important element in this approach is to identify an undisturbed reference reach that has similar hydrology and geomorphology to the proposed treatment reach or, where available, use historic information to develop a template of historic channel morphometric and riparian conditions in the stream corridor. This template would form the basis for the restoration goals of the project conceptual design.

g. Project Life

The expected life of the East Birch Creek aquatic ecosystem restoration project is 25 years. This life expectancy is a function of the deterioration rate of large wood (i.e. logs and root wads) which is a major component of structural measures intended to stabilize the channel until riparian vegetation becomes reestablished. Within this period the more natural channel geometry and the structural channel stabilization measures constructed by the project plus aggressive revegetation and fencing would have created optimal conditions for the recovery of riparian vegetation. In the East Birch Creek drainage, it would require approximately 10-20 years for woody riparian plants such as cottonwood, willows, and red osier dogwood to reach sufficient maturity for the riparian zone to become "functional" in terms of channel stability. The planned failure of channel stabilization structures would occur gradually as wood used in structure rots away. As this proceeds the dense riparian root mass would function to maintain the stream in a state of dynamic equilibrium where the channel is able to move laterally at a rate in balance with the geology of the valley and the sediment supply from the watershed.

Figure 1. Annual habitat units created by the East Birch Creek 206 Project



The result is sustainable restoration of aquatic habitats that maintain characteristically favorable dimension, pattern, and profile and do not require significant long-term maintenance.

It is anticipated that the East Birch Creek Project would have a rapid and profound effect on spawning and rearing habitat for ESA listed summer steelhead trout. Although it is difficult to relate actual summer steelhead production to habitat units as defined in this study, it is assumed that changes in key attributes judged to be limiting factors for steelhead are an appropriate predictor of production. Figure 1 shows the change in habitat units, which are an index of habitat quality, expected to occur in the 25 years following construction of the project. The existing, pre-project condition was determined to have an aggregate value of 30,500 habitat units, which relates to poor habitat conditions and poor production rates for summer steelhead. By year three, assuming normal runoff cycles, the aggregate habitat value would be up to 625,180 habitat units which indicates excellent habitat conditions and relates to much higher production rates for naturally spawned summer steelhead. After year three the increase in habitat quality is more gradual through year 21 when the quantity of habitat units levels off through year 25. This amounts to a 20-fold increase in the ability of habitat to meet the life requirements of a species that is listed as Threatened under the ESA. In the 25-year life of the East Birch Creek Project, 648 thousand average annual habitat units will have been created.

h. Preliminary Recommendations.

A plan has been developed based on conditions observed during field trips to the proposed restoration site and work completed by ODFW in an adjacent reach of East Birch Creek. Figures provided in the enclosure describe the current design plans. The preliminary recommended plan involves restoration of natural channel function, to the extent possible, using natural fluvial processes and natural materials. Work to construct the structures would be performed during late summer when irrigation withdrawals combined with low stream inflows create the lowest stream flows through the project area. This is also creates the highest water temperatures, which would discourage fish movement through the system. This would be a time when construction activity in the active stream channel would have the least impact on the aquatic environment. Recommended structural restoration measures for the reach are summarized below.

1 rock entrance control structure (at project entrance)
15-30 J-hooks with chute cutoffs
10-26 rock cross vanes
8-10 rock vanes
6-12 grade control structures
300-600 ft of bank lay-back
40-60 ft of rock sill bank protection
4000 ft of bank stabilization
2700-3200 ft of new channel (channel realignment)
2100-2600 ft of existing channel reshaping

100-500 feet of stabilization of toe
600 feet of footer boulders
3-5 fill areas
3-6 debris removal areas
2-5 gravel bar removal areas
10-50 rootwads
200-600 feet of armoring with continuous drop structures
(for watershed side drainage entrance)
1-2 ponds (borrow areas)
1 excess material spoil area

Rock cross-vane weirs would span the width of the channel. They would be constructed of boulders placed to form a modified upstream "V." This is best described as an upstream "V" minus the apex that is replaced with a straight sill situated perpendicular to the thalweg. The limbs of this modified "V" would be tied into the bank to prevent end cutting, and footer rocks would be buried to prevent undercutting. The configuration of the structure would act to direct the entire range of stream flows away from the bank and reduce near-bank erosion zones and velocities. The reduced velocity zones would become a depositional area for finer bedload and suspended sediment materials, creating a suitable substrate and conditions for vegetative recovery. This structure would stabilize the channel by dissipating energy, controlling gradient, maintaining sediment transport, preventing further downcutting, directing erosive flows away from the bank, and training flows into a defined thalweg. This work would be performed using a backhoe to move and place rocks and dig out the bank to key the ends. Work in the active stream channel would cause some pulses of sediment releases. This impact should be short-lived during the course of the construction. The work would be performed when little or no water is in the stream channel so the sediment releases would be relatively minor. Work in the dry channel would not impact the adjacent waterway.

The structure would benefit fishery habitat by scouring a large, high quality pool in the zone where overflow converges, providing channel diversity, providing cover, capturing fine sediment, and providing a stable area at the shoreline for riparian vegetation to grow. The height of the structure above the channel bed would determine the depth and size of the pool it creates. A more defined thalweg would also result in deeper surface flow during the dry part of the year.

Laying back the banks is necessary to reduce erosive energy at high flows and prevent further sediment loading from bank erosion. This action would be taken in areas where downcutting has resulted in high cutbanks that are actively eroding. The intent from a hydraulic perspective is to create a bigger channel cross section that would reduce erosive pressure on the bottom during flood events. The bank would be laid back to a stable slope, which would allow native vegetation to become established. A backhoe and/or bulldozer would perform this work where appropriate. In the active channel, this work would cause short-term pulses of sediments. The work would be performed when little or no water is in the stream channel so the sediment releases would be relatively minor. Work in the dry channel would not impact the adjacent waterway.

This would benefit fishery habitat by reducing sediment loading and promoting riparian vegetation that would provide shade, large wood recruitment, and in stream cover (*e.g.*, underbank and overhanging vegetation).

Bank stabilization would be constructed of large rocks, rootwads, and logs anchored into the bank such that they provide protection from bank erosion in unstable sections of the reach. They are generally placed where banks are actively eroding and have a stabilizing effect as a result of effective energy dissipation and deflection of high velocity flows away from the bank. A backhoe and/or bulldozer would perform this work where appropriate. In the active channel, this work would cause short-term pulses of sediments. The work would be performed when little or no water is in the stream channel so the sediment releases would be relatively minor. Work in the dry channel would not impact the adjacent waterway.

This work would benefit fishery habitat by scouring a high quality pool around the end of the structure; providing dense cover, large woody debris, and channel complexity; reducing sediment; and providing a stable area along the bank for riparian vegetation to grow.

J-hooks would consist of rock boulders or combination of rock boulders and rootwads. The J-hook reduces the shear stress on the outside bank of a bend in the stream. The construction method is similar to the rock cross-vane, with similar aquatic habitat benefit.

Channel reshaping consists of reshaping the thalweg and banks in portions of the stream where the new alignment follows the alignment of the existing channel. This includes construction of pools at the edge of the adjacent bank on the outside edge of bends, shaping of point bars to form the bankfull channel and flood prone area. Additionally, this would shape the pool, glide, riffle, run reaches. The benefits to aquatic habitat result from a more hydraulically stable channel and also from the direct forming of habitat areas.

New channel construction consists of forming the new meanders that align with the existing channel to create a natural and stable geometry. The location of the meander channel is designed to minimize the impact on the existing vegetation. A backhoe and/or bulldozer would be used to create the channels. Some tree and brush removal may be needed to create the meander channel. The preparation work would be performed in the dry channel, so would not impact the active stream channel. The existing stream channel would then be diverted into the new stream channel by obstructing the old channel, just downstream of the new channel connection. The initial watering of the new channel would cause a pulse of sediment release. There also is a chance that fish in the existing stream system could be trapped in pools in the old channel, when the stream is dewatered. The ODFW would conduct salvage operations to capture trapped fish and move them downstream of the project area.

Channel realignment would have a beneficial effect on fishery habitat by creating a stable meandering channel with an even distribution of pools and riffles, clean gravel deposits, and bordered by a zone of riparian vegetation.

Along with the structural measures listed above would be fencing of the entire reach, installation of coir erosion control fabric, reseeding of disturbed areas with a mix of native graminoids, and extensive revegetation with native woody vegetation. The fabric would reduce sediment releases to the stream when higher flows return to the system. Fencing would protect new plantings and structures from livestock.

Only native woody plant species would be used in the revegetation for this project. Plant species include willow (*Salix spp.*), red osier dogwood (*Cornus stolonifera*), cottonwood (*Populus spp.*), and alder (*Alnus spp.*). The exact composition of the trees used in the project would be dependent upon the availability of these species. Actual vegetative planting would be done in the fall of the construction year (*i.e.,* when these plants are dormant). Follow-up measures would be taken to optimize survival of newly planted vegetation. Plantings would probably be done by hand. This activity should have little impacts except the presence of a group of workers during the planting operation.

5. Schedule:

Action	Date
Letter of Intent Received	April 9, 1999
Submit PRP to Division Office	Feb 2000
NWD approval of PRP/receipt of Work Allows	Mar 2000
Conceptual Plan Design	Mar-Dec 2000
Plans and Specifications	Jan-Feb 2001
Draft EA complete	Jan 2001
EA complete	Mar 2001
Advertise & Award	Apr-Jun 2001
Construction (in-stream)	Jul 1, 2001-Oct 31, 2001
Project Completion (vegetation planting)	May 1, 2002

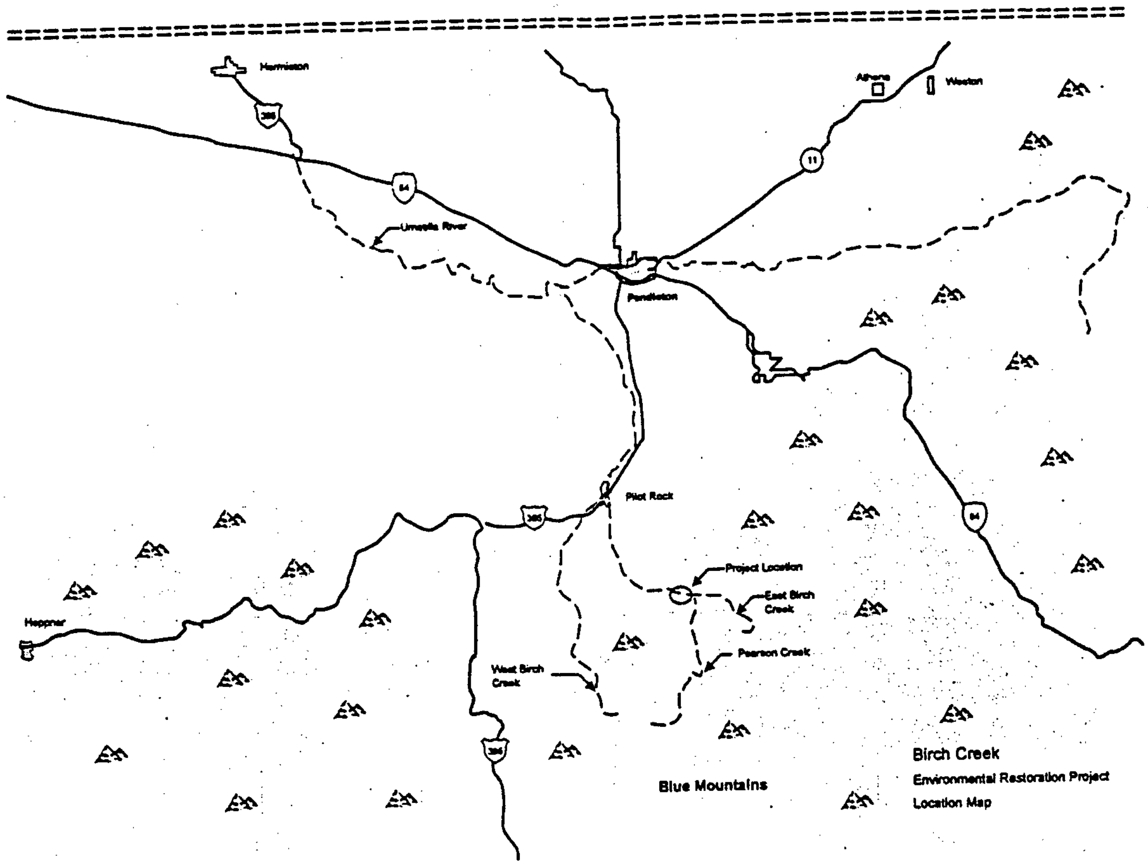


Figure 2 - East Birch Creek 206 Project Vicinity Map.

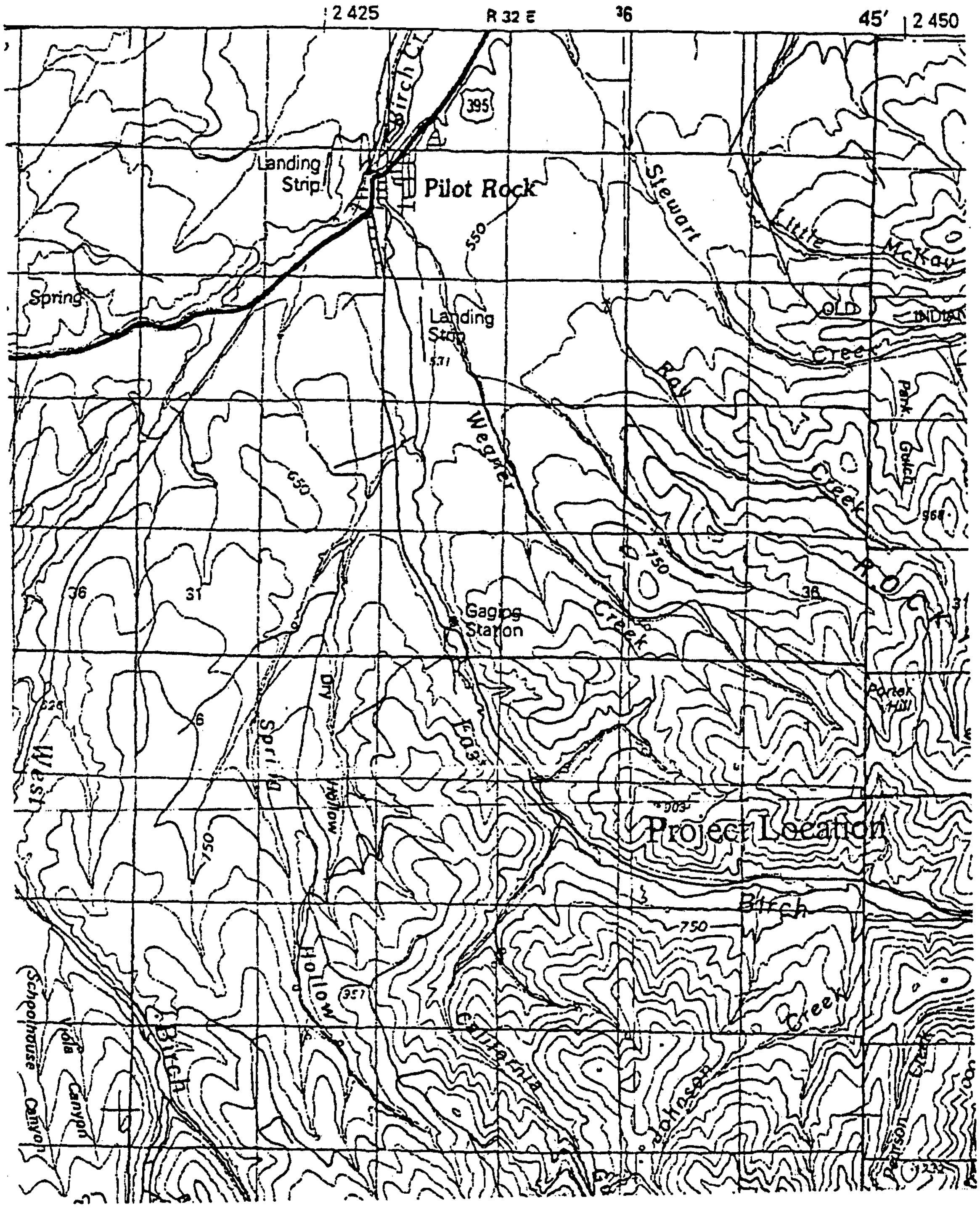


Figure 2- East Birch Creek 206 Project Location.

Listed Species and Effects:

The following species list was obtained from the U.S. Fish and Wildlife letter dated June 7, 2000, FWS Reference 1-7-00-SP-405. The accuracy of the list was informally verified on November 21, 2000, by email from Cindy Bright of the USF&WS Portland office. The only change to the list was to upgrade the Washington Ground Squirrel from Species of Concern status to Candidate status, and there were no changes to the Listed species. The following discussion is based on the above letter, as verified, and the references at the end of the document.

Federal Threatened and Endangered Species Listing for Area:

ENDANGERED

None

THREATENED

Bald eagle *(Haliaeetus leucocephalus)*

PROPOSED

None

CANDIDATE

Washington Ground Squirrel *(Spermophilus washingtoni)*

Threatened and Endangered Species:

Work impacts can be divided into two areas. The first is the impact of the construction activity itself. In order to minimize environmental impacts due to construction activity, the project would abide by conditions 1 through 15 required for a Department of the Army Regional General Permit for Stream Restoration, even though, as a Corps of Engineers project, it is not required to obtain such a permit. The second is the presence of the new structure, and the subsequent impact on the wildlife. Below is a brief list of the major actions and the timing of these actions:

Dry Channel Work - Summer/Fall 2001
Placement of In-stream Structures - Summer/Fall 2001
Divert Stream from Old Channel to New Channel - Summer/Fall 2001

Put Down Erosion Control Fabric - Summer/Fall 2001
Plant Grasses - Fall 2001
Fence Shoreline - Fall/Winter 2001
Plant Trees and Shrubs - Fall 2001/Spring 2002

Bald Eagle:

The bald eagle is a bird of aquatic ecosystems. It frequents estuaries, large lakes, reservoirs, major rivers, and some seacoast habitats. However, such areas must have an adequate food base, perching areas, and nesting sites to support bald eagles. In winter, bald eagles often congregate at specific wintering sites that are generally close to open water and that offer good perch trees and night roosts. Bald eagle habitats encompass both public and private lands.

In the area of East Birch Creek bald eagles are only a winter visitor. There are no nests reported in Umatilla County (ODFW, 2000). There is not much of a prey base in this area so winter use is considered low density (ODFW 2000). Bald eagles are sometimes seen scavenging on deer killed on the roads. There are no waterfowl or fish congregation areas to attract eagles for long periods of time or in large numbers.

The East Birch Creek stream restoration is a continuing effort by ODFW to restore natural stream function. Stretches of East Birch Creek have already been restored downstream of the potential work site with good results.

The existing stream channel has native cottonwood and shrubs growing near the stream channel in isolated clumps. The work to open up the old stream channel in this area may impact some of the existing trees and shrubs. Open areas would be planted with native poplars, willow, dogwood and alder. Though some mature native vegetation would be removed during project construction, this should be compensated by the restoration effort. The restoration effort would also establish vegetation in the open areas between clumps of cottonwood and brush. This would eventually establish a more continuous riparian buffer along this stretch.

Winter eagle use of this area is very sporadic. If work were to continue into the traditional winter use period (November 15th to March 15th), eagles would probably avoid the work area. Care would be taken to avoid harassing eagles that may be present in the work area. The ODFW personnel would be overseeing the construction activity, and would therefore be onsite to monitor wildlife activity in the area. Mature tree removal would be avoided in all areas possible to facilitate the completion of the project.

Since the project work itself may impact eagles through construction activity or the removal of marginal perching habit, this project "*May affect but is not likely to adversely affect*" bald eagle populations and their habitat. Over the long term, the effect of the restoration work would improve bald eagle habitat and improve their prey base. The project would establish a more continuous riparian corridor along the creek. This would provide perching and possibly nesting habitat in the future. The riparian buffer with changes in stream dynamics would also improve conditions (shading, riffle-pool habitat) for trout and potentially salmon species to utilize the stream.

Conclusion:

Based on the above lack of anticipated negative impacts, it is determined that the above described actions for bald eagle use of the area or their habitat is *"May Affect But Is Not Likely To Adversely Affect"*.

This biological assessment was prepared by Mr. Scott Ackerman, USACE biologist. If you have any questions or desire additional information about the proposed action, please contact Mr. Stan Heller at 509-527-7258.

HELLER/PM-PD-P/cac

Sincerely,

CHRISTIANSON/PM
PM-PD-P FILES

Carl J. Christianson
Project Manager
E. Birch Creek Aquatic Ecosystem
Restoration Project

Enclosure

Copy Furnished:
CENWW-PM-PD-E (Ackerman)

References:

Franklin, J.F. and C.T. Dyrness. 1973. Natural vegetation of Oregon and Washington. U.S. Dept of Agriculture, Forest Service, Pacific Northwest Forest and Range. Exp. Sta. General Technical Report. PNW-S. 417 pp.

Leopold, L.B., M.G. Wolman, and J.P. Miller. 1964. Fluvial processes in geomorphology. Freeman, San Francisco, CA: 522 pp.

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Raleigh, R.F., T. Hickman, R.C. Solomon and P.C. Nelson. 1984. Habitat suitability information: rainbow trout. U.S. Fish and Wildlife Service, FWS/OBS-82/10.60. 64 pp.

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APPENDIX D

BIOLOGICAL ASSESSMENT (NMFS)

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA, WASHINGTON 99362-1876

Reply To
Attention Of:

February 16, 2001

Planning, Programs, and Project
Management Division

Subject: East Birch Creek – Stream Restoration - Biological Assessment – Formal Consultation Request

Mr. Michael Tehan
525 NE. Oregon Street
Suite 500
Portland, Oregon 97232-2778

Dear Mr. Tehan:

Pursuant to Section 7(c) of the Endangered Species Act, we request your review and formal consultation on the proposed stream restoration project on East Birch Creek near Pilot Rock, Oregon. We have determined that our proposed project *"may affect and is likely to adversely affect"* Snake River Steelhead. However, the action will have long-term beneficial effects on listed fish species and species of concern.

Enclosed is our biological assessment of the proposed project. We have also enclosed extra copies of the plan drawing for your files. If you need more copies or would like additional information about the proposed action, please contact Mr. Ben Tice at 509-527-7267. We would greatly appreciate your timely response on this project so that we can initiate construction early this summer. We need your guidance and biological opinion before we can advertise to prospective bidders.

Sincerely,

Carl J. Christianson
Project Manager

Enclosures

BIOLOGICAL ASSESSMENT

EAST BIRCH CREEK STREAM RESTORATION PROJECT

Section 206

February 16, 2001

LOCATION AND INTRODUCTION

This Biological Assessment considers potential impacts on species listed under the Endangered Species Act from a proposed stream restoration project on East Birch Creek in northeast Oregon. The proposed project reach is located on the Brogoitti property that fronts East Birch Creek Road in Umatilla County, Oregon approximately 8 miles (12.9 km.) southeast of the town of Pilot Rock. East Birch Creek is a fork of Birch Creek, a headwater tributary of the Umatilla River, which empties into the Columbia River. The proposed project area is approximately 1.2 miles (1.9 km) long. The project work would be located in T 2 South, R 32 East, Sec 12 (Pilot Rock) and T 2 South, R 33 East, Sec 7 (Sevenmile Creek). The proposed project would include work and oversight by the Corps of Engineers (Corps) and the Oregon Department of Fish and Wildlife (ODFW). Work is scheduled to begin in the summer of 2001. A drawing of the project area is included.

Several alternatives to repair/restore the creek habitat were evaluated and the preferred alternative was selected based on function, cost, and impacts to the environment. Adverse impacts to the environment by the preferred alternative are expected to be minor. Impacts to species listed under the Endangered Species Act are discussed in this assessment. A similar project was completed in recent years just down stream. The proposed project would significantly assist in the restoration effort for the river, serving as another incremental improvement. Having two contiguous restoration projects increases the biological benefits in a cumulative fashion. It is hoped that many similar efforts will be conducted in the future as local landowners monitor and assess the results of these projects, adding to the cumulative restoration effort.

The proposed project is to improve the condition of fish and wildlife habitat throughout the reach. Land use practices and channel modifications have resulted in physical changes that have degraded habitat quality to a considerable extent. Habitat degradation has resulted primarily from the following actions.

A. removal or suppression of riparian vegetation,
B. disruption of natural geomorphic processes,
C. alteration of stream flows, and
D. increased sediment input.

Following is a brief discussion of each of these broad impacts.

A. Removal of riparian vegetation -- Prior to the advent of modern land management practices, undisturbed riparian zones existed along most streams in the Umatilla River basin. The value of these riparian zones cannot be overstated. Riverine and terrestrial ecosystems are linked, separated only by a riparian zone. Because of the close connection between the stream and its drainage basin, land uses and management practices such as grazing, timber harvest, or road and bridge construction have profound effects on the stream ecosystem. Riparian areas serve as a buffer and can very effectively moderate the negative effects of land use practices on the aquatic ecosystem. Riparian vegetation provides logs and branches that influence channel morphology, retain organic matter, and provide essential cover for salmonids. As trees mature and fall into or across streams, their large mass helps to control the slope and stability of the channel and they help create high quality pools and riffles. Natural recruitment of large woody material from the riparian zone is obviously reduced by the reductions in riparian woody vegetation. This situation is aggravated by intentional removal of logs and rootwads, which are sometimes perceived as impediments to flow that cause flooding. Riparian vegetation root systems stabilize stream banks and maintain undercut banks that offer prime salmonid habitat.

Large woody debris, along with water depth, water turbulence, large particle substrates, undercut banks, overhanging riparian vegetation, and aquatic vegetation provide cover for salmonids. Fish abundance in streams has been correlated with the abundance and quality of cover. When large woody debris is removed from a stream, the surface area, number, and pool size decrease and the water velocity increases. Brush, like trees, builds stability in vegetative mats and sod banks that reduce surface erosion and mass wasting of streambanks. In some situations, the root systems of native grasses and other plants trap sediment to help rebuild damaged banks. During flood events, water moving at high velocity transports large amounts of sediment within streams. As it rises up and over its banks, it flattens flexible streambank vegetation such as willows and grasses into mats that hug the stream edge causing sediments to settle out and become part of the bank. Presently only a fraction of the riparian trees providing shade to East Birch Creek remain. Riparian vegetation forms a protective canopy that helps maintain cool stream temperatures in summer. The effect of the lack of shading is elevated temperatures throughout the basin that limits fish habitat quality.

Although no historic quantitative stream physical habitat data exists for East Birch Creek, it is highly probable that the habitat has been dramatically altered as a result of the destruction of the riparian zone. Resultant fish habitat impacts are generally summarized by:

- less in-stream cover associated with large organic debris, underbank cutting, overhanging vegetation, and surface turbulence,
- fewer slack-water pockets/pools associated with large organic debris,
- reduced in-stream depth, velocity, and substrate diversity,
- reduced energy input from detritus,
- reduced intergravel flow (=reduced stream productivity and fish reproductive success) resulting from increased sedimentation,
- higher water temperature resulting from reduced shading.

B. Disruption of natural geomorphic processes -- Natural channel dynamics in East Birch Creek as well as most other stream channels in the country have been "controlled" to some extent to accommodate land uses. Measures are commonly taken to keep the channel from meandering or otherwise adjusting laterally and to prevent overbank flooding. These measures can include construction of dikes and levees, channelization, and riprapping which are all evident in the proposed project reach. Interference in natural geomorphic processes disrupts channel patterns which are self-developed and self-maintained. Stream channel pattern, morphology, and other features are determined by the laws of physics which are directly tied to fundamental variables including width, depth, velocity, discharge, slope, channel roughness, sediment load, and sediment size (Leopold *et. al.* 1964). A change in any one of these variables results in commensurate adjustments that are manifest in the form of lateral channel migration and higher than normal rates of bank erosion, abnormal patterns of channel degrading and aggrading, channel encroachment on riparian vegetation, increased flooding with lower magnitude base flows, increased sedimentation, and substrate material size shifts. The most obvious differences in the stream physical habitat are: a) the channel is less sinuous, b) the width/depth ratio is higher, c) there is less pool habitat and more run habitat, d) mean sediment particle size is smaller with a substantially higher proportion of sand and silt and associated cobble embeddedness.

C. Alteration of stream flows -- Diversion of stream flow for irrigation purposes has resulted in reduced flow in East Birch Creek during the irrigation season, which is generally the period May through October. Dewatering is most evident when the wetted area of the channel is reduced during the irrigation season. The most obvious effects of May-October stream flow reductions on fish habitat are as follows. a) reduced volume of habitat, b) reduced depth, c) elevated temperature, and d) concentration of total dissolved solids (*e.g.* salts, nutrients, etc).

D. Increased sediment input -- Stream systems that are balanced have a sinuosity, gradient, and channel geometry that allow them to transport the quantity of sediment that is received as a result of erosion under a natural flow pattern. If, for any reason, the sediment transport capability is diminished, sediment would accumulate in the channel. The most evident effects of sedimentation on fish habitat in East Birch Creek are as follows:

- a reduced amount of pool habitat,
- a high degree of cobble imbeddedness resulting in lower stream productivity and lower salmonid reproductive success,
- increased bank erosion and encroachment on riparian vegetation due to forced lateral channel adjustment.

In summary, conditions in the proposed restoration reach are significantly degraded as a result of the impacts described above. The alignment of the channel has been grossly altered due to efforts to develop irrigation and to prevent flooding. Excessive grazing and removal of brush and trees (*e.g.* willows, cottonwood) from the riparian zone has reduced native woody species and decreased midday shade. The change in alignment along with the loss of stabilizing riparian vegetation has caused instability in the channel. The channel that has developed under these conditions lacks the distribution of riffle and pool habitat, which is needed for salmonid rearing. The existing East Birch Creek channel is largely run habitat with a small amount of riffle habitat and only about 5-10 m^2 of high quality pool habitat in the proposed restoration reach. The changes in alignment and geomorphic character (*i.e.* increased width to depth ratio) along with irrigation withdrawals have resulted in sections of the channel being without adequate surface flow in some sections during the irrigation season. The channel is devoid of large wood and there is little potential for future recruitment from existing riparian vegetation. The homogeneous nature of the channel results in little in-stream diversity and little cover.

DESCRIPTION OF THE PROJECT AREA

The proposed project on East Birch Creek is located approximately 4,000 feet below the confluence with Pearson Creek. The stream through the project area has an overall slope of approximately 1.8% and is incised approximately 6 - 9 feet into the broad valley floor. A few short reaches of the stream provide good aquatic habitat, but most is poor. The characteristics of the existing stream vary over the length of the project.

The land within the project area has been developed for livestock ranching and agriculture. East Birch Creek has also been altered to allow for irrigation diversions. These practices result in crowding of the stream to one side of the valley to make more room for the fields. This action probably occurred early in the century. Additionally, residents upstream and within the project area have constructed numerous flood control structures (i.e. makeshift dikes, barbs, gravel removal from the channel bed, etc.) to protect the structures on their properties.

Other past actions contributing to the degraded Birch Creek ecosystem include roadway development, altered drainage areas, and construction of residences along the creek. These actions occurred in a piecemeal fashion over several decades. The cumulative impact of these activities has caused a more straightened channel for a significant amount of the stream's length. The straightening has contributed to the current channel down-cutting with vertical banks that continually erode resulting in increased river turbidity and loss of riparian vegetation.

Based on the 1956 topographic map of the site, the alignment of the channel has been grossly altered. Excessive grazing and removal of brush and trees (e.g. willows, cottonwood) from the riparian zone has reduced native woody species to about 25% of their original coverage and midday shade to about 10% of the wetted channel. The change in alignment, loss of stabilizing riparian vegetation, and increased sediment load from upstream (caused by livestock grazing, roadway encroachment on Pearson Creek, and a landslide on Pearson Creek) has caused instability in the channel with roughly 70% of banks showing active erosion. The channel that has developed under these conditions lacks the distribution of riffle and pool habitat that is needed for salmonid rearing.

Within a few hundred feet of the upstream end of the project, the thalweg is eroded downward and is disconnected from the ancestral floodplain. Much of the reach contains large gravel bars that move during high flows, head-cutting, unstable banks and alignment problems. Other than the cover provided by the vegetation, there is little in-stream habitat. The stream is mostly a straight, narrow channel. Near the middle of the project reach there is substantial structural development (house, sheds, bridge, etc.) adjacent to the stream confining the stream to a narrow band. Some of this is also confined by bedrock along the opposite bank. Boulders and cobbles are beginning to form an armor layer over the thalweg. The downstream portion of the project reach has a higher sinuosity than other portions of the project, but the meanders are unstable with several 90-degree bends and chute cut-offs progressing at several locations. This section also contains large gravel bars that move during high flows, head-cutting, and unstable banks. The streambed within this lower reach is eight to ten feet below the ancestral floodplain and the flood prone area is incised.

The existing stream channel has native cottonwood and shrubs growing near the stream channel in isolated clumps. The work to open up the old stream channel in this area may impact some of the existing trees and shrubs. Disturbed areas would be planted with native poplars, willow, dogwood, and alder. Though some mature native vegetation would be removed during project construction, this would be compensated by the revegetation effort. The restoration effort would also establish vegetation in the open areas between clumps of cottonwood and brush. This would eventually establish a more continuous riparian buffer along this stretch.

PROJECT DESCRIPTION

The use of bioengineering techniques would be utilized to the extent practicable to restore salmonid habitat quality, reduce unnatural bank erosion, restore natural channel function, and improve aquatic and riparian biological processes in East Birch Creek. This approach would involve development of plans for erosion resistant stream restoration treatments using primarily natural fluvial processes and natural materials. Specific principles that would be utilized are summarized as follows:

- Develop designs that take advantage of the natural hydrologic and sediment movement characteristics of the East Birch Creek drainage.
- Develop designs that enhance and ultimately capitalize on the stabilizing effect of healthy native riparian vegetation.
- Reestablish natural channel geometry and balance energy and sediment transport to the point that natural channel adjustments are gradual and more typical of a stable stream.
- Use natural materials such as large wood and rock for channel and bank stabilization in high-energy areas.

A healthy, viable riparian zone is essential to meet the goals of this project. Riparian vegetation not only directly contributes to stream biological productivity and fish habitat quality, but also provides a buffer between the terrestrial and the aquatic systems.

Effective restoration of riparian vegetation is pivotal to achieving restoration benefits and ensuring long term stability of the reach. Restoration of riparian function is one of the primary goals of this project that will ultimately benefit fish and wildlife.

The other primary goal of the proposed environmental restoration work in East Birch Creek is to restore geomorphic function of the channel which would generally mean a narrower, deeper, more meandering channel with more stable, vegetated banks and more diverse in-stream habitat. This would result in a self-maintaining system that meets specific habitat needs of ESA listed summer steelhead. Summer steelhead use the proposed project reach for spawning and rearing. Our restoration plan is based on habitat requirements for these lifestages.

A plan has been developed based on conditions observed during field trips to the proposed restoration site and work completed by ODFW in an adjacent reach of East Birch Creek (plan drawings are attached). The recommended plan involves restoration of natural channel function, to the extent possible, using natural fluvial processes and natural materials. Work to construct the structures would be performed during late summer when irrigation withdrawals combined with low stream inflows create the lowest stream flows through the project area (1 July to 31 October). This also creates the highest water temperatures, which would discourage fish movement through the system. This would be a time when construction activity in the active stream channel would have the least impact on the aquatic environment. Recommended structural restoration measures for the reach are summarized below. The actual number and quantities for each structure may be refined depending on field conditions during construction.

- 1 Rock entrance control structure
- 1 Off-set levee
- 51 J-hooks with chute cutoffs
- 27 Rock cross vanes
- 8-10 Rock vanes
- 6-12 Grade control structures
- 300-600 ft of bank lay-back
- 40-60 ft of rock sill bank protection
- 4000 ft of bank stabilization
- 2700-3200 ft of new channel (channel realignment)
- 2600 ft of existing channel reshaping
- 100-1000 feet of stabilization of the bank toe
- 3-5 Fill areas
- 3-6 Debris removal areas
- 2-5 Gravel bar removal areas
- 10 Rootwads
- 200-600 feet of armoring with continuous drop structures (for side drainage entrance)
- 2-5 Borrow ponds
- Removal of existing barbs
- Revegetation
- Fencing
- 30 Rock cover structures for fish habitat
- 10 Floating log cover structures for fish habitat
- Development of a spring(s) and/or shallow well(s) for livestock watering

Brief descriptions of each of the project elements follow.

The **rock entrance control structure** (at project entrance) is a structure that funnels the flow into the project in a way that precludes the stream from eroding out around the start of the project. This design also includes an off-set levee which contains any flows that get out of bank in the vicinity of the upstream end of the project.

The **off-set levee** would be constructed of random earth materials located at a distance of 30 to 100 feet back from the edge of the stream for the purpose of containing flows that get out of bank and have the potential to flow around the newly designed stream channel. This feature ties into the entrance control structure. The height of the levee is between 2 and 5 feet. The top width is between 5 and 20 feet.

The **J-hooks with chute cutoffs** are rock structures that extend upstream at an angle of between 20 to 30 degrees from the outside bank and cross approximately two-thirds of the stream. The structure will be keyed below the riverbed sufficiently to avoid problems with scour and undercutting. The rock size may vary from 2.5 to 3.5 feet in diameter. The J-hook structure reduces the shear stress at the outside edge of a bend. This reduces erosion of the bank and provides grade control for the thalweg. A pool forms in the hook of the structure.

Rock cross vanes are structures that extend upstream at an angle of between 20 to 30 degrees from both banks and extend across the entire width of the stream. They would be constructed of boulders placed to form a modified upstream "V." This is best described as an upstream "V" minus the apex that is replaced with a straight sill situated perpendicular to the thalweg. The limbs of this modified "V" would be tied into the bank to prevent end cutting. Footer rocks would be buried to prevent undercutting. The configuration of the structure would act to direct the entire range of stream flows away from the bank and reduce near-bank erosion zones and velocities. The reduced velocity zones would become a depositional area for finer bedload and suspended sediments, creating suitable conditions for vegetative recovery. Dimensions and rock size would be similar to the J-hook structures. The cross vane provides grade control and directs the flow towards the center of the channel. This structure would stabilize the channel by dissipating energy, controlling gradient, and maintaining sediment transport. The structure would benefit fishery habitat by scouring a large, high quality pool in the zone where overflow converges, providing channel diversity, cover, and a stable area at the shoreline for riparian vegetation to grow. The height of the structure above the channel bed would determine the depth and size of the pool it creates. A more defined thalweg would also result in deeper surface flow and lower stream temperatures during the dry part of the year.

Rock vanes are structures that extend upstream at an angle of 20 to 30 degrees from the outside bank. They extend across about two-thirds of the width of the channel. The dimensions and rock size would be similar to the J-hook, except that the rock vane structures would not hook back downstream. The vane reduces the shear stress in the vicinity of the bank (reduces erosion). The pool that gets created is generally smaller than the one created by a J-hook structure.

The **grade control structures** are structures that cross the stream and provide grade control for the thalweg. They span the entire width of the channel, but do not generally create a pool.

Bank lay-back areas presently contain near vertical banks that are from 5 to 15 feet in height. The banks will be excavated to provide stable slopes. The slopes will vary depending upon the channel section required to provide adequate flood prone area. Slopes may vary from nearly flat to 1 vertical on 2 horizontal. These areas will be aggressively revegetated to reduce erosion. Laying back the banks is necessary to reduce erosive energy during high flows and prevent further sediment loading from bank erosion. The intent from a hydraulic perspective is to create a larger channel cross section that would reduce erosive pressure on the bottom during flood events. This would improve fish habitat by reducing sediment loading and promoting riparian vegetation that would provide shade, large wood recruitment, and in-stream cover (*e.g.*, underbank and overhanging vegetation).

Rock sill bank protection would be constructed in areas where there is a risk that the stream may cut across the meander. The sill will be installed along the inside bank of the curve to form a wall to protect against high flows cutting across the meander. The sill is keyed below the riverbed to avoid problems with scour and under-cutting. The rock size may vary from 8 inches to 3 feet in diameter.

Bank stabilization would be constructed of large rocks, rootwads, and logs anchored into the bank such that they provide protection from bank erosion in unstable sections of the reach. They are generally placed where banks are actively eroding and have a stabilizing effect as a result of effective energy dissipation and deflection of high velocity flows away from the bank. This work would improve fish habitat by scouring a high quality pool around the end of the structure; providing dense cover, large woody debris, and channel complexity. It would also reduce sediment and provide a stable area along the bank for riparian vegetation to grow.

New channel (channel realignment) would be excavated in some areas outside of the existing channel prism. New channel construction consists of forming the new meanders that align with the existing channel to create a more natural and stable geometry. The location of the meander channel is designed to minimize the impact on the existing vegetation. Some tree and brush removal may be needed to create the meandering channel. The preparation work would be performed in the dry channel, so would not impact the active stream channel. The existing stream channel would then be diverted into the new stream channel by obstructing the old channel, just downstream of the new channel connection. The section and profile are based upon typical restoration calculations based on data from a reference reach located near the project and on stable portions of the existing stream observed within the project. The new alignment would provide for better hydraulic and habitat characteristics.

Existing channel reshaping consists of reshaping the thalweg and banks in portions of the stream where the new alignment follows the alignment of the existing channel. The designed section and profile are based on typical restoration calculations based on data from a reference reach located near the project and on stable portions of the existing stream observed within the project. This includes construction of pools on the outside edge of bends and shaping point bars to form the bankfull channel and flood prone area. Additionally, this would shape the pool, glide, riffle, and run reaches. The benefits to aquatic habitat result from a more hydraulically stable channel and also from the direct creation of habitat areas.

Stabilization of the bank toe would be used with minor change to the existing section and profile in some areas. In these areas the toe of the bank has local erosion spots that require reinforcing. Rocks for this work will vary in size from 8 inches to 3 feet in diameter.

Fill areas are abandoned channels and low areas within the flood prone area where excess material from excavation of the new channel section will be placed.

Debris removal areas are locations with extensive debris jams within the existing channel. This debris consists primarily of small wood materials that will be removed from the channel area and burned on-site within the staging or stockpile areas.

Gravel bar removal areas are locations where unstable gravel bars exist within the bankfull area or immediately adjacent to the bankfull area. These bars will be removed for stability purposes and used as fill in other areas of the project.

Rootwads consisting of the root and trunk of a large tree will be installed along the bank of the stream to provide cover and to create scour pools where the root projects into the stream flow. The rootwads will be anchored by cables to dead-man anchors located away from the bank.

Side drainage **armoring with continuous drop structures** would be used at an existing side drainage entering East Birch Creek at the lower 1/3 of the project. There the stream has downcut from 5 to 15 feet into the adjacent bank. Bank armoring and cross vanes will be used to control further downcutting and erosion of the banks of this side drainage.

Ponds, or borrow areas, would be excavated so that they would fill with groundwater for part of the year. The size and ultimate number of the ponds will depend upon the quantity of fill material needed. Ponds may vary from 50 to 200 feet in diameter and the depth may vary from 1 to 4 feet.

Removal of existing barbs. There are from 4 to 10 existing barbs that would be removed in order to fit into the new channel design. The rock material would be salvaged for use in the cross vanes, J-hooks, or other structures for the project.

Revegetation would be incorporated into much of the project area. This would involve installation of coir erosion control fabric, reseeding of disturbed areas with a mix of native graminoids, and extensive revegetation with native woody vegetation. The fabric would reduce sediment releases to the stream when higher flows return to the system. Fencing would be incorporated to protect new plantings, streambanks, and structures from livestock. Native woody plant species would be used in the revegetation for this project. Plant species include willow (*Salix spp.*), red osier dogwood (*Cornus stolonifera*), cottonwood (*Populus spp.*), and alder (*Alnus spp.*). The exact composition of the trees used in the project would be dependent upon the availability of these species. Actual vegetative planting would be done in the fall or early spring of the construction year (*i.e.,* when these plants are dormant). Follow-up measures, such as watering during the first summer, would be taken to optimize survival of newly planted vegetation. Plantings would probably be done mechanically with heavy equipment.

Fencing would be used to exclude livestock from the stream and adjacent riparian zone. An alternate livestock water source would need to be developed. Springs or shallow wells off-stream, outside of the riparian buffer may be developed. Springs would require minimal plumbing and a tank. The shallow wells would require a solar powered water pump. It may also be possible to use some of the borrow ponds outside of the riparian zone as a livestock water sources.

Rock cover structures for fish habitat would be used throughout the project reach to provide additional fish habitat. A scour pool would form around the base of the rock, forming a hiding and resting area for fish.

Floating log cover structures for fish habitat may be used to further increase the amount of fish habitat. These structures would be comprised of a log buried into the bank, projecting out into the stream. The log would provide overhead cover for fish.

A few springs or shallow wells may need to be developed to provide a water source for livestock, which lose access to the stream because of the fencing.

A backhoe and/or bulldozer would perform most of the work where appropriate. Dump trucks would be used to transport some of the material. Work would be performed when little water is in the stream channel so any sediment releases would be relatively minor. There is a chance that fish in the existing stream system could be trapped in pools in the old channel, when the stream is dewatered. Oregon Department of Fish and Wildlife personnel would conduct salvage operations to capture trapped fish and move them out of the project area. The in-water work would be limited to July 1 to October 31 to minimize impacts on aquatic species (ODFW 2000). Temporary staging areas would be required during construction. All equipment refueling and maintenance would be preformed in a designated part of the staging areas at least 300 feet away from the active stream channel.

Monitoring and Maintenance
Oregon Department of Fish and Wildlife personnel will conduct monitoring of the condition of the stream on a periodic basis. The results of this monitoring will be used to fine tune the stream geometry to ensure efficient transport of sediment through the project reach and dynamic equilibrium of the stream system. This work may include removal of excess sediments, repair of structures, and addition of new structures. Maintenance activities are expected to be minimal. Any additional work will be performed in manner consistent with the timeframes and methods described in this biological assessment.

LIST OF SPECIES

Endangered: None Listed

Threatened:

Snake River Basin Steelhead (*Oncorhynchus mykiss*)
Bald eagle *(Haliaeetus leucocephalus)**

Proposed: None

*Addressed in a separate biological assessment

DESCRIPTION OF SPECIES AND HABITATS

Mid-Columbia Steelhead were listed as threatened under the Endangered Species Act in March 1999 by the National Marine Fisheries Service (NMFS). Adult steelhead return to their natal streams from December through April to spawn. After spending one or two years rearing in the area, juveniles begin their outmigration to the ocean in April and May when flows are usually higher than average. Optimal steelhead habitat is characterized by clear, cold water with complex cover including large woody debris and boulders. Periodic low flow, flood control measures, irrigation diversions, and habitat destruction limit both adult and juvenile steelhead survival. The upper incipient lethal temperature for adult rainbow/steelhead is 25°C (77°F) (Raleigh *et. al.* 1984)

Rainbow/steelhead trout are found in East Birch Creek year-round. This reach is also an important spawning area for summer run steelhead. The Umatilla stock of summer steelhead was designated part of the Mid-Columbia Evolutionarily Significant Unit (ESU) by National Marine Fisheries Service (NMFS) when it listed that stock as "Threatened" under the Endangered Species Act.

The race of summer steelhead that occurs in the East Birch Creek drainage enters the Columbia River on its spawning in-migration between March and October. Spawning occurs in mid-elevation tributaries, including East Birch Creek, in the spring following the in-migration. The peak in spawning activity is during the January through May time period. Survival from egg through emergence is most affected by waste removal and oxygen supply to the eggs/embryos/sac fry, which require reasonably clean gravel allowing adequate intergravel flow. Upon emergence, which occurs by July, fry utilize in-stream cover such as cobble interstitial spaces to avoid predators. As they increase in size they gradually move into different habitat types and utilize a variety of food items and cover types. During rearing, juveniles require large, deep, low velocity pools with abundant cover. The availability of quality pool habitat is often a limiting factor for this life stage. Summer steelhead juveniles usually rear for two years in natal streams and begin their seaward migration downstream with the first spring freshets.

Inventories and Surveys for Steelhead

The Oregon Department of Fish and Wildlife maintains an adult fish trap on the mainstem of Birch Creek in Pilot Rock. Some of the fish are able to jump the diversion dam and avoid the trap. Most of the steelhead are wild fish. Following is a table of data from the trap.

Brood Year	Wild	Hatchery	% Hatchery	Total
1995-96	143	6	4	149
1996-97	109	6	5	115
1997-98	85	1	1	86
1998-99	78	0	0	78

In 1996 a mark and recapture study was performed to estimate the total steelhead escapement above the diversion dam. The total escapement was estimated at 350. When the following year's data are multiplied by the escapement ratio obtained in 1996 (2.35), the estimated total escapement would be the values presented in the following table.

Brood Year	Total escapement
1995-96	350
1996-97	270
1997-98	202
1998-99	183

These escapement values are for the entire Birch Creek watershed, not just East Birch Creek. Values for East Birch Creek would be a fraction of total escapement estimates for the entire Birch Creek watershed.

No estimates on the number of juvenile steelhead have been made. Juvenile steelhead can be found in pools in the project reach year-round, however.

Analysis of Effects on Steelhead

The largest expected direct effects to steelhead are from the capture and relocation of juveniles. All fish will be captured with nets and/or electro-fishing methods to protect them from the construction effort. Trained biologists with ODFW will perform this task. In-water construction work could have direct effects to steelhead if all of the juveniles are not completely removed from a work area. Capture and relocation efforts will be preformed to remove as many individuals as possible.

Indirect effects related to water temperature could occur. A minimal amount of shade may be lost, which could increase the stream temperature. However, the new channel will be consolidated into a narrower deeper channel that will likely lead to cooler stream temperatures. Overbank flooding into the borrow ponds near the channel could also indirectly effect steelhead after high flow events if they were to become stranded in the ponds.

This project in addition to the completed project just downstream will provide a positive cumulative effect for steelhead. Revegetation and fencing efforts will allow a well developed riparian zone that will provide benefits to steelhead well into the future. Interdependent and interrelated effects associated with possible leaks in heavy equipment are possible, but the chances of effects occurring will be minimized using specific management actions listed in the following section.

Management Actions Related to Steelhead

This project would be designed to minimize impacts to stream and riparian habitat.

1. All in-water work will take place within the work window prescribed by ODFW (1 July to 31 October) to minimize impacts to steelhead.
2. Oregon Department of Fish and Wildlife personnel will coordinate and lead the fish capture and relocation efforts following their standard procedures that minimizes impacts to steelhead.
3. Fish capture and relocation efforts will be performed prior to any construction activity that could "take" steelhead.
4. Minimizing the clearing of trees and re-planting suitable native trees would mitigate unavoidable clearing. A narrower, deeper low flow channel will also offset any potential temperature increases.
5. The borrow ponds will be visually checked following flood flows for the presence of fish. If fish are noticed to be stranded, they will be captured and relocated back into the main channel by qualified ODFW personnel.
6. Exclusion of livestock by fencing will dramatically improve the survival and quality of the riparian zone.
7. Standard erosion control techniques will be used during construction.
8. Equipment refueling and maintenance will be performed in a staging area further than 300 feet from the active channel. Any leaks of fuel or lubricating fluids will be addressed immediately after being noticed. If a leak can not be stopped by maintenance, a different piece of equipment will be used.

Conclusion for Steelhead

Because juvenile steelhead can be found in East Birch Creek throughout the entire year, we conclude that this project "may affect, and is likely to adversely affect" steelhead or their habitat. Efforts will be taken to minimize any negative impacts. After the project is constructed, negative effects would be reduced as vegetation reestablishes, providing increased shade and cover to the stream.

REFERENCES

Leopold, L.B., M.G. Wolman, and J.P. Miller. 1964. Fluvial processes in geomorphology. Freeman, San Francisco, CA: 522 pp.

ODFW 2000. Oregon guidelines for timing of in-water work to protect fish and wildlife resources. Oregon Department of Fish and Wildlife. June, 2000

Raleigh, R.F., T. Hickman, R.C. Solomon and P.C. Nelson. 1984. Habitat suitability information: rainbow trout. U.S. Fish and Wildlife Service, FWS/OBS-82/10.60. 64 pp.

APPENDIX E

COORDINATION CORRESPONDENCE

1. USFWS Consultation response letter
2. NMFS Consultation response letter (to be added later)
3. SHPO Consultation response letter (to be added later)