Watershed Restoration in the Upper Lochsa River Basin

Protect and Restore Fishing (Waw’aatmnima) Creek to Legendary Bear (‘Imnaamatnoon) Creek
Watersheds Analysis Area
This Document should be cited as follows:


Bonneville Power Administration
P.O. Box 3621
Portland, OR 97208

This report was funded by the Bonneville Power Administration (BPA), U.S. Department of Energy, as part of BPA's program to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries. The views in this report are the author's and do not necessarily represent the views of BPA.
Watershed Restoration in the Upper Lochsa River Basin

Protecting and Restoring Fishing (Waw’aatamnima) Creek\(^1\) to Legendary Bear (‘Imnaamatnoon) Creek\(^2\) Watersheds Analysis Area

Annual Progress Report
June 2002 – May 2003

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Funded by:
U.S. Department of Energy
Bonneville Power Administration
Division of Fish and Wildlife
Portland, OR. 97208-3621

Project No. 1996-077-03
Contract No. #00004505

May 2003

\(^1\) formerly Squaw Creek
\(^2\) formerly Papoose Creek
INTRODUCTION

Figure 1. Location of Analysis Area

Figure 2. More detail of the Analysis Area watersheds

Project Focus 2002-2003

METHODS

Project Objectives

Road Removal

Figure 3. Example of a recontoured road in the Wawaatamnima Drainage

Road Removal Monitoring-Technique Evaluation

Culvert Replacements

Culvert Replacement Monitoring and Evaluation

Long-term Monitoring and Evaluation

RESULTS

Road Removal

Culvert Replacement

Road Removal Monitoring

Culvert Replacement Monitoring

Long term Monitoring and Evaluation in Badger Creek

Planning for 2003 Field Season

Dissemination of Project Information

CONCLUSIONS
INTRODUCTION

The watersheds included in the project Analysis Area drain into the Upper Lochsa River, together the Lochsa and the upper tributaries contain critical spawning and rearing habitat for anadromous and resident fish in the state of Idaho (Clearwater National Forest 1999). Species that depend on the tributary habitat include spring chinook salmon, Snake River summer steelhead, bull trout, and westslope cutthroat trout. Steelhead and bull trout populations are currently listed as Threatened under the Endangered Species Act (ESA), and westslope cutthroat trout has been petitioned for listing. Both out-of-basin and in-basin factors threaten fish populations in the Lochsa Drainage (Clearwater Subbasin Plan 2003). Out-of-basin factors include the hydroelectric system and ocean conditions, while in-basin factors include a variety of management activities leading to habitat degradation.

Location of Analysis Area:
The Waw’aatamnim to 'Imnaamatnoon Analysis Area is located in the Clearwater Subbasin within the Lochsa River Drainage. The analysis area contains five fifth order watersheds a total of nearly 60 mi².
Figure 2. More detail of the Analysis Area watersheds. Notes: Post Office drainage not included on this map. Road system depicted is not complete as many of the abandoned logging roads were never officially mapped.

**Project Focus 2002-2003:**

This year’s restoration projects focused on improving in-stream habitat conditions by addressing legacy management impacts associated with timber harvest and road systems. Roads built to support timber harvest and other management needs have many impacts on watershed condition with the greatest impacts to aquatics in the Lochsa being sedimentation to fisheries and passage barriers to various life stages of fish and invertebrates.

In the watersheds of the Lochsa, road derived sediment enters streams and riparian areas primarily from the following pathways: surface erosion, chronic mass failures (small, 10 yd$^3$ or less), and landslides (greater than 10 yd$^3$, which tend to be driven by heavy precipitation events). In the steep, dissected breaklands slopes of the Upper Lochsa, landslides are of particular concern. Following two record level rain-on-snow events during the 1995-96 winter, landslides occurred across the Clearwater National Forest. A landslide analysis revealed that over half the landslides occurring in the Lochsa initiated from abandoned logging roads. After more detailed ground surveys,
we learned these abandoned logging roads, despite being overgrown still proved to have many locations of significant surface erosion, smaller mass failures, and potential failure points. In general, our survey data found that older roads posed greater risk to the watersheds.

The project work this year continues implementation work started in 1997. After the flood events of 1995-96, the Nez Perce Tribe Department of Fisheries and Resource Management- Watershed Division (DFRM-Watershed) and the Clearwater National Forest developed a watershed analysis and transportation plan during the first phase of project work. These documents identified over three hundred miles of unneeded roads in the Analysis Area and prioritized areas for road removal. Most of these three hundred miles of road were built on landslide prone slopes; data collected during road survey revealed them to be sediment sources, which if not mitigated would continue to degrade aquatic habitat.

The afore mentioned analysis document also identified impassable culverts on needed Forest Service system roads as a key limiting factor to spawning and rearing success in the tributaries. In the past two years we have begun addressing connectivity barriers created by roads that will remain on the Forest Service transportation system. In 2002, most of these culverts were replaced under a different BPA funded contract approved under high priority funding in 2001.

**METHODS**

There are 8 objectives listed for this year’s project. The methods section addresses primarily the methods used in the implementation of project work. However, objectives include both tasks for planning and technical implementation.

**Objective 1:** Finalize 2002 Partnering Agreement with the Clearwater National Forest (CNF).

**Objective 2:** Reduce the risk for further stream channel degradation from mass wasting and surface erosion related to road sources in cooperation with the CNF and PCTC.

**Objective 3:** Monitoring and evaluation of road obliteration implementation and effectiveness.

**Objective 4:** Return fisheries habitat to target species at 3 road crossings in cooperation with the CNF and PCTC.

**Objective 5:** Monitor and evaluate past culvert replacements in cooperation with the CNF.

**Objective 6:** Long-term monitoring and evaluation of watershed, stream, and aquatic conditions. Tier to M&E project proposal. Lead agency – NPTFWP

**Objective 7:** Dissemination of project information and peer review. Lead agency – NPTFWP.

**Objective 8:** Provide office/clerical support.

**Road Removal (referred to as Decommissioning/Obliteration)-Objective 2**

Using the research available from other road stabilization/removal programs and anecdotal evidence from the Clearwater’s fledgling road removal work in the early 1990’s, the Clearwater National Forest/Nez Perce Tribe Partnership determined the most cost-effective and function way to prevent continued erosion from these unneeded roads was by a prescription of removing the road prism from the hillside either by
outsloping or recontouring the fillslope\textsuperscript{3}. Our prescriptions are developed on site during intensive pre-work road survey and refined or adjusted during contract inspection. We prescribe the minimum level of treatment required to reduce or eliminate mass failure risk, restore watershed hydrology, and restore land productivity. The Clearwater National Forest defines levels of road treatment as the following:

- **Level 1**: Recontour road entrance to restrict vehicle access.
- **Level 2**: Some work required along the road to address mass failure or erosion risk factors.
- **Level 3**: Substantial work required along the full length of the road.
- **Level 4**: Recontour of most of the road.

Because of the instability of roads in the Analysis Area, stabilization generally requires Level 3 or Level 4 treatment. The following kinds of work are involved in these levels of treatment. All culverts are removed. Fills are removed in the area around live streams and stream channels are restored to original grade. Ditches are eliminated and road surfaces are strongly outsloped or recontoured to provide continuous drainage. Road surfaces may be decompacted to promote tree growth. Erosion control blankets may be installed at sensitive locations to control surface erosion. Disturbed areas are mulched with straw, native woody debris, or a scattering of logs and stumps. Native shrubs and sod excavated during outsloping or recontouring are transplanted into disturbed areas. At completion, the area will no longer convey vehicle traffic, and requires no maintenance.

Successfully completing road treatments requires the use of excavators and in some cases, dozers.

Definitions for stabilization techniques:

**Full recontour**
A full recontour involves reestablishing the natural contours of the hillside, restoring the original topography. In full recontour sections, we pull up the entire fill, place it on the cut bench and blend to the top of the cut slope.

**Partial recontour**
A partial recontour involves removing fill and replacing cut material while leaving a flat or sloped section of the traveled way in tact, usually for use as a trail (USFS, 1996). Sometimes the term "partial recontour" is used to mean pulling some fill (usually that which can be easily reached) and placing in on the cut bench, creating a strong outslope.

**Outslope**
An outslope involves pulling up some fill, removing ditches, removing berms, and leaving a cross slope on the template that water will run off of. In road decommissioning, we construct a non-drivable 10\% - 30\% outslope. Often, a strong outslope is confused with a full or partial recontour. However, on outsloped sections

\textsuperscript{3} Definitions follow at end of section.
we do not focus on blending the material to the top of the cut. On flat sideslopes, a strong outslope may be a recontour.

Figure 3. Example of a recontoured road in the Waw’aatamnima Drainage.
Road Removal Monitoring-Technique Evaluation (Objective 3)

The Clearwater National Forest and Nez Perce Tribe spent this year refining our monitoring protocols. Our primary goal monitoring program is to provide a feedback loop into the techniques of our program, with protocols being quantitative, non-subjective, and repeatable. Most of the revisions occurred during the winter season of 2002-2003 and will continue in the future; consequently, the field work accomplished was using a combination of old and new protocol. The objectives of our monitoring program correspond to the objectives of road obliteration. This monitoring plan looks to provide some feedback to the program goals by looking for answers to the following questions:

- Are there indications of surface erosion? If so how much?
- Are there mass failures present?
- Are natural surface and subsurface drainage patterns restored?
- Is there vegetation coverage? Is there a succession to native plants?
- Are stream channels restored to the point that subsequent adjustments are minimal?
- Are stream channels restored to the point that subsequent adjustments are minimal?
- Is the treatment appropriate for the site/landtype where is was used?

To evaluate these questions, a quarter mile monitoring segment is established for every 10 miles of road decommissioned. At each segment the following are monitored:

- Surface erosion-ocular determination of presence and evaluation of quantity.
- Mass failures-if any new failures are found, the location, size, and cause are determined.
- If stream channels are present survey cross-sections are established with Wolman pebble counts.
- Vegetation transects to record type and percent cover of vegetation, protocols follow ECODATA (USDA USFS 1992).

Monitoring is completed for each segment immediately after decommissioning (year 0), the 1st and 2nd year after decommissioning, and again the 5th year after decommissioning.

Culvert Replacements- Objective 4

Existing culverts are considered fish barriers if they prove a barrier to fish passage at any life stage of anadromous fish or resident trout. Culvert replacements are designed on the principle of stream simulation. All tasks to complete the project would be done in cooperation with the CNF.

Culvert replacements are designed by an interdisciplinary team. This experienced team includes biologists, hydrologists, and engineers. References used include the Oregon Road/Stream Crossing Restoration Guide (Allen, M., A. Mirati, and E.G. Robison, 1999), Designing for Stream Simulation @ Road Crossing (Porior, D., 2000), Fish Passage Through Culverts (Baker, C.O., and F.E. Votapka, 1990) and Fish Passage
Design at Road Culverts (WDFW, 1999) documents. Peer review of culvert designs will be performed Don Porior (Coos Bay BLM District Engineer), Nick Gerhart (Nez Perce National Forest Hydrologist), Pete Minard (CNF Engineer) and Thanos Papanicolaou (Washington State University Hydraulic Engineer).

Each culvert is sized first for the active stream channel and checked for the 100-yr. flood event, if the two are different, the larger is accepted as design size. When sizing the culvert and designing the grade, consideration will be given to embedding the culvert to ensure substrate will fill the bottom of the culvert. Most crossings require a pipe-arch (squash) culvert, with two exceptions, the West Fork of Fishing Creek and the 3.7 mile marker of road #568 (Legendary Bear Creek) these required/require a bottomless arch and a bridge respectively. Squash pipes are retrofitted with an 8-inch high baffling system to aide in retaining substrate for natural channel simulation (bottomless designs and bridges do not require baffles to retain substrate). This baffling system has been successfully used in the Coos Bay BLM area for retaining substrate within the culvert length. Culvert inlet and outlet invert elevations will be embedded approximately 20% of the rise or 18 inches (below natural stream grade), which ever is greater, to allow for natural streambed simulation.

![Figure 4. West Fork of Fishing Creek culvert replacement, before and after, a pipe arch replaced with a bottomless.](image-url)
Culvert Replacement Monitoring and Evaluation (Objective 5)

Like the road removal monitoring protocol our program is working on revising and standardizing culvert replacement monitoring. Our focus on the protocol revision will take place during the 2003-04 winter season. Monitoring during 2002 focused on evaluation whether the culvert met stream simulation objectives and achieved the goal of fish passage. Parameters monitor include the following:

- Spawning surveys.
  Conduct redd counts for Chinook salmon, bull trout, and steelhead trout. Redds of these species should be easy to detect in our tributary systems. Redd counts will be conducted at least three times each spawning season. If one redd is found above a culvert, the replacement will be judged a success for adult fish passage.

- Physical condition surveys
  Surveys completed one year after implementation to evaluate whether the culvert outlet is in contact with the stream and what percentage of substrate has colonized the culvert bottom. Stream bottom contact and 100% substrate colonization indicate that the culvert is achieving stream simulation and that passage for all aquatic organisms is achieved.

Long-term Monitoring and Evaluation (Objective 7)

Protocols for this objective are tiered to BPA project number 2002-068-00 Evaluating Stream Habitat… and a project designed by USFS Rocky Mountain Research Station in Moscow, ID. The project began in the year 2000 in Badger Creek and its tributaries with the goal of evaluating how reconstructing multiple stream channel crossings affects mainstem water temperature and habitat.

RESULTS

Road Removal Results

<table>
<thead>
<tr>
<th>Drainage</th>
<th>Miles Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Office Creek</td>
<td>14.25</td>
</tr>
<tr>
<td>Fishing Creek</td>
<td>0.45</td>
</tr>
<tr>
<td>Wendover</td>
<td>3.0</td>
</tr>
<tr>
<td>Badger Creek</td>
<td>13.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30.7</strong></td>
</tr>
</tbody>
</table>

All roads were treated with recontour and outslope. Two excavators were used throughout the field season. The 30 miles of road removed met the target established with the BPA Statement of Work, but fell short of the Clearwater National Forest goal of 40 miles of road stabilized. The BPA contract arrived nearly 5 months late and delayed the beginning of field season.
Culvert Replacement Results

Due to the late arrival of the BPA contract this year, all plans for replacing three culverts in the Legendary Bear drainage were postponed. These culverts must be replaced by August 15 under a self-imposed moratorium on work during bull trout spawning season; the BPA contract did not arrive until mid-July making this work impossible. However, seven culverts were replaced in the Analysis Area under a BPA high priority contract.

Road Removal Monitoring-Technique Evaluation

The Clearwater National Forest and Nez Perce Tribe monitoring crew visited nine monitoring segments in the Analysis Area and established two new monitoring segments. No new mass failures were recorded. The project manager is still waiting for a final draft of the 2002 monitoring report with more detailed results for vegetation surveys and channel cross-sections.

Culvert Replacement Monitoring

The project manager is still waiting for the final report of the culvert monitoring visits from the fall of 2002 and spring of 2003. While, no written results have been turned in, the verbal discussion on monitoring results has taken place. All culverts appear to be passing anadromous fish and bull trout, as adult spawners or redds have been observed above each culvert replaced. Due to time and personnel shortages this year the larger Culvert Monitoring report will be deferred until 2003 field season.

Long term Monitoring and Evaluation in Badger Creek

Due to delays in the receipt of contract, the Nez Perce Tribe could not offer much help to the USFS crew in Badger Creek. As a consequence, not much was accomplished during the field season of 2002. However, we did resume planning in the spring of 2003. Between April and June, we set up longitudinal monitoring segments in the mainstem of Badger, monumented pools that will be evaluated for residual pool depth, selected a location for the installation of a rain gage, and established a discharge station and TSS collection point on a tributary of Badger Creek.

Planning for 2003 Field Season

Planning activities have included planning the focus of 2003 work. The focus will be two areas, Badger Creek and Parachute Creek. We completed required NEPA and permitting for these drainages and have begun working with Plum Creek Timber Company on how to decommission the cost-share road in Parachute. We are in the initial stages of planning a monitoring project using low elevation, high resolution aerial photos. We have announced the contract for road removal work and culvert replacement work and are currently receiving bids. In addition, we are working on the contract for road and culvert risk assessment to take place in the Analysis Area and the
rest of the Upper Lochsa. In addition, the project manager assisted in preparing a grant proposing to plant native revegetation on some road removal project sites and culvert replacement sites.

**Dissemination of Project Information-Objective 7**

The project leader was an invited speaker at the annual conference of the National Network of Forest Practitioners to talk about road removal techniques and restoration jobs benefiting community. In addition, the work of the Clearwater National Forest and Nez Perce Tribe was selected as a focal point of a regional conference on road removal. The project manager led a field trip to visit sites of past and future project and led discussion of techniques and contracting methods.

**CONCLUSIONS**

With the notable exception of culvert replacements, the 2002 field season and the related project planning for the 2002 field season and the 2003 field season was successful. However, the delay with the receipt of the contract this year caused great difficulty in project planning and hiring of qualified crew members. As a result of the delay, the contract dates have changed for the upcoming year with contract renewal at the beginning of field season. For partnership projects such as this one, where contracting work and sharing expenses requires coordination between project managers and legal agreements between partners, a contract renewal date during mid-field season creates delays in field productivity and efficient planning and contracting. In spite of the hardships caused by delay, the work we accomplish on the Upper Lochsa continues to receive recognition as some of the most progressive and quality work in the Pacific Northwest.