Hood River
Watershed Action Plan

June 2002

Hood River Watershed Group

Table of Contents

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A special thanks to Mike Lambert now in Alaska but whose work is reflected here

Hood River Watershed Action Plan

June 19, 2002

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Hood River, Oregon

Introduction

This Watershed Action Plan identifies cooperative projects, strategies, and priorities to improve water quality and fish populations in the Hood River subbasin of the Columbia River. The Watershed Action Plan is part of a statewide strategy to address endangered species and water pollution concerns using locally developed solutions[1].

The Action Plan was developed by the Hood River Watershed Group (HRWG), a forum of irrigation and water districts, landowners, business interests, citizens, Confederated Tribes of the Warm Springs Reservation, and local, state and federal agencies involved in resource management. One of many watershed councils in Oregon, the HRWG was formed in 1993 in response to Endangered Species Act and other concerns. Its purpose is to sustain and improve the Hood River Watershed through education, cooperation, and stewardship. The Hood River Soil and Water Conservation District is the fiscal manager for the HRWG.

The Watershed Action Plan builds on local stream restoration efforts begun in the 1990s on the National Forest as well as county-owned and private land. Action Plan measures are based on the 1999 Hood River Watershed Assessment[2], which describes watershed conditions and opportunities from an ecosystem standpoint. The Action Plan will be implemented over the next 5 years or through 2007. During this time, the HRWG will review the Plan annually and revise it if needed based on new information.

Many Action Plan measures help to address requirements of the federal Endangered Species Act, the Clean Water Act, and related state legislation. The Plan also supports or compliments state and tribal fish recovery plans for the Hood River and the Northwest Power Planning Council Columbia Basin Fish and Wildlife Program. But aside from any regulatory obligations that it may help fulfill, the Watershed Action Plan promises to benefit the Hood River valley by promoting watershed health and sustainable resource use. A specific goal of the Plan is to support economic and environmentally sound agriculture and forestry, and to preserve the existing high quality of life in the Hood River watershed for future generations. Action Plan measures will contribute to the health of the Columbia River Basin as well.

The Action Plan was prepared with financial help from the Oregon Watershed Enhancement Board, the Confederated Tribes of the Warm Springs Reservation, and the Bonneville Power Administration.

[1] The Oregon Plan for Salmon and Watersheds and the Healthy Streams Partnership
[2] Hood River Watershed Group, 1999. Hood River Watershed Assessment Report.

Background

Hood River Watershed Assessment

Action Plan recommendations are based on the results of the Hood River Watershed Assessment completed in 1999 by the HRWG. The Assessment evaluated watershed resources, historical conditions, physical and biological constraints, and needs and opportunities for restoration and protection. The assessment followed the Oregon Watershed Assessment Manual[3] using ecosystem principles and methods. Agencies and individuals with expertise in Hood River natural resources served as contributors or reviewers. Below is a summary of its key findings.

Fish Populations and Habitat

- The abundance and range of anadromous (sea-going) fish have declined compared to historic conditions. Native spring chinook, coho and fall chinook stocks are extinct. Bull trout and steelhead were listed in 1998 as threatened under the Endangered Species Act. Sea-run cutthroat are classified as depressed. Pacific lamprey were common in the watershed in the 1960s, but are no longer seen above Powerdale Dam.
- A joint state and tribal effort to rebuild native summer and winter-run steelhead, and reintroduce spring chinook with Deschutes stock began in 1991. This is part of an ongoing fish recovery effort called the Hood River Production Program and is funded by Bonneville Power Administration.
- Stream survey data collected from 62 miles of streams in 1992 to 1994 indicate that pool area, pool frequency, and gravel availability are below desirable levels.
- Inadequate fish screens or migration barriers were noted at 14 sites not including road crossings. State surveys found 34 County road culverts in need of fish passage remediation, and 12 on State Highway 35. Other barriers are still being identified.

Channel Habitat Types

- Most of Hood River's fish bearing channels are confined by hill slopes or terraces and have limited floodplain area. The majority (77%) of stream channels consisted of habitat types classified as "confined". 41% of channels were classified as a sediment sources, 36% as sediment transport zones, and 23% as sediment deposition zones.
- Low gradient (<4% slope) and unconfined/ relatively unconfined channels are deposition areas for large woody debris and sediment that create fish habitat. These channels have the highest potential for quality fish habitat development, but also are most sensitive to disturbance. In this category, 59 miles of stream were classified as low-to-moderate gradient/unconfined-to-moderately confined, 8 miles as small or medium floodplain, and 23.5 miles as alluvial fan/glacial outwash. A total of 482 stream miles were analyzed.

[3] Watershed Professionals Network. 1999. Oregon Watershed Assessment Manual. Prepared for the Oregon Watershed Enhancement Board, Salem, Oregon.

Streamflow and Hydrology

- Junior to most other water rights, instream water rights are often not met in summer and fall in the West and Middle Forks of the Hood River; East Fork Hood River above the Middle Fork; Neal Creek; and Dog River. Under dry conditions, the East Fork Hood River becomes depleted below the EFID diversion. Dog River is depleted each summer below The Dalles municipal diversion. Higher summer streamflows were recommended to improve fish habitat in Green Point Creek. Opportunities exist to keep more water instream for fish without harm to existing water users.
- The Hood River natural flow pattern is one of rapid runoff where streamflows rise and fall quickly after rain events. Steep terrain, confined valleys and a large land area subject to "rain on snow" storms contribute to flooding. Neal, Green Point, and Tony drainages are most vulnerable to “rain-on-snow” floods. A high risk of watershed damage exists in Divers, Trout, Evans, and Long Branch drainages due to large openings in forest canopy created by roads and timber harvest. Low road density and adequate percentages of mature forest cover would help prevent flow changes that damage stream habitat, and increase landslides and road washouts.

Water Quality

- Six stream segments are listed under the Clean Water Act Section 303d (as of 1998) for exceeding state temperature standards. The Oregon 64^{o}F salmonid rearing criteria is exceeded in Indian, Whiskey, Neal, and Odell creeks; Hood River below Tucker Bridge; East Fork Hood River below the EFID diversion, and Lake Branch below Lost Lake. The 50^{o}F bull trout standard is exceeded in the Middle Fork Hood River, Clear Branch above and below Laurance Reservoir, and Compass Creek. Questions exist as to whether 50^{o}F is naturally attainable in Compass and upper Clear Branch. The pH standard of 8.5 was exceeded below Powerdale Dam in 1995 and 1996, but no elevated pH was measured in 1999, 2000 or 2001.
- Elevated nitrogen and phosphorus concentrations were found in Baldwin, Graham, Odell, McGuire, Neal, Lenz, Trout, Wishart, Whiskey, and Indian creeks. Bacterial contamination occurs in many of the same creeks.
- Pesticides and herbicides are used on orchard, residential/commercial properties, forest, roads and right-of-ways. A 1999 study found concentrations of organo-phosphate insecticides *chlorpyrifos* and *azinphos methyl* (i.e., Lorsban and Guthion) exceeded state standards or federal guidelines in Neal and Indian creeks. A 2000 study found much lower concentrations, although some samples were still above the standards. Monitoring and promotion of improved pesticide practices and alternatives are continuing.

Sediment Sources

- Natural sediment sources include glacial silt, landslides, and dam break floods originating on the slopes of Mt. Hood. Landslides and debris torrents are frequent in Newton, McGee, Ladd, Coe Branch, Pinnacle, Compass, Eliot Branch, Tilly Jane, Pollalie, Clark, and Clear Branch subwatersheds.

- Sediment from human activity is primarily from roads, blow-outs from undersized culverts and irrigation ditches. Irrigation canals deliver sediment through canal failure, ditch erosion, and transfer of glacial silt into non-glacial streams. Road maintenance practices may be a local sediment source, as are livestock concentrations along streams, and exposed soils at construction or recreation sites. Mapping of site-specific sediment sources and updated road maps were recommended.

Riparian and Wetland Conditions

- Riparian (streamside) shade levels were analyzed in the lower Hood River, Neal, Odell, Whiskey, Pine, Cedar, and Indian creeks by aerial photo and spot field verification. Shade levels were low along 28% of total stream length. Large woody debris recruitment (presence or absence of big conifer trees with the potential to fall instream and build fish habitat) was limited along 64% of the total stream length. Natural conditions like rocky ground, steep south slopes, and wetlands limited large tree growth along 18%. A similar assessment[4] in Bear, Tony, Trout Creek, Middle Fork, Lower East Fork, Baldwin, Emil, Evans creeks found comparable results.
- The National Wetland Inventory (NWI) identifies less than 1% of the watershed as occupied by wetlands, but this was viewed as an underestimate. Historic wetlands have been drained for agriculture and other land uses but data about the extent of wetland loss is unavailable. An wetlands inventory and functional assessment was recommended to prioritize voluntary wetland protection and restoration opportunities.

Channel Modifications

- A preliminary assessment found that roads and railroads were the most common stream channel modification affecting a total stream length of 21 miles. The assessment did not include other problem sites (erosion, channel shifting) or confinement by bridge crossings.
- Neal Creek is altered by channelization and bank stabilization associated with agriculture and road construction. This has led to a shorter, faster-flowing, entrenched channel disconnected from its floodplain in many areas.
- Chronic habitat disturbance is caused by the construction, reconstruction, and maintenance of ODOT Highway 35 in the East Fork Hood River floodplain, especially in "The Narrows" area and from Dog River to Baseline Road.
- Drainage and channelization may have re-routed some smaller streams compared to historic conditions. Historic aerial photos and maps should be analyzed to identify realigned sites and potential restoration opportunities.
- Detailed, updated, and more accurate floodplain maps are needed to replace the coarse-level FEMA floodplain maps prepared in 1984.

[4] Nelson, C. 2000. Riparian Conditions Assessment of the Lower Middle Fork Hood River and the Lower East Fork Hood River Watersheds. Prepared for Hood River SWCD, Hood River, OR.

Action Plan Goals

Following completion of the Watershed Assessment, Watershed Group members developed goals for the Action Plan. The **general goals** are to:

1. Protect stream reaches in relatively good condition, for example, areas with relatively high aquatic-riparian habitat, high fish use, and good water quality.

   Factors to consider: Is the area already protected by planning, ownership, or regulation? Is planning and regulation adequate? Are there opportunities for good stewardship, best management practices, voluntary conservation easements or voluntary land acquisition?

2. Restore stream reaches with habitat or fish populations currently in degraded condition but which have the potential to support high-quality habitat and fish populations – and where the impacts and improvement opportunities are known.

   Factors to consider: What is the potential habitat quality of the site? What is the best strategy to address factors that contribute to the problem?

3. Recommend ongoing education and awareness projects to educate the public about watershed issues and best management practices for improved stewardship.

4. Recommend further investigation or data collection as necessary to monitor trends, fill information gaps, or identify problems or opportunities where not well known.

In addition, **specific goals** include:

- **Human** – Promote economically and environmentally sustainable agriculture and natural resource use; preserve the high quality of life in the Hood River Valley for future generations.
- **Water Quality** – Reduce contaminants to protect aquatic life, human health, and beneficial uses. Comply with state water quality standards and/or EPA guidelines consistent with natural conditions.
- **Fish Populations and Other Aquatic Organisms** – Address requirements under the Endangered Species Act. Protect and restore abundance and diversity of native species. Provide improved sport and tribal fishing opportunity.
- **Streamflow and Watershed Hydrology** – Improve streamflows where opportunities exist to do so, while also protecting existing water rights. Meet instream water rights on streams where these are established. Minimize alteration of natural hydrology. Where feasible, protect and restore the hydrologic functioning of upland, wetland, and riparian areas.
- **Instream and Riparian Conditions** – Improve fish passage conditions where affected by artificial impediments; protect and restore riparian vegetation; protect remaining natural floodplain areas; restore/enhance aquatic habitat structure (e.g., large wood supply, side channels); and restore channel interaction with historic floodplains where compatible with existing land use.
- **Plants and Wildlife** – Promote preservation of native plant communities and viable wildlife populations.

Relationship to Other Planning Efforts

A number of related plans concerning the Hood River Valley fish and water quality have been prepared to satisfy specific state, regional, federal, or tribal requirements for fish or species recovery, water quality protection, or ecosystem health. These include:

- Northwest Forest Plan (USDA, 1994)
- Hood River Habitat Protection, Restoration, and Monitoring Plan (CTWS, 2000)
- Hood River Subbasin Summary (NPPC, 2000)
- Hood River Agricultural Water Quality Management Area Plan (ODA, 2001)
- Western Hood Subbasin Total Maximum Daily Load (ODEQ, Draft July 2001)
- ESA Recovery Plan for Lower Columbia Steelhead (NMFS, in progress)
- ESA Recovery Plan for Hood River Bull Trout (USFWS, in progress)
- Hood River Subbasin Plan (NPPC, in progress)

The Watershed Action Plan differs from other plans because it is a voluntary, community-based plan prepared by landowners, agriculture, and affected interests working with local-level natural resource managers. Nevertheless, the Watershed Action Plan is consistent with recommendations included in many of these other plans. For example, several projects help implement the Hood River Agricultural Water Quality Management Area Plan rules recently adopted into state law. In another example, a Pinnacle Creek road culvert replacement recommended in the draft Endangered Species Act Recovery Plan for Hood River Bull Trout is also included in the Watershed Action Plan.

As directed by the Northwest Power Planning Council (NPPC), a subbasin plan for the Hood River will be submitted in 2003 to help guide Bonneville Power Administration (BPA) funding decisions for projects that enhance, mitigate, and protect fish and wildlife impacted by the Columbia River hydrosystem. The NPPC, BPA, National Marine Fisheries Service and U.S. Fish and Wildlife Service also intend to use subbasin plans to help meet certain Endangered Species Act requirements. It is expected that many Hood River Watershed Action Plan projects will be incorporated into the NPPC Subbasin Plan.

Funding Sources

A cooperative partnership approach will be used to help fund Action Plan measures where appropriate. This approach has been used in the Hood River Valley in recent years, where members of the Watershed Group have worked successfully together to obtain grants and other funding from the Forest Service, BPA, OWEB and others for watershed projects. This approach depends on continued cooperation and collaboration in the local community and availability of funding.

While many sources of funding exist, some of the principal ones are:

- Bonneville Power Administration
- Oregon Watershed Enhancement Board
- United States Forest Service

  PL 105-277 Section 323 ("Wyden Amendment" authorizes use of federal funds for some off forest projects)

  PL 106-393 Secure Schools Payments to Counties Act
- Oregon Department of Land Conservation and Development

National Marine Fisheries Service

- U.S. Environmental Protection Agency/ Or. Depart. of Environmental Quality

  Section 319 Nonpoint Pollution Source Grant Program
- U.S. Fish and Wildlife Service

  Fisheries Restoration and Irrigation Mitigation Act of 2000 (PL 106-502)

  North American Wetlands Conservation Act

USDA/National Resources Conservation Service

Environmental Quality Incentives Program

River Network

American Farmland Trust

Oregon Department of Fish and Wildlife

Project Prioritization

Action Plan priorities were established predominantly based on natural resource needs and expected benefits. A relative priority ranking of *High*, *Medium*, or *Low* was assigned for each Action Plan project or measure within the major categories of fish passage, water quality, low flows, habitat structure, and education. Relative priorities were assigned with the greatest weight given to the needs and benefits to fish habitat, water quality, or natural resources. The advisory committee used these criteria or factors to assign project priorities:

- Degree of resource need or concern
- Extent of expected resource benefits
- Whether threatened or endangered species are affected
- Degree of urgency
- Technical or practical feasibility
- Addressing multiple resource problems (e.g. fish passage and water quality)
- Optimism about project success
- Whether a positive outlook for partnerships and funding assistance exists
- Other factors discussed below:

Protection Versus Restoration

Protection of high quality, productive aquatic habitat deserves the top priority in any habitat or fish recovery plan. It is widely accepted that the most effective and least costly habitat management approach is to first protect areas of good, intact stream habitat rather than to allow degradation and attempt to restore it later on. If a human activity is causing harm to aquatic life, then stopping the degrading activity is the next highest priority, and allowing time for the watershed or habitat to recover naturally. In situations where the habitat cannot recover quickly enough on its own, then active restoration can be considered to accelerate a return to healthy conditions.

Geographic Prioritization

As much as possible, site-specific restoration and protection activities were prioritized within a geographic or spatial context. While needs and opportunities exist in all 50 Hood River subwatersheds, the Watershed Assessment identified stream areas that are particularly important from a biological standpoint given current information. Geographic prioritization also considered the risk of natural hazards including landslides, floods, and debris torrents.

Likelihood of Success

Expectation about the potential success or effectiveness of a project was another factor in prioritizing projects. In some project types, the success is typically high – for example culvert barrier removal, while other project types are more experimental and success is harder to predict.

Cost-Effectiveness

Action Plan priorities are based principally on natural resource needs as identified in the Watershed Assessment. However, cost-effectiveness or "bang for the buck" can be a factor in prioritizing between projects. Projects that are low in cost and promise high benefits are naturally preferred over projects that are high in cost and have low benefit.

Accurately predicting project benefits and biological outcomes is difficult and controversial. Some measures of benefit, for example, the increase in number of fish resulting from an individual project, are easily confounded by outside variables such as flooding, poor water years, ocean conditions, fishing, impacts outside the watershed, and so forth. A number of Action Plan projects satisfy legal requirements and are needed to comply with state or federal law regardless of how they would rank in a cost/benefit analysis. Cost and benefit information is not available for all projects at this time.

Given all of the above, HRWG members did not elect to prioritize projects according to a common cost-benefit formula applied to all projects. Instead, it was agreed to consider costs and benefits on a case-by-case basis where information was available, and where competing projects would accomplish the same objectives.

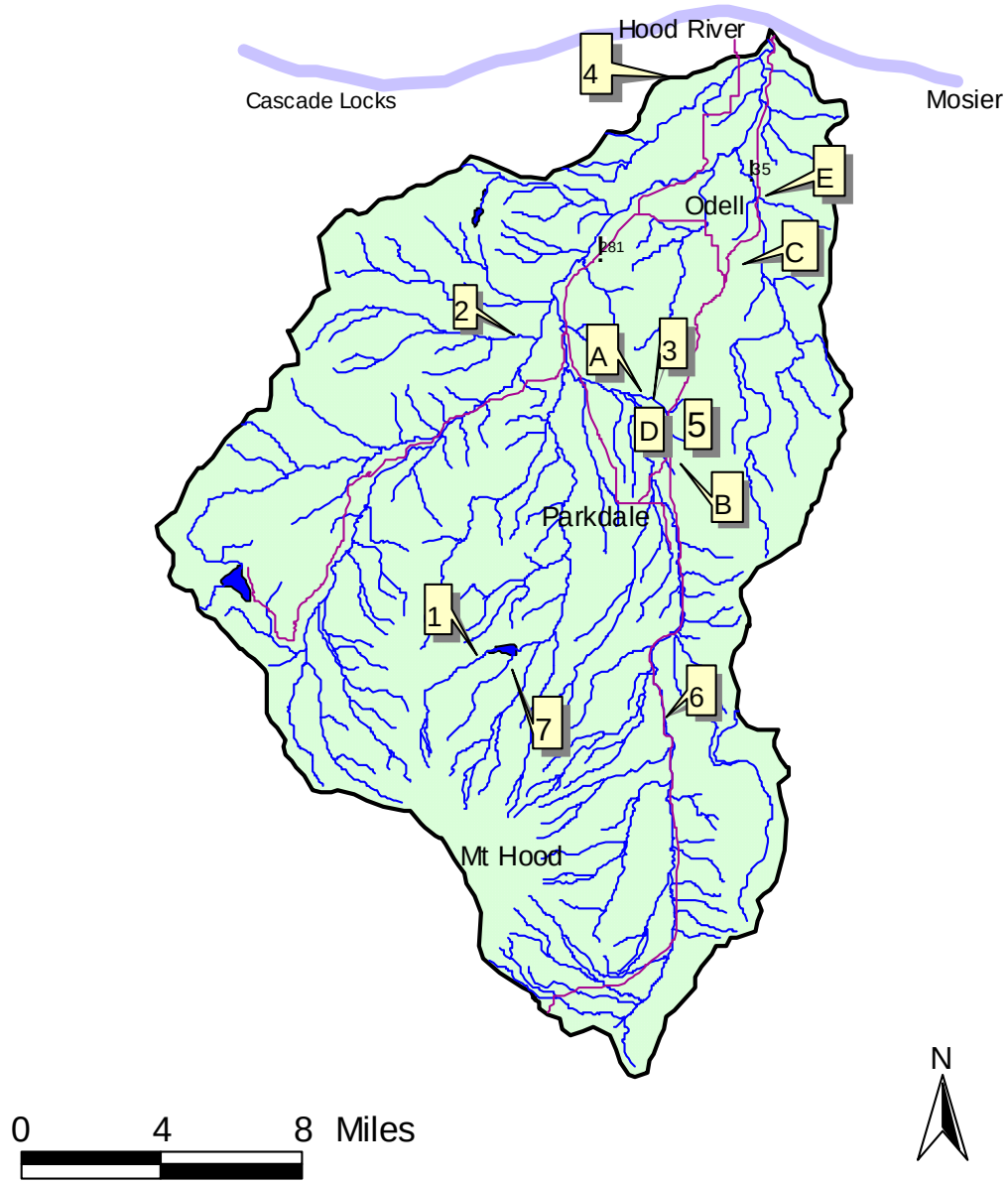
An important note about priority ranking and scheduling

Ranking an action as *high priority* usually implies that it will be completed before a lower priority project. But alas, in this Plan, a *high priority* ranking means that a project is "most important" -- but not necessarily that it will be completed before another lower ranking project. In some instances, high priority projects are scheduled for completion ***after*** lower priority projects because

1) More time is needed to raise funds;
2) Another project must be completed first to achieve project benefits;
3) Timing is outside of local control; or
4) A practical or cost-saving opportunity exists to proceed ahead of ranking order.

Completed Projects

Since January 2000 while work on drafting the Watershed Action Plan continued, seven early Action Plan projects were finished. A map of locations and project descriptions are shown below.



1. Clear Branch Habitat Restoration ☑

Lead Entity: US Forest Service
Date Completed: November 2000
Description: Large woody debris was placed in Clear Branch upstream of the Laurance Lake Reservoir (by helicopter) for a distance of 0.7 miles to improve habitat quality for bull trout and restore flow to a former "old growth" channel with more pools, shade, gravels, and hiding cover. Monitoring thus far shows the project to be successful, and continued large woody debris placement is proposed in this Plan.

2. Green Point Creek Restoration ☑

Lead Entity: Farmers Irrigation District
Date Completed December 2000
Description: 600 pieces of large wood were placed in stream and riparian areas (also by helicopter) and trees planted in lower Green Point Creek to improve stream health. Historic timber harvest and use of splash dams had caused the streambed to cut down under its floodplain, and pool and gravel availability was poor. This project compliments work completed in 1995. Partners included OWEB, US Forest Service, Longview Fibre Co., and HRC Forestry Department. Three orchard landowners donated additional logs and rootwads.

3. Pheonix Pharms Fish Passage Improvement ☑

Lead Entity: Oregon Department of Fish and Wildlife
Date Completed: April 2001
Description: A rotary fish screen was installed to replace an existing screen at the Phoenix Pharms trout pond operation at Baldwin Creek. Two concrete v-slot weirs were installed to eliminate a juvenile fish migration barrier and a partial adult barrier to help steelhead, coho salmon, and cutthroat trout using Baldwin Creek. The new screens meet current fish protection criteria and keep the creek's natural fish from moving into the fish culture ponds. The Confederated Tribes of the Warm Springs Reservation helped plan the project. Phoenix Pharms contributed labor and materials, and will maintain the screen to insure it works properly.

4. Stormwater Bioswale Demonstration Project ☑

Lead Entity: Stonegate Development
Date Completed: June 2001
Project Description: 170 feet of drain pipe leading to Phelps Creek was replaced with a constructed "bioswale" wetland planted with native plant species. A bioswale is a vegetated, low-lying area that collects stormwater from rooftops, driveways, and roads and allows it to infiltrate into the soil and groundwater. By slowing runoff, bioswales can reduce erosion and protect water quality, helping mitigate impacts of urban development on streams. A brochure about bioswales was prepared. An OWEB small grant was used to offset costs. Stonegate contributed labor, plants, and other costs and will maintain the bioswale.

5. Baldwin, Tieman, and Graham Creek Stream Surveys ☑

Lead Entity: Confederated Tribes Warm Springs Reservation
Date Completed: June 2001
Project Description: Stream habitat surveys were completed along three small East Fork Hood River tributaries near the town of Mt. Hood with permission from landowners. ODFW stream

survey protocol was used to record physical habitat characteristics and to identify restoration needs and opportunities. Partners included BPA and the Hood River Watershed Group.

6. Nottingham Campground Improvements ☑

Lead Entity: US Forest Service
Date Completed: October 2001
Project Description: Several informal campsites along the East Fork Hood River were closed and replaced with new, better-defined campsites located further away from sensitive areas. Two bathrooms were added, and a dirt access road was graded and rocked for erosion control. Informal camping and picnic areas had littered the riparian area with trash and human waste. A rutted road caused sediment runoff to the river. The area will now be maintained as part of the Forest Service campground system.

7. Pinnacle Creek Bridge Fish Passage Improvement ☑

Lead Entity: US Forest Service
Date Completed: November 2001
Estimated Cost: $220,000
Project Description: A road culvert at the Pinnacle Creek stream crossing near Laurance Lake was replaced with a bridge-- removing an impediment to the upstream migration of threatened bull trout. Migration had been blocked during low reservoir conditions.

Five other projects that help meet Action Plan goals were recently completed thanks to cooperation between landowners and local partners:

- ✓ **A.** May 2000 -- Confederated Tribes of Warm Springs Reservation and AmeriCorps built three-quarters of a mile of livestock fence along Baldwin Creek. Mt. Hood Meadows Ski Resort and other volunteers planted trees donated by Lava Nursery.
- ✓ **B.** November 2000 -- A half-mile of livestock fence was built along Tieman Creek. The fenced area included several acres of land set aside for wildlife. The Confederated Tribes of the Warm Springs Reservation provided materials, design and crew supervision. AmeriCorps crews were paid under a DEQ 319 Nonpoint Pollution Grant obtained by the SWCD.
- ✓ **C.** December 2000 -- An orchardist enclosed 660 feet of an open ditch that ran down the middle of his orchard with help from the Natural Resource Conservation Service and SWCD. The pipe project is intended to keep potential pesticide contaminants from entering the ditch and Neal Creek. A grant from the OWEB Small Grants Program was used to help pay landowner costs.
- ✓ **D.** April 2001-- 200 hundred native seedling trees and shrubs were planted on private lands along Baldwin, Graham and Tieman creeks under the DEQ 319 Nonpoint Pollution Grant project. Volunteers including Parkdale Elementary School 4th graders and a Parkdale resident helped water and weed the plantings to insure their survival.
- ✓ **E.** May 2001-- A quarter mile of livestock fence was built by the SWCD along Rhoades Creek, a Neal Creek tributary. Downspouts and gutters were installed on farm buildings to control cow manure runoff, and streambanks were planted with native shrubs. Oregon Department of Fish and Wildlife donated materials, the Confederated Tribes of Warm Springs donated equipment and technical support, while AmeriCorps and Mt. Hood Meadows Ski Resort donated labor.

Proposed Strategies and Actions

This Chapter describes recommended Action Plan projects and measures. Projects are prioritized by their main goal: fish passage, water quality, streamflow restoration, habitat protection and restoration, and education. Wildlife measures were added as a separate section. Strategies, projects, and measures are listed by their primary goal, although many projects address multiple goals. For instance, a piping project may eliminate leakage to improve instream flows, while at the same time remove a sediment source affecting a stream.

Fish Passage

Goal: Improve fish passage conditions where affected by artificial impediments

Dams and road culverts impede the upstream migration of juvenile and adult salmonids at a number of sites in the watershed. Water diversions and associated dams redirect and impound water from streams and rivers for crop irrigation, hydroelectric power, drinking water, and other purposes.

Water diversions can block the normal migration of fish, while diversion of fish into pumps, pipes, irrigation canals, and fields can greatly reduce their survival. Downstream migration is obstructed when juvenile fish are killed, injured or trapped going through power and water supply diversions without adequate fish screen facilities.

These problems prevent use of potential spawning and rearing areas, and result in fewer salmon, steelhead, and trout surviving on their way to the ocean or to the Columbia River. The proposed actions would reconnect historic fish habitats that have become isolated by diversion dams, road culvert barriers, or where fish migration is interrupted by poor fish screens on water diversions.

Inventories of road-related barriers at stream crossings on most road ownerships have been completed, but data gaps remain for rural driveways and for Longview Fibre Company lands. Fish migration conditions at all Mount Hood National Forest (MHNF) road crossings were surveyed in 2000, on Hood River County public and forest roads and state highways in 1999 and in 2000. A list of all currently known fish passage remediation needs at road crossings is included in Appendix 1.

Fish Passage Strategy

The fish passage strategy is to reconnect aquatic habitat now disconnected by structures that interfere with migration and full utilization of fish habitat.

Since the law requires that fish passage be provided at all barriers, prioritization concerns the relative order in which remediation should occur. The Oregon Department of Fish and Wildlife, MHNF, and Oregon Watershed Enhancement Board will work with the HRWG, local agencies and the National Marine Fisheries Service to develop a model fish passage prioritization method in the Hood River Watershed for regional use in late 2002 or 2003. To prepare for this, additional surveys will be conducted to complete a basin-wide inventory of all barriers.

Meanwhile, the Action Plan strategy is to fix currently identified fish passage barriers based on priority rankings assigned by Oregon Department of Fish and Wildlife (ODFW) or the Mt Hood National Forest. Where priorities are not yet assigned, the fisheries co-managers ODFW and the Confederated Tribes Warm Springs Reservation will determine the relative priority of a barrier.

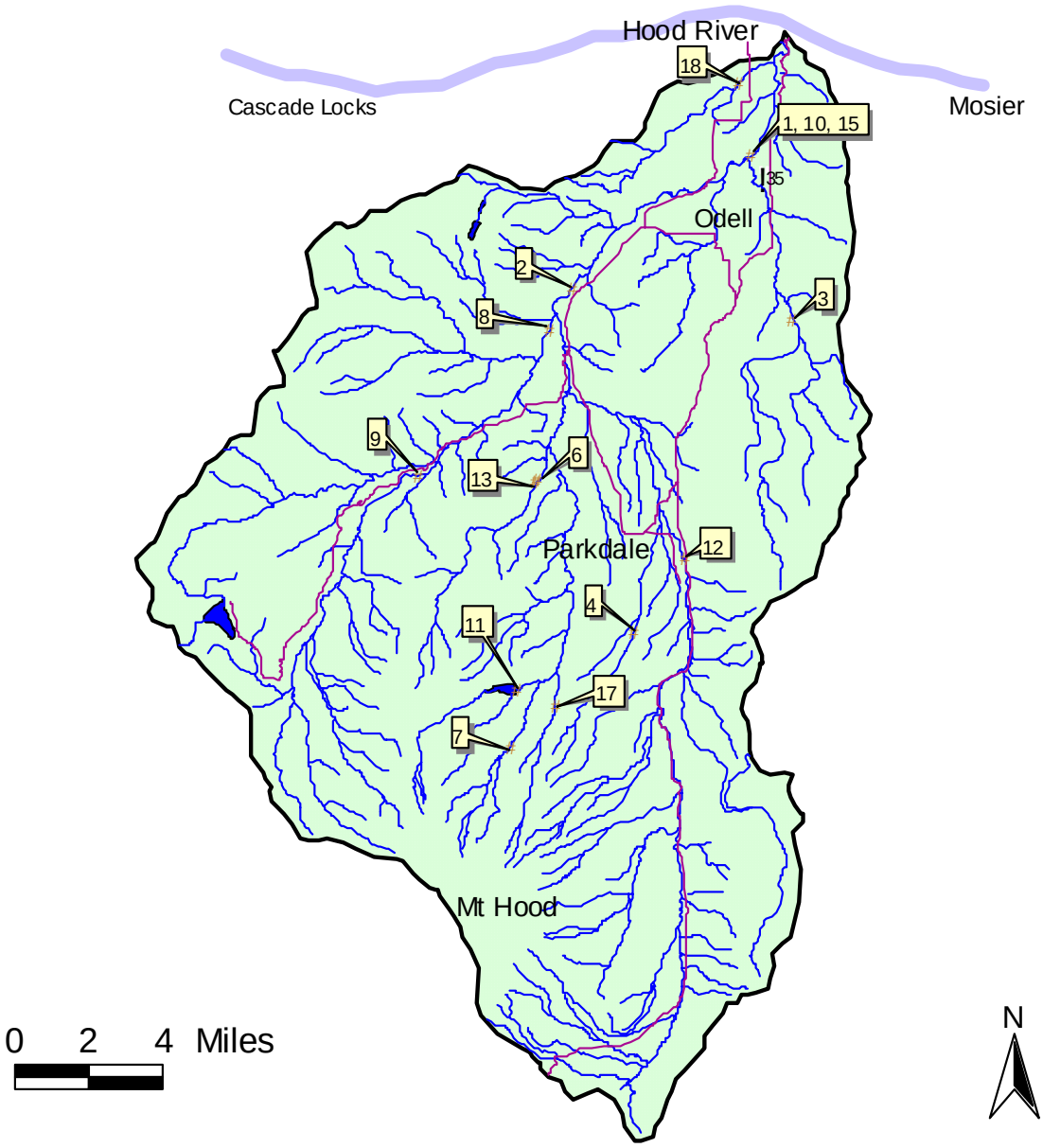
Factors used to determine the priority ranking of a fish passage barrier include:

- *Position in the stream network. The farther downstream a barrier is, the higher its priority compared to another barrier on the same stream.*
- *Whether a threatened species or sensitive population is affected*
- *The potential number and diversity of species affected*
- *The quality and amount of habitat area above the barrier*
- *Whether the barrier is within a priority watershed area*
- *For screening projects, priority is influenced by the proportion of streamflow diverted, since this affects the number of fish likely to encounter the diversion*

As a practical matter -- efficiency may influence the actual order of road culvert replacement. For example, if a road crew is scheduled to work near a known barrier, e.g., during a timber sale or other road maintenance work, the lead entity may choose to fix a fish passage barrier regardless of its priority since work crews and equipment would already be mobilized in the area.

Fish Passage – List of Proposed Actions

Ref. No.	Project Name	Priority	Schedule
1	Powerdale Dam Fish Screen Replacement	High	?
2	Farmers Canal Fish Screen	High	2002
3	Central Canal Upgrade/Neal Creek Inverted Siphon	High	2004
4	Glacier Ditch/Evans Creek Fish Passage and Water Quality Improvement	High	2002
5	Complete Forest Road Culvert Inventory	High	2002
6	Dee Mill Tony Creek Fish Screen	High	2002-3
7	Coe Branch Diversion and Fish Screen Improvement	High	2006
8	Punchbowl Falls Fishway Access Ladder Replacement	High	2003
9	Dee Irrigation District Diversion Fish Passage Improvement	High	2003-4
10	Powerdale Dam Auxiliary Fish Ladder Intake Screen Replacement	Med	?
11	Clear Branch Dam Fish Trap Attraction	Med	2004
12	East Fork Hood River Diversion Intake Design Alternative	Med	2006
13	Aldridge Ditch Diversion Fish Screen Improvement	Med	2002-3
14	Fish Passage Improvements on Private Land –Various Tributary Streams	Med	2002-6
15	Powerdale Dam Upstream Passage Improvements	Med	2004
16	Fish Barrier Prioritization Method and Culvert Remediation	Med	2002-3
17	Eliot Branch Diversion and Fish Screen Improvement	Low	2004-5
18	Indian Creek Dam Passage Improvement	Low	2006
19	Small Pump Intake Screen Upgrades	Low	2002-7



Fish Passage Project Locations

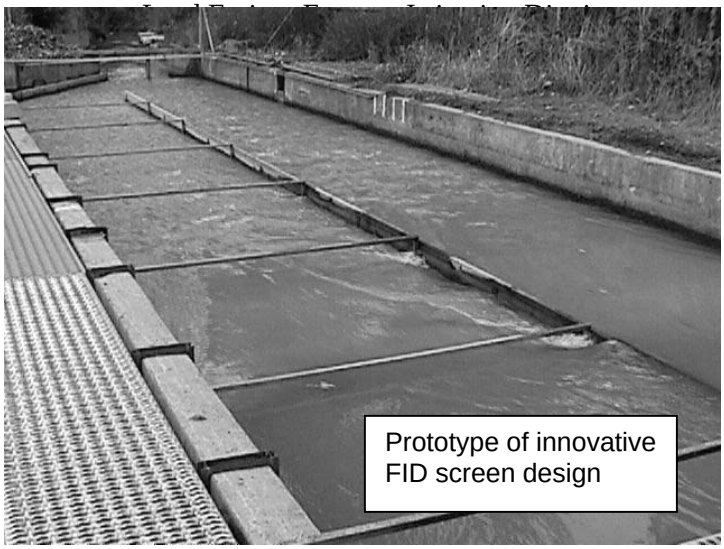
Projects with multiple sites not shown on map

Project Descriptions

FP-1. Powerdale Dam Fish Screen Replacement

Priority: High
Lead Entity: PacifiCorp
Subwatershed: Hood River Mainstem
Estimated Cost: $2.4 million
Description: Under Federal Energy Regulatory Commission (FERC) license requirements, PacifiCorp would replace existing fish screens at Powerdale Hydroelectric Project at river mile 4.0 to meet current fish protection criteria. Given news that PacifiCorps may surrender its power license, interim measures are needed while the fate of the dam is resolved.
Benefits to ESA Listed and Target Species: The project will increase downstream migration survival of threatened bull trout and steelhead. The diversion is located downstream of 96% of all spawning and rearing area in the Hood River system. Bull trout, summer and winter steelhead, spring chinook, cutthroat and sea-run cuthroat trout, rainbow trout, mountain whitefish, and coho salmon occur upstream of this diversion. Juvenile fish are swept into the power canal and a proportion injured and killed at the screen and powerhouse turbines. This project would prevent fish entering the canal and turbine area and associated mortality.
Habitat Concerns Addressed: Fish passage problems including inadequate screening is a limiting factor in the Hood River. The existing screens do not meet current NMFS passage criteria. A test in 1995 found juvenile salmonids in the canal past the existing screens.
Rationale for Priority Ranking: This is the largest and downstream-most fish screen problem in the watershed. Powerdale Dam is on the mainstem Hood River 4 miles from the Columbia River, where up to 500 c.f.s. or up to 80% of river flow is diverted. This project would benefit a large number and diversity of species including threatened fish.
Schedule: This project is part of an ongoing FERC licensing process and is currently in a delay mode. In early 2002, PacifiCorp notified FERC of its intention to file an application to surrender its license due to economic factors. Meanwhile, power generation could continue under an annual license while PacifiCorp, the agencies, and local "stakeholders" negotiate surrender and decommissioning terms as required by FERC. In 1999, the HRWG requested accelerated fish screen replacement or interim actions to protect fish, but PacifiCorp has not responded.
Sequence in relation to other projects: Timely screen replacement or interim protection measures at Powerdale Dam are essential. Otherwise, a large proportion of fish saved by upstream fish screen improvements at irrigation diversions will be lost.
Partners: This is a federal license proceeding involving a large corporation. State, tribal, and federal agencies, and local parties will continue to participate in the process to resolve problems.
Monitoring: PacifiCorps is required to conduct post-installation tests to evaluate the efficiency and safety of new screen facilities.

FP-2. Farmers Canal Fish Screen


Prototype of innovative FID screen design

Priority: High
Subwatershed: Hood River Mainstem
Estimated Cost: $1,375,000
Description: Farmers Irrigation District (FID) will replace an old rotary drum fish screen at the Farmers Canal Hood River diversion with an innovative, passive infiltration, high velocity horizontal fish screen designed and patented by FID and fish return facility. A wooden flume at the upper end of the canal will also be replaced with pipe. The proposed fish return bypass will use an existing ephemeral channel enhanced as a natural habitat instead of a standard pipe. Other project features are a more natural intake configuration and improved sediment management.
Benefits to ESA Listed and Target Species: This project will increase survival of threatened bull trout and steelhead from the majority the watershed. The existing screen does not meet current NMFS fish protection criteria. Juvenile migrants and spawned steelhead kelts are carried past the screen and trapped in the canal. The diversion is downstream of primary spawning and rearing areas in the Hood River system. Bull trout, summer and winter-run steelhead, spring chinook, cutthroat and sea-run cuthroat trout, rainbow trout, and coho salmon use upstream habitat areas.
Habitat Concerns Addressed: Inadequate screening at water diversions is a key limiting factor in the Hood River. Mortality occurs as a proportion of downstream migrant salmonids are swept into the canal and become trapped or stranded. Hundreds to thousands of juveniles are removed from the canal annually. In addition, the diversion will be improved so that organic matter and sediment will remain suspended and not settle out in the intake, eliminating periodic removal and discharge to the river under existing condition.
Rationale for Priority Ranking: This project will increase fish survival from the majority of the subbasin given that all major tributaries are upstream of this diversion. About 80 c.f.s. is diverted into the Canal from the Hood River.
Schedule: Construction and initial monitoring completed November 2002.
Sequence in relation to other projects: Ideally, *FP-1 Powerdale Dam fish screen replacement* should occur before this project, but it is on hold pending FERC licensing proceedings.
Cost-share and other partners: Farmers Irrigation District - $313,000 incl. permits/design Oregon Watershed Enhancement Board - $316,000; Hood River County/USFS P.L 106-393 - $150,000; Bonneville Power Administration - $600,000; National Fish and Wildlife Foundation - $50,000; Confederated Tribes of Warms Springs - $5,400; Oregon Department of Fish and Wildlife- $6,400. Fundraising support Hood River Soil and Water Conservation District.
Monitoring: An approved monitoring plan will be implemented. Success will be determined by testing the new facilities to insure they meet fish protection criteria and do not harm or delay fish. Fish salvages in Farmers Canal will occur for 3 years after construction. Bypass success will be defined as having no injury to fish or predation increase compared to river conditions. The bypass channel will be surveyed for habitat use by juvenile and spawning fish.

FP-3. Central Canal Upgrade/Neal Creek Inverted Siphon


Fish salvage in Eastside Canal with volunteer help

Priority: High
Lead Entity: East Fork Irrigation District
Subwatershed: Lower Neal Creek
Estimated Cost: $10 million
Description: The EFID Central Canal will be piped to carry an additional 42 c.f.s. now conveyed by Neal Creek. A large-diameter pipeline will connect the Central Canal to the Eastside Lateral using an siphon under Neal Creek. The total project length is 4.3 miles. This project would replace a significant segment of an old canal system and solve associated fish and water quality problems. Currently, an open unlined ditch and 1.7 miles of Neal Creek's natural channel carry irrigation water from the EFID East Fork Hood River source into Eastside Canal.
Benefits to Endangered Species Act Listed and Target Species: Threatened winter steelhead, and resident and sea-run cuthroat trout will benefit by restoring up-and downstream migration in Neal Creek, including access to 2 miles of upstream anadromous habitat. The project will improve habitat and water quality in 7 miles of the creek by eliminating a chronic sediment source.
Habitat Concerns Addressed: The Neal Creek diversion has an old drum screen that does not meet current fish protection criteria and that allows fish to pass into the Eastside Canal (photo). The dam impedes upstream migration at low flows. Fish passage is identified as a key limiting factor in the watershed assessment. This project eliminates the need for fish screen and ladder improvements at the diversion. At the same time, it would end the transport of glacial silt and bank erosion sediment into Neal Creek from the irrigation system, and eliminate risk of landslide and canal failure in the improved section of Central Canal. Aquatic insect species diversity and production and salmonid incubation are impaired by sediment and turbidity. Note: This project may affect the creek's summer streamflow but result in a more natural annual flow regime.
Rationale for Priority Ranking: Because there are no falls near its mouth, Neal Creek is the only lower Hood River tributary accessible to anadromous fish. Its headwaters are forested, in public ownership, and have the potential for improved road and habitat conditions and productivity for fish. Livestock-related water quality improvements are ongoing in lower Neal Creek, now totaling 2 miles of treated area. Converting open ditches to pipe may generate water savings to help EFID restore East Fork Hood River streamflows.
Schedule: Final engineering is being completed in spring 2002. The EFID and partners will seek funding and financing for construction in 3 phases beginning in 2003. Phase I is estimated at $4.2 million and could begin in 2004 depending on funding.

Sequence in relation to other projects: Project *H-8 West Fork Neal Creek Floodplain and Channel Restoration* should be postponed until the Central Canal Upgrade/Neal Creek Inverted Siphon is completed, so that restoration work will occur when the irrigation system is no longer using the creek as a conveyance and the natural summer flow regime is restored.
Cost-share and other partners: Engineering funds already raised: EFID - $ 111,000; Oregon Watershed Enhancement Board - $35,000; Hood River County/USFS P.L 106-393 - $52,250; Bonneville Power Administration through Confederated Tribes Warms Springs - $241,300, plus an additional $500,000 for construction. Partners will work to obtain other construction funds.
Monitoring: A monitoring plan will be developed for this project.

FP-4. Glacier Ditch/Evans Creek Fish Passage and Water Quality Improvement

Priority: High
Lead Entity: Middle Fork Irrigation District
Subwatershed: Evans Creek
Estimated Cost: $541,965
Description: MFID now uses Evans Creek to transport up to 12 c.f.s. of irrigation water from Eliot and Coe Branches via the open Glacier Ditch. Two new pipeline sections totaling 3.4 miles would replace Glacier Ditch and eliminate using Evans Creek to carry water supply.
Benefits to Endangered Species Act Listed and Target Species: Juvenile and adult coho, cutthroat and rainbow trout, and threatened winter steelhead will benefit from this project. MFID operates 2 diversion dams that impede fish passage at miles 4 and 5.5. Both are outfitted with window screen that does not meet current fish screen protection criteria. Passage will be restored to 2.5 miles of creek with average stream gradients between 4 and 8%. Spawning and rearing conditions will improve in the lower 5.5 miles by eliminating silt from glacial water sources.
Habitat Concerns Addressed: Delivery of glacial sediment into clear-water streams is noted as a problem in the assessment. Lower Evans Creek contains 2.7 miles of low gradient (<3%), unconfined/moderately confined channel habitat adversely affected by this sediment source. Excessive fine sediment levels in lower Evans Creek (29 to 44%) were noted by ODFW stream surveys. Piping Glacier Ditch will eliminate the threat of landslide and canal failure. Summer stream flow will be reduced but restored to a more natural condition.
Rationale for Priority Ranking: Ending the delivery of glacial silt and turbidity from the glacial Eliot and Coe Branches is expected to significantly improve habitat conditions in Evans Creek.
Schedule: Project completion anticipated by Fall 2002.
Sequence in relation to other projects: A third barrier at a MFID diversion dam downstream was removed in 1999. Four other road culvert barriers on Evans Creek, three on county-owned roads, will be removed as soon as possible
Cost-share and other partners: MFID - $97,953; OWEB - $76,000; Hood River County/USFS P.L 106-393 - $127,478 requested; BPA through Confederated Tribes Warms Springs Reservation - $194,000; design consultation and fundraising - CTWS, fundraising- SWCD.
Monitoring: Post-construction and routine inspection of pipeline facilities and fish passage conditions. Baseline suspended sediment data collection initiated by MFID in Summer 2001. Further monitoring anticipated beginning in Spring 2003.

FP-5. Complete Forest Road Culvert Inventory

Priority: High
Lead Entity: Longview Fibre Co
Subwatershed: Tony Creek, West Fork Hood River
Estimated Cost: $50,000
Description: All private and county-owned forest roads will be surveyed in 6 land sections using the Oregon Department of Forestry and ODFW protocols, to extend the 2000 County Forest road survey to Longview Fibre and other non-federal forest roads. The land sections are 2N9, 1S10; 1N10; 2N 10, 1N 11; 2 N11, 1 N 9 and 1 S 9, largely owned by Longview Fibre Company but

interspersed with other forest landowners including Hood River County.
Benefits to Endangered Species Act Listed and Target Species: Inventory will lead to reduced sediment runoff, lower risk of forest road washouts and culvert barrier remediation if needed to restore access to upstream habitat for juvenile and adult steelhead and bull trout listed as threatened species, and spring chinook, coho, and resident trout.
Habitat Concerns: Fish passage at all stream crossings was identified as a data gap. A full inventory of road culverts that impede passage or present a risk of road washout, has not yet been identified for the watershed. The survey will include road conditions and maintenance needs to minimize sediment runoff. Forest roads are a chronic source of fine sediment delivery to streams.
Rationale for Priority Ranking: This survey would fill the largest remaining data gap regarding road culvert fish passage barriers in the Hood River watershed.
Schedule: 2002
Sequence in relation to other projects: This survey would help complete an inventory of all migration barriers. ODFW, USFS, OWEB and local partners plan to develop and apply a standardized fish passage prioritization method in the watershed during 2002 or 2003.
Cost-share and other partners: The company has budgeted for this project.

FP-6. Tony Creek Dee Mill Site Fish Screen

Priority: High
Lead Entity: ODFW and Conf. Tribes Warm Springs Res.
Subwatershed: Tony Creek
Estimated Cost: To be determined
Description: Work with owner to design and install a fish screen and juvenile passage facility. Evaluate the feasibility of combining intakes with the Aldridge Ditch Co. diversion and screen at a single diversion point.
Benefits to Endangered Species Act Listed and Target Species: Threatened winter-run steelhead use Tony Creek, and bull trout and spring chinook were radiotracked in Tony Creek below the dam. Fish screening will insure safe downstream migration for steelhead, bull trout, chinook, cutthroat, rainbow trout and other species using Tony Creek.
Habitat Concerns: Fish passage is identified as a major limiting factor in the Hood River. Screening that meets current federal and state protection criteria is needed at this site. Juvenile fish cannot migrate into upstream habitat because of an 18-inch step barrier at the diversion dam.
Rationale for Priority Ranking: Tony Creek is an important tributary to the Middle Fork Hood River and contains several miles of habitat accessible to anadromous fish. Unscreened diversion of water is currently occurring and this problem should be fixed as soon as possible. Juvenile steelhead and other juvenile fish are unable to access upstream rearing habitat areas.
Schedule: 2002-3
Sequence in relation to other projects: Interim upstream passage improvements for adult fish were completed in 1999 by CTWS appear to be performing well.
Cost-share and other partners: FID has prepared a screen design that may be of use at this site.

FP-7. Coe Branch Diversion and Fish Screen Improvements

Priority: High
Lead Entity: Middle Fork Irrigation District
Subwatershed: Coe Branch
Estimated Cost: $944,598 subject to revision
Description: Replace or improve existing diversion for fish passage and continual movement of sediment downstream. Install new screens and fish ladder. Design options under review, including using a new undershot horizontal fish screen designed by Farmers Irrigation District.
Benefits to Endangered Species Act Listed and Target Species: The U.S. Forest Service fisheries surveys document bull trout spawning in Compass Creek above the diversion dam. Bull trout juveniles are believed to utilize Coe Branch for rearing. This project would insure upstream

passage and safe downstream passage past the Coe diversion for bull trout, and maximize distribution and utilization of Compass Creek which a clear and stable tributary to Coe Branch.
Habitat Concerns Addressed: Inadequate fish screening and fish passage exist at this site. Heavy bedload movement and sediment loads present a challenge for designing passage facilities.
Rationale for Priority Ranking: Bull trout are a listed as threatened and the total Hood River population numbers fewer than 300 individuals. This project will promote use and distribution of bull trout in Coe Branch and Compass creeks.
Schedule: Estimated completion by 2006 pending further design testing, engineering, agency approval, and funding availability. An environmental assessment was started by the USFS.
Sequence in relation to other projects: MFID is working with Farmers Irrigation District to investigate using a new undershot screen design at this site pending testing at the Eliot diversion.
Cost-share and other partners: As of 2000, $15,000 was made available from the Forest Service, $100,000 from CTWS; and $25,000 from the USFWS. MFID will provide $50,000 as matching funds for a pending $180,000 BPA Innovative Technology grant proposal to build and test the FID "undershot" horizontal fish screen at the Eliot diversion. If successful, this design will be used at the Coe diversion.
Monitoring: Baseline sediment transport study conducted by MFID in 1998-2000.

FP-8. Punchbowl Falls Fishway Access Ladder Replacement

Priority: High Lead Entity: Oregon Department of Fish & Wildlife
Subwatershed: West Fork Hood River Estimated Cost: $121,000
Description: A new stairway will be built to replace an unsafe, dilapidated stairway down the face of a 200-foot basalt cliff to allow fishery workers to maintain the Punchbowl Fish Ladder. The fishway is vulnerable to bedload and debris accumulations during river flood events. This debris periodically interferes with the movement of water and fish through the fishway.
Benefits to Endangered Species Act Listed and Target Species: This project will ensure that threatened summer and winter steelhead, and spring chinook salmon adults can access available spawning habitat in the West Fork Hood River and tributaries upstream of the fishway. Flood events flush gravel and debris into the fishway entrance impairing its effectiveness to pass summer and winter steelhead, as well as spring chinook, coho, and resident rainbow trout. Natural spawning of native stock summer steelhead occurs only the West Fork and tributaries above Punchbowl Falls, as does most spring chinook spawning.
Habitat Concerns Addressed: Reliable passage over Punchbowl Falls is needed for upstream migration of steelhead and spring chinook in the West Fork Hood River and will assist in rebuilding these stocks. The Punchbowl Fish Ladder was built by the Oregon Game Commission in 1957 to improve passage over a natural falls that were passable under some flow conditions. Anedotal reports indicate that these falls were historically passable, but downcutting caused by flooding, splash damming, and riparian timber harvest has heightened the falls.
Rationale for Priority Ranking: Access to essential spawing and rearing habitat for threatened summer steelhead and spring chinook currently is depends upon this fishway functioning properly. No safe alternative access to maintain the fishway exists. Under all flow conditions it is dangerous to wade the river above the falls to clean out the ladder.
Schedule: 2003
Sequence in relation to other projects: N/a
Cost-share and other partners: An ODFW Salmon and Trout Enhancement Program Grant application is pending. CTWS and SWCD will provide other assistance as needed.
Monitoring: This facility will help monitor passage conditions and proper ladder functioning.

FP-9. Dee Irrigation District Diversion Fish Passage Improvement

Priority: High
Lead Entity: Dee Irrigation District
Subwatershed: West Fork Hood River Mainstem
Estimated Cost: To be determined
Description: This project would design and construct an alternative intake system to replace the existing boulder push-up dam in the West Fork Hood River near river mile 6 where the District diverts about 13 cubic feet per second from May or June though October each year.
Benefits to Endangered Species Act Listed or Target Species: This project would provide unimpeded upstream adult migration for spring chinook and native wild summer-run steelhead and resident trout into the upper West Fork Hood River on Forest Service lands. Anadromous salmonid spawning and rearing habitat in the upper West Fork and its tributaries is among the best quality in the Hood River subbasin. The steelhead population is listed as threatened, and summer-run steelhead use the West Fork Hood River drainage almost exclusively.
Channel Habitat Type: Moderate gradient, confined habitat at the diversion site with moderate to low gradient, unconfined to moderately confined habitat upstream.
Habitat Concerns Addressed: The diversion impedes spring chinook and summer steelhead adult passage into the upper West Fork Hood River under certain flow conditions.
Rationale for Priority Ranking: Wild summer steelhead population numbers are very low. Native spring chinook became extinct in the 1970s, and an effort is underway to develop a locally adapted run using Deschutes River stock.
Schedule: To be determined
Relationship to other projects: Dee, Farmers, and Middle Fork Irrigation District staff have discussed a potential alternative water supply using water savings recovered by future system efficiency measures (*S-3 Middle Fork Hood River Flow Restoration*). This approach could influence any decision to invest in a permanent new intake facility on the West Fork.
Monitoring: To be determined.
Potential Partners: CTWS, ODFW, BPA, OWEB

FP-10. Powerdale Dam Auxiliary Fish Ladder Intake Screen Replacement

Priority: High
Lead Entity: PacifiCorp
Subwatershed: Hood River Mainstem
Estimated Cost: $25,000
Description: Install traveling screen on the 70 c.f.s auxiliary water intake for the fish ladder.
Benefits to Endangered Species Act Listed and Target Species: Threatened bull trout, summer and winter steelhead, spring chinook, sea-run cuthroat trout, and coho salmon occur upstream of this diversion. This project will insure proper fish ladder functioning so that upstream migration is not impeded by reduced attraction flow to the fish ladder.
Habitat Concerns: The trash rack for the fish ladder auxiliary attraction water supply allows smaller debris to pass through and become lodged against the diffuser grate. When the diffuser grate plugs, the attraction flow to the fish ladder is reduced thereby increasing the difficulty for fish in locating the ladder entrance.
Rationale for Priority Ranking: This project will help maintain continuous attraction into the fish ladder, which would insure adult passage into the majority of the Watershed. It is a medium priority since the fish ladder appears to be working reasonably well at present.
Schedule: To be determined. This project is part of a FERC power licensing process including the recent PacifCorp proposal to surrender their power license. However, it could be required as an interim operations measure.
Monitoring: Pacificorp will maintain and monitor the screen to insure proper functioning.

FP-11. Clear Branch Dam Fish Trap Attraction

Priority: Medium
Lead Entity: MFID or US Forest Service
Subwatershed: Clear Branch
Estimated Cost: To be determined
Description: Investigate options and improve attraction to the fish trap located in the stilling basin area below the dam. Evaluate the re-design and repair of stilling basin area below the dam to eliminate erosion during high flow events.
Benefits to Endangered Species Act Listed and Target Species: Threatened bull trout are affected by a complete barrier at Clear Branch Dam. Primary spawning and rearing habitat areas for bull trout are located above the dam in upper Clear Branch, with some use of Pinnacle Creek that flows into the Laurance Lake reservoir. This project will help mitigate the effects of the dam barrier on bull trout migration. Other fish, such as resident rainbow trout, also may use the trap.
Habitat Concerns: The fish trap below the dam works poorly and is not catching fish, possibly due to warm temperature of a spring used as attraction flow into the trap. Fish instead appear to be attracted to the cooler drain water at the toe of the dam. Also, the stilling basin area is subject to severe erosion in flood events.
Schedule: 2004
Sequence in relation to other projects: *WQ-13 Laurance Lake Temperature Study* will develop useful information for this project.
Cost-share/ other partners: Agency, tribal and local partners will help seek grant funds as needed.

FP-12. East Fork Hood River Diversion Intake Alternative Design

Priority: Medium
Lead Entity: East Fork Irrigation District
Subwatershed: East Fork Hood River
Estimated Cost: Undetermined
Description: An alternative water collection intake design would be developed to replace the existing "push up dam" in the East Fork Hood River at the EFID diversion. The EFID diverts up to 130 cubic feet per second from the East Fork (6.5 miles from the Middle Fork confluence).
Benefit to Endangered Species Act Listed and Target Species: Restore improved adult fish passage for steelhead, coho salmon, mountain whitefish and cutthroat trout at the East Fork Canal headgate. Improve habitat conditions for steelhead and other native fishes by restoring the East Fork Hood River streambed to a more natural configuration and decrease or eliminate maintenance-related channel disturbances at this river location by heavy machinery.
Habitat Concerns Addressed: To facilitate diversion into its main delivery canal, EFID has to manipulate the riverbed after flood events or during very low flows. This project would eliminate frequent instream disturbance caused by heavy machinery used to maintain the existing diversion intake, and improve adult fish passage past the diversion. Because a new fish screen and return bypass was installed in 1996 in the canal, new juvenile fish protection facilities are not required.
Channel Habitat Type: MM (low-moderate gradient, variably confined)
Schedule: 2006. This project is in an early discussion phase with EFID. A DSL and ODFW field visit occurred in early 2001. The schedule depends on funding for design and construction.
Sequence in relation to other projects: Channel movement, sediment deposition and transport patterns in this unstable reach of the East Fork Hood River should be examined as part of this project. A large bedload accumulation has grown on the opposite bank immediately above a constriction formed by the short-span ODOT bridge on Tollbridge Road.
Potential Partners: Confederated Tribes Warm Springs Reservation, Oregon Department of Fish and Wildlife, Mt Hood Irrigation District, Hood River Watershed Group, US Forest Service.

FP-13. Aldridge Ditch Diversion Fish Screen

Priority: Medium
Lead Entity: Aldridge Ditch Company
Subwatershed: Tony Creek
Estimated Cost: $10,000 to $20,000
Description: Design and install new fish screen and safe downstream fish return pipe meeting current fish passage criteria. Evaluate the feasibility of a combined intake with the Dee Mill diversion and screening a single diversion point in cooperation with Aldridge Ditch Company.
Benefits to Endangered Species Act Listed and Target Species: Threatened winter steelhead use Tony Creek, and bull trout and spring chinook have been observed in Tony Creek below the diversion. Fish screening will insure safe downstream migration for steelhead, cutthroat, rainbow trout and other species using Tony Creek.
Habitat Concerns: Fish screening that meets current federal and state protection criteria is needed at this diversion facility. Fish passage is identified as a major limiting factor in the Hood River.
Rationale for Priority Ranking: Tony Creek is an important tributary to the Middle Fork Hood River and contains several miles of habitat accessible to anadromous fish. Inadequate fish screen is in place that does not meet current standards, and fish return pipe appears hazardous to fish.
Schedule: 2002-3
Sequence in relation to other projects: Could be addressed in conjunction with *FP-6 Tony Creek Dee Mill Site Fish Screen*.
Cost-share and other partners: ODFW, Conf. Tribes of WSR, Hood R. Watershed Group.

FP-14. Fish Passage Improvements on Private Land –Various Tributary Streams

Priority: Medium
Lead Entity: Confederated Tribes WSR and ODFW
Subwatershed: various
Estimated Cost: To be determined
Description: Complete stream habitat surveys where needed in cooperation with private landowners. Improve fish passage as needed at various types of barriers in Baldwin, Graham, Tieman , Evans, and other creeks at small dams and driveway crossings.
Benefits to Endangered Species Act Listed and Target Species: This project will expand spawning and rearing habitat in smaller tributaries used by threatened steelhead and by resident salmonids including cutthroat trout.
Habitat Concerns: Impediments to fish migration are a statewide and regional priority and a key limiting factor in the Hood River watershed. Stream habitat surveys have found a large number of small barriers of various types that limit habitat utilization by both anadromous and resident fish.
Rationale for Priority Ranking: Barriers on small tributaries can block important spawning and rearing areas, including habitats used as overwintering and flood refuge areas. Stream surveys will continue to identify barriers and an effort will be made to correct downstream barriers before moving upstream. Barriers on anadromous stream reaches will have higher priority.
Schedule: Work to be completed between 2002 and 2004
Sequence in relation to other projects: Work on *FP-16 Barrier Prioritization Method and Culvert Barrier Remediation will assist prioritization among projects.*
Cost-share and other partners: ODFW, OWEB, BPA, other grant sources. SWCD will assist in fundraising and coordination as needed.

FP-15. Powerdale Dam Upstream Passage Improvements

Priority: Medium
Lead Entity: PacifiCorp
Subwatershed: Hood River Mainstem
Estimated Cost: $5000
Description: Develop and implement a detailed operation and maintenance plan to insure proper functioning of the fish ladder and fish trap facility. Investigate whether any operational or

structural improvements are feasible to improve fishway attraction and passage into the fish ladder trap.
Benefits to Endangered Species Act Listed and Target Species: Insure that returning adult listed bull trout and steelhead, as well as other fish can move upstream with a minimum of delay introduced by the dam or by poor attraction to the fish ladder.
Habitat Concerns: Fish attraction and upstream migration through the fish ladder is delayed under certain flow and gate opening configurations.
Rationale for Priority Ranking: This is the downstream-most migration barrier in the subbasin and affects all returning migratory fish.
Schedule: This project is part of the FERC licensing process and is likely to be hold until FERC issues a power or surrender license accepted by PacifiCorp.

FP-16. Barrier Prioritization Method and Culvert Barrier Remediation

Priority: Medium
Lead Entity for Prioritization: ODFW and US Forest Service
Lead Entity for Remediation: Varies by road ownership
Subwatershed: Entire watershed
Estimated Cost: Varies by project
Description: Refine fish passage barrier prioritization method using complete inventory. Meanwhile local entities will proceed to fix known culvert and other barriers according to assigned priorities, availability of funds and as opportunities arise.


This road culvert on Evans Creek blocks migration and will be replaced in 2002

Benefits to Endangered Species Act Listed and Target Species: Barrier remediation will restore access to more upstream habitat for steelhead and bull trout listed as threatened species, and spring chinook, coho, resident trout, and Pacific lamprey.
Habitat Concerns: Fish passage is identified as a key limiting factor in the watershed.
Rationale for Priority Ranking: Impediments to fish migration are a statewide and regional priority concern and a key limiting factor in the Hood River watershed. The state and federal agencies, including NMFS and the USFWS, are interesting in developing a uniform approach to fish passage prioritization to guide funding decisions. This project will facilitate a refined barrier prioritization process for the watershed based on a total inventory. See Appendices.
Schedule: 2002-3
Sequence in relation to other projects: This project will follow *FP-5 Complete Forest Road Culvert Inventory,* and will combine information from each of the other projects in this Chapter. Partners will proceed to fix known culvert using assigned priorities or as opportunities arise.
Cost-share and other partners: OWEB

FP-17. Eliot Branch Diversion and Fish Screen Improvements

Priority: Low
Lead Entity: Middle Fork Irrigation District
Subwatershed: Eliot Branch
Estimated Cost: $1,124,875 depending on design
Description: Design and install a new screen and fish ladder at the Eliot diversion. Currently, there is a plan to build and test the FID undershot horizontal fish screen design at this site.
Benefits to Endangered Species Act Listed and Target Species: State and federal law requires fish passage and fish screening at diversion dams. This could improve passage for threatened bull trout and steelhead which may be present during periods of relative channel stability, along with resident trout, however, fish usage in Eliot is not well known.
Habitat Concerns: Inadequate fish screen and adult and juvenile fish passage.
Rationale for Priority Ranking: Landslides 1999 and 2000 severely disturbed the channel. Screen design work is ongoing and needs more time. Eliot Branch is a steep glacial outwash channel with frequent debris flows. There are no clear tributaries and current fish usage is questionable.
Schedule: 2004-5
Cost-share and other partners: Farmers Irrigation District, Confederated Tribes of Warm Springs Reservation, Bonneville Power Administration, and US Forest Service.
Monitoring: MFID has collected baseline suspended sediment and bedload data.

FP-18. Indian Creek

Priority: Low
Lead Entity: Hood River SWCD
Subwatershed: Indian Creek
Estimated Cost: To be determined
Description: Remove or otherwise improve fish passage at old Diamond Fruit Dam behind Down Manor near stream mile 1.0.
Benefits to Endangered Species Act Listed and Target Species: No species in Indian Creek are currently listed.
Habitat Concerns: Resident trout passage is blocked.
Rationale for Priority Ranking: The fact that no listed or target species using Indian Creek makes this project less urgent, however, this project may be important to the resident fish population using Indian Creek. HRV High School uses Indian Creek in their advanced biology program.
Schedule: 2006
Cost-share and other partners: Hood River Watershed Group may adopt this project.

FP-19. Small Pump Intake Screens

Priority: Low
Lead Entity: Oregon Department Fish & Wildlife
Subwatershed: Scattered Sites in Watershed
Estimated Cost: $1000
Description: Finish and distribute the inventory report begun in 1998 to allow identification of priority fish screen upgrades needed on small private pumped withdrawals to better protect fish. Assist landowners to upgrade screens.
Benefits to Endangered Species Act Listed and Target Species: A proportion of screen upgrades may affect juvenile threatened steelhead, or coho, cutthroat, and resident rainbow trout.
Habitat Concerns: There may be unscreened or inadequately screened small pumped withdrawals in fish bearing streams.
Rationale for Priority Ranking: It is believed there are relatively few private pumps in fish-bearing waters are few since most land is supplied by irrigation districts.
Schedule: To be determined. Inventory was completed in 1999. Awaiting report from ODFW.
Cost-share and other partners: ODFW has an assistance program for screening small pumped withdrawals.

Water Quality

Goal: Reduce contaminants to protect human health, aquatic life, and beneficial water uses; meet or surpass water quality standards/guidelines consistent with natural conditions**.**

Elevated water temperatures, pesticides, nutrients, pH, bacterial contamination and turbidity have been measured in several tributaries and in the Hood River. Nineteen measures are proposed in this section to address these water quality concerns.

Summer and fall water temperatures exceed state water quality standards in a number of stream reaches. Power lines, roads, railroad, livestock, residential and agricultural land uses have removed riparian vegetation. Inadequate streamside vegetation leads to decreased shade, higher summer water temperatures, more bank erosion and less absorption of potential contaminants from adjacent land use, and a lower water retention and infiltration capacity. Reduced streamflow levels due to irrigation, power and domestic water diversion also contributes to stream heating.

Natural glacial melt and frequent landslides on Mt Hood contribute silt and sediment to Hood River streams on a seasonal or episodic basis. However, sediment from human activities persistently raises the amount and duration of turbidity in Hood River streams. Chronic sediment delivery from human sources include forest road runoff, bank and ditch erosion; landslides associated with roads, canals, and culverts; and use of clear streams to carry irrigation water from upriver glacial sources.

Water Quality Strategy

Stream Temperature:

- Apply the Hood River Agricultural Water Quality Area Management Plan (ODA 2000) and rules (OAR 603-095-1100 through 603-095-1160)
- Extend streamside vegetation protection to residential & other lands
- Maintain and restore adequate summer streamflow levels through water conservation education & efficiency opportunities

- Implement water quality management plans outlined in the Western Hood Subbasin Total Maximum Daily Load study (ODEQ 2001)

Pesticides:

- Support education and research by the Oregon State University Extension and Mid-Columbia Agricultural Research and Experiment Center leading to improved pesticide, fertilizer, irrigation, and other orchard practices that can help water quality and fruit production efficiency
- Implement cost-share programs for growers that help promote use of bug scouting, beneficial insect releases, soil and leaf analyses, and other practices to reduce potential pesticide entry to streams
- Support continuation of the Hood River Grower-Shipper Association Integrated Fruit Production (IFP) program and related grower efforts
- Continue pesticide monitoring in streams. Assess whether pesticide concentrations in surface waters are adversely affecting aquatic life
- Determine the mechanisms by which pesticide residues are reaching waterways in order to select best management practices that prevent contamination of streams

Sediment:

- Promote improved road design, road management, and road maintenance (including road closure and obliteration if warranted) on all land ownerships.
- Eliminate historic use of streams to carry irrigation water from glacial water sources
- Pursue piping of open ditches and canals to eliminate the threat of landslides and occurrence of return flows which carry silt to streams

Nutrients and Bacteria:

- Apply the Hood River Agricultural Water Quality Area Management Plan (ODA 2000) and rules (OAR 603-095-1100 through 603-095-1160)
- Implement landowner projects and conduct education activities to promote best management practices designed to control pollution of ground and surface waters by animal and human waste and fertilizers
- Continue monitoring to identify nutrient and bacteria sources and assess long term trends

Water Quality – List of Proposed Actions

Ref. No	Project Name	Priority	Schedule
1	Landowner Cost Assistance for Agricultural Water Quality Improvements	High	2002-5
2	Extend Streamside Vegetation Protection to All Land Uses	High	2003
3	Continue Pesticide Monitoring Studies	High	2002-7
4	Lower East Fork Tributaries Water Quality Improvement	High	2002-5
5	County Public Roadside Maintenance	High	2002-7
6	U.S. Forest Service Road Maintenance	High	ongoing
7	County Forest Road Maintenance	High	ongoing
8	Longview Fibre Company Road Maintenance	High	ongoing
9	Odell Creek Water Quality Improvements	High	2002-5
10	QVL/Hanel Mill Settling Pond/Drainage Improvement	High	2004
11	Lower Neal Creek Riparian Area Improvement	High	ongoing
12	BPA Powerline Crossing Revegetation and Road Maintenance	High	2003
13	Laurance Lake Reservoir Temperature Study	Med	2003-6
14	Long Term Water Quality Monitoring	Med	ongoing
15	Bacterial Contamination Monitoring	Med	2002
16	Promote Onsite Stormwater Infiltration and Retention	Med	2002 -7
17	Middle Fork Irrigation District Sediment Basin Overflow	Med	2006
18	East Fork Hood River Quarry Treatment	Low	2004
19	Rehabilitate Dispersed Streamside Recreation Sites on National Forest	Low	2005

WQ-1. Landowner Cost Assistance for Agricultural Water Quality Improvements

Priority: High
Lead Entity: NRCS and SWCD
Subwatershed: Hood River
Estimated Cost: $750,000 over 3 years
Description: Use programs such as the federal Environmental Quality Incentives Program to deliver technical and financial aid to agricultural landowners to upgrade sprinkler systems, adopt streamside fencing, pasture management, pesticide reduction, riparian plantings, buffer strips, gutters, and help fund other practices aimed at water quality improvement. Landowner pays part of cost in either cash and/or in-kind services.
Benefits to Endangered Species Act Listed or Target Species: If fully implemented, this measure would create cumulative changes resulting in improved riparian conditions, streamflow levels, and water quality and positively affect habitat used by threatened steelhead.. Other species that would benefit are resident rainbow and cutthroat trout, spring and fall chinook, and coho salmon.
Habitat Concerns: Low streamflows below diversions, pesticide, and fertilizer runoff due to over-irrigation, nutrient and bacterial contamination from livestock waste runoff and over-fertilization, and a lack of shade and stream bank integrity along agricultural area streams.
Rationale for Priority Ranking: Helps to implement Hood River Agricultural Water Quality Area Management Plan and rules. Assists efforts to improve summer stream flow levels.
Schedule: 2002 through 2005
Cost-share/ other partners: $250,000 USDA cost-share funds available in Hood River FY 02-05.
Monitoring: Implementation monitoring is included in the USDA program. Water quality trend monitoring is planned per measure WQ-3 and WQ-10.

WQ-2. Extend Streamside Vegetation Protection to All Land Uses

Priority: High
Lead Entity: Hood River Watershed Group
Watershed: Entire subbasin except MHNF
Estimated Cost: To be determined
Description: Encourage and assist the County and City Planning Departments, Planning Commissions, and elected officials to develop and adopt appropriate development standards, ordinances, and rules to maintain sufficient vegetation buffers along streambanks in residential, commercial and all other non-forest, non-agricultural lands. State law requires that adequate shade and vegetation be maintained along stream corridors for timber harvest and agriculture, but no similar protection exists for other land use activities.


Riparian vegetation removed along Odell Creek tributary

Benefits to Endangered Species Act Listed or Target Species: This measure will help restore and protect important riparian zone functions including shade, erosion control, large woody debris recruitment, and absorption of contaminated runoff in streams used by threatened steelhead, as well as other salmonids.
Habitat Concerns: Insufficient development rules currently exist to protect streamside vegetation important to aquatic life. Several stream segments exceed temperature standards that protect coldwater fish. Riparian and shade assessments of the Lower Hood River and Lower East and Middle Fork Hood River watersheds found that up to 28% of streambank length has low shade and that wood recruitment potential is limited by development and infrastructure along 58 miles of stream length examined. A 2001DEQ study found similar results.
Rationale for Priority Ranking: This measure would help fulfill Statewide Land Use Planning Goal 5, as well as potential requirements of the pending Lower Columbia Steelhead Endangered Species Unit Recovery Plan and /or "4-d rule", Clean Water Act requirements per the Western Hood Subbasin Total Maximum Daily Load Temperature Study (DEQ 2001).
Relationship to Other Projects: Riparian corridor inventory and ordinance work recently begun by the County Planning Department under ***H-4. Update Goal V in Comprehensive Land Use Plan*** will substantially contribute to the goals of this project.
Schedule: 2002-3
Cost-share/ other partners: Hood River County may use an advisory committee made up of several landowners and agencies to assist with this or related measures.

WQ-3. Continue Pesticide Monitoring Studies

Priority: High
Lead Entity: OSU and DEQ
Subwatershed: Various
Estimated Cost: $75,000 per year

Description: Continue pesticide monitoring, bioassay and fish tissue analysis program in selected streams in consultation with the grower community. The timing of water and fish sample collection is coordinated with spraying in the valley.
Benefits to Endangered Species Act Listed or Target Species: Improve water quality for steelhead, cutthroat trout and other salmonids. Organophosphate insecticides potentially interfere with normal hormone function in salmonids including steelhead and alter species composition and abundance of the aquatic insect food supply.
Habitat Concerns: A preliminary study in 1999 found that concentrations of chlorpyrifos, an organophosphate insecticide, exceeded the state standard in Neal and Indian creeks. Concentrations of azinphos methyl, another organophosphate pesticide, exceeded the state standard in Neal and Indian creeks and at the mouth of the Hood River.
Rationale for Priority Ranking: Monitoring is needed to confirm whether contamination levels are decreasing and improved pesticide practices and alternatives are being used effectively.
Schedule: Water sampling and testing has occurred in spring and summer since 1999 and was expanded in 2000 to include fish tissue and other bioassay work. Cost-share grants from EPA and OWEB will extend continued sampling through 2003, after which other funds will be sought.
Relationship to other projects: *WQ-1 Landowner Cost Assistance for Agricultural Water Quality Improvements*, and additional grower and other efforts will help reduce pesticide entry to streams.
Cost-share/ other partners: OWEB, SWCD, HR Grower-Shippers Association, OSU Extension, Mid-Columbia Agricultural Research and Experiment Station, ODA, BPA, CTWS, U.S. EPA.

WQ-4. Lower East Fork Tributaries Water Quality Improvement

Priority: High
Lead Entity: HRSWCD and CTWS
Subwatershed: Lower East Fork
Estimated Cost: $40,000
Description: Conduct various projects such as fencing livestock away from streams, re-vegetate streambanks and control other degrading activities (e.g. failing septic drainfields) in cooperation with private landowners along Baldwin, Graham, Tieman, Evans and Emil creeks. Include educational activities and water quality monitoring.
Benefits to Endangered Species Act Listed or Target Species: Several of these creeks support threatened winter –run steelhead, as well as cutthroat trout. Coho salmon juveniles have been sampled in several of these creeks in the last decade by ODFW.
Habitat Concerns: Degraded riparian vegetation, livestock waste, low shade, low habitat complexity, channel modifications, wetland losses, high temperatures, high nutrient levels.
Rationale for Priority Ranking: These creeks are accessible or historically accessible to anadromous fish, and are low gradient floodplain type habitats with potential for increased natural spawning, rearing and overwintering use by species including steelhead and coho. Helps to implement Hood River Agricultural Water Quality Area Management Plan and rules.
Schedule: Ongoing. Begun in Fall 2000, with additional work to occur through 2006.
Relationship to other projects: Fish passage improvements are being pursued simultaneously.
Cost-share/ other partners: As of January 2002, nine landowners have participated. A $10,000 EPA 319 grant award in 2000 focuses on the Baldwin-Tieman area. US Bureau of Reclamation - lab analyses. DEQ – equipment, technical assistance. AmeriCorp/Northwest Service Academy, local volunteers, schools, and County Health have contributed labor.
Monitoring: Water quality monitoring will continue as funding allows. Some projects include photo-documentation and other monitoring requirements.

WQ-5. County Public Road Maintenance

Priority: High Lead Entity: Hood R. County Public Works
Subwatershed: Various Estimated Cost: To be determined
Description: Identify sensitive road segments where alternative storm water and roadside vegetation control practices are needed, continue staff training regarding the need to adapt practices and techniques to meet changing environmental standards, and identify opportunities to improve management practices while still meeting roadway safety requirements.
Benefits to Endangered Species Act Listed or Target Species: A reduction in impacts caused by traditional roadside management approaches is expected to improve aquatic habitat conditions for steelhead, bull trout, chinook, and cutthroat trout by reducing storm water erosion, fine sediment loading, and herbicide contamination. State agencies (including ODOT) are adjusting roadside management practices as required by the Oregon Plan for Salmon and Watersheds and the ESA.
Habitat Concerns: Excessive siltation can occur from roadside management and ditch cleaning methods that expose bare soils to stormwater erosion. Of key concern are locations where ditch lines slope and drain directly into creeks e.g., at road crossings. Herbicide sprayed in roadside ditches may contaminate streams and harm aquatic life.
Rationale for Priority Ranking: Sediment delivery from roadside ditches can be observed around the watershed. In 1999, an incident occurred where chinook fry died 45 minutes after herbicide was applied to a road ditch flowing into the Parkdale hatchery water supply.
Relationship to other projects: Fish passage remediation at road culverts is being addressed in *Project FP-16, Fish Barrier Prioritization Method and Culvert Remediation.* In most cases, such projects will also improve flood capacity and reduce the risk of road washouts and sedimentation.
Cost-share and other partners: Hood R. Soil and Water Conservation District will assist in obtaining grants or partnership funding if needed, and help identify sensitive ditch lines.
Schedule: Begin in 2002

WQ- 6. U.S. Forest Service Road Maintenance

Priority: High Lead Entity: U.S. Forest Service
Subwatersheds: Various Estimated Cost: To be determined
Description: Conduct various road maintenance activities including drainage improvements, culvert enlargement for flood capacity, cut slope and roadside ditch treatment, resurfacing, obliteration, gating, or other treatments as needed to reduce sediment delivery to streams and control risks of washouts and slope failures associated with the forest road system.
Benefits to Endangered Species Act Listed and Target Species: This measure would reduce fine sediment loading and road-related landslide risks introduced by the forest road network, and is expected to improve aquatic habitat conditions for threatened steelhead and bull trout, as well as chinook, cutthroat and rainbow trout, and other native fish species.
Habitat Concerns: Road sediment and silt fills pools, clogs gravel, and degrades streambed habitat. Excessive siltation can occur from traditional roadside ditch cleaning/scraping methods that expose bare soils to stormwater erosion. Of key concern are locations where ditch lines slope and drain directly into creeks such as at road crossings
Rationale for Priority Ranking: Fine sediment from forest road runoff and road washouts has been identified as the major source of non-natural sediment delivery to streams in the watershed.
Relationship to other projects: Fish passage remediation at road culverts is being addressed in Project *FP-16, Barrier Prioritization Method and Culvert Barrier Remediation*
in most cases, such projects will simultaneously improve flood capacity and therefore reduce the risk of road washouts and sedimentation.
Cost-share or other partners: HRWG, Hood River County Title II PL 106-393 funds
Schedule: ongoing

WQ-7. County Forest Road Maintenance

Priority: High
Lead Entity: Hood R. County Forestry Depart.
Subwatersheds: Various
Estimated Cost: To be determined
Description: Conduct various road maintenance activities, drainage improvements, culvert enlargement for flood capacity, cut slope and roadside ditch treatment, resurfacing, obliteration, gating, or other treatments as necessary to reduce sediment delivery to streams. Control risks of washouts and slope failures associated with the forest road system. Use the 2001road inventory that was cost-shared by OWEB to develop a maintenance plan and project list.
Benefits to Endangered Species Act Listed or Target Species: Improved road maintenance and road management will reduce fine sediment loading and landslide risks introduced by the forest road network. It is expected to improve aquatic habitat conditions for threatened steelhead and bull trout, as well as chinook, cutthroat and rainbow trout, and other native species.
Habitat Concerns: Forest roads are a major source of fine sediment delivery to streams especially where poor road conditions and wet weather vehicle use intersect and where culvert failures exist. County roads with native soil surfaces, inadequate drainage, too-small culverts, and poor ditch conditions were all identified in a road inventory completed in 2001. Inventory methods followed Oregon Department of Forestry and ODFW protocols.
Rationale for Priority Ranking: Forest roads are identified as the primary source of fine sediment delivery to streams in the watershed.
Relationship to other projects: Fish passage remediation at county road culverts is being addressed in *FP-16, Barrier Prioritization Method and Culvert Barrier Remediation.* In most cases, fish passage projects will also improve flood capacity and lower the risk of road washouts.
Cost-share or other partners: Hood R. Soil and Water Conservation District will help obtain grants and raise partnership funds as needed.
Monitoring: Plan to be developed.
Schedule: 2002-2007

WQ-8. Longview Fibre Company Forest Road Maintenance

Priority: High
Lead Entity: Longview Fibre Company
Subwatersheds: Various
Estimated Cost: To be determined
Description: Conduct various road maintenance activities, drainage improvements, culvert enlargement for flood capacity, cut slope and roadside ditch treatment, resurfacing, obliteration, gating, or other treatments as necessary to reduce sediment delivery to streams and control risks of washouts and slope failures associated with the forest road system. Project list to be submitted.
Benefits to Endangered Species Act Listed or Target Species: This measure would reduce fine sediment loading and road-related landslide risks introduced by the forest road network, and is expected to improve aquatic habitat conditions for threatened steelhead and bull trout, as well as chinook, cutthroat and rainbow trout, and other native fish species.
Habitat Concerns: Fine sediment delivery to streams caused by road runoff and road washouts.
Rationale for Priority Ranking: Forest roads are identified as the primary source of fine sediment delivery to streams in the watershed.
Relationship to other projects: Fish passage remediation at Longview Fibre Company road culverts is being addressed in Project FP-16, in most cases, such projects will simultaneously improve flood capacity and therefore reduce the risk of road washouts and sedimentation.
Cost-share and other partners: Hood R. Watershed Group, Hood River County, Hood River Soil & Water Conservation District will help obtain grants and identify partnerships as needed.

Schedule: 2002-2007
Monitoring: Plan to be developed.

WQ-9. QVL/Hanel Mill Settling Pond/Drainage Improvement

Priority: High Lead Entity: Hood R. Watershed Group
Subwatershed: West Fork Neal Creek Estimated Cost: To be determined
Description: Contact new owner to encourage cooperative action to improve the mill yard settling ponds and drainage to prevent contaminated runoff from entering local ditches and Neal Creek. While the mill is under new ownership and future operation plans are uncertain, this discharge is regulated by a storm water permit administered by DEQ. .
Benefits to Endangered Species Act Listed or Target Species: This project will improve water quality in the anadromous portion of Neal Creek and its West Fork. Neal Creek provides habitat for threatened steelhead as well as cutthroat trout and other salmonids.
Habitat Concerns: Contaminated storm runoff from the mill yard and detention ponds drains into the EFID Canal and the West Fork Neal Creek area, delivering organic compounds and increased turbidity to the aquatic system.
Rationale for Priority Ranking: A large investment continues to be directed at improving water quality and fish habitat in the Neal Creek system. Neal Creek is the only lower Hood River tributary with a significant number of miles of stream habitat accessible to anadromous fish.
Schedule: 2004
Cost-share/ other partners: Appropriate partners will be identified.
Monitoring: Will be included as part of project.

WQ-10. Odell Creek Water Quality Improvements

Priority: High Lead Entity: Hood R. Soil & Water Conservation District
Subwatershed: Odell Creek Estimated Cost: $100,000
Description: In cooperation with interested landowners, conduct various activities including fencing to prevent livestock access to streams, plant native riparian vegetation, install best management practices for manure management, and conduct educational activities.
Benefits to Endangered Species Act Listed or Target Species: This measure improves Odell Creek habitat for native resident trout including rainbow and cutthroat, but also contributes to improved downstream water quality in the Hood River for threatened bull trout and steelhead.
Habitat Concerns: Water sampling indicates high nitrogen and phosphorus levels and high summer stream temperatures. Low riparian shade, livestock damage to streambanks and riparian areas, animal waste runoff, storm runoff, and questionable sewage discharge are noted problems.
Rationale for Priority Ranking: Odell Creek water quality is affected by intensive land use including livestock, agriculture, a wastewater plant, and a growing urban center. The creek itself provides habitat for native resident trout, but impaired water quality affects the Hood River mainstem used by anadromous fish and bull trout. This measure helps implement Hood River Agricultural Water Quality Area Management Plan and rules.
Relationship to other projects: Some projects adopted under WQ-1 *Agricultural Landowner Assistance,* will occur in the Odell Creek subwatershed. The Odell Sewage Treatment Plant is regulated by DEQ under an existing wastewater discharge permit.
Cost-share and other partners: OWEB awarded $44,000 to the SWCD in 2001 for the horse-keeping demonstration project. NRCS, ODA, DEQ will provide technical assistance as available.
Monitoring: Some projects will require specific monitoring, otherwise, improvements due to this suite of measures will be subject to long term monitoring as part of Project No. WQ-10.

Schedule: 2002 through 2006. Horse-keeping best management practices demonstration project at the Arena at Wyeast will be completed in 2002.

WQ-11. Lower Neal Creek Riparian Area Improvements

Priority: High Lead Entity: Hood R. Soil & Water Conservation District
Subwatershed: Neal Creek Estimated Cost: To be determined
Description: Fence livestock, protect and restore riparian vegetation, and conduct landowner education activities.
Benefits to Endangered Species Act Listed or Target Species: This measure would improve Neal Creek habitat used by threatened steelhead, as well as cutthroat trout, and contribute to improved downstream water quality in the Hood River used by other salmonids.
Habitat Concerns: Neal Creek above Dethman Ridge Road has low riparian shade, high summer water temperatures, nutrient runoff, poor pool area/frequency, and low overall habitat complexity.
Rationale for Priority Ranking: Helps to implement Hood River Agricultural Water Quality Area Management Plan and rules. This project would compliment completion of *FP-3: Central Canal Upgrade/Neal Creek Inverted Siphon* which will remove glacial silt from Neal Creek.
Schedule: ongoing
Cost-share and other partners: NRCS, Conf. Tribes of Warm Springs Reservation, ODFW
Monitoring: Some projects will require specific monitoring, otherwise, improvements due to this suite of measures will be subject to monitoring in Project No. WQ-14.

WQ-12. BPA Powerline Crossing Revegetation and Road Maintenance

Priority: High Lead Entity: Confederated Tribes of Warm Springs Reservation
Subwatershed: West Fork Hood River Estimated Cost: To be determined
Description: Work with the BPA and U.S. Forest Service to evaluate feasible instream habitat and riparian vegetation enhancement opportunities, and improve road conditions and vegetation management in the powerline right of way along the upper West Fork Hood River.
Benefits to Endangered Species Act Listed or Target Species: Improved conditions in the immediate vicinity of prime spawning and early rearing habitat for threatened summer-run steelhead, and for spring chinook affected by power line maintenance activities. Increase usable pool area, gravel, and cover for adult holding, spawning, incubation, and rearing life stages.
Habitat Concerns: Vegetation management and roadway negatively affects instream, riparian, and water quality conditions along an approximately 1200 foot segment of low gradient, unconfined habitat above and below primary high quality spawning and rearing areas in the West Fork Hood River and tributaries Elk and McGee creeks. At one site, the BPA powerline access maintenance road fords the creek, and the roadway contributes silt and sediment to steelhead and chinook spawning habitat just downstream. There is a severe lack of pool habitat, riparian cover, shade, and large woody debris in the powerline stretch compared to the adjacent forested area.
Rationale for Priority Ranking: The area is close to prime habitat spawning and rearing habitat for summer-run steelhead and chinook salmon. While restoration to forested conditions is precluded by the overhead power line, enhancement could significantly improve habitat.
Cost-share and other partners: BPA, ODFW, Hood R. Watershed Group, US Forest Service.
Monitoring: Plan to be developed.
Schedule: 2003

WQ-13. Laurance Lake Reservoir Temperature Study

Priority: Medium Lead Entity: Middle Fork Irrigation District
Subwatershed: Clear Branch Estimated Cost: To be determined
Description: Prepare a study plan to investigate annual temperature regimes in Clear Branch above, in, and below the Laurance Lake reservoir and develop a computer model to compare effectiveness of mitigation alternatives. Assess costs and feasibility of mitigation options.
Benefits to Endangered Species Act Listed or Target Species: This measure may improve spawning and holding conditions for threatened bull trout, or help resolve questions about potential effects of warm water discharge on bull trout spawning (e.g. incubation success emergence timing, holding conditions) in Clear Branch below the dam.
Habitat Concerns: Heat accumulation in the reservoir results in a warm water discharge below Clear Branch Dam in late summer and fall. Lake outflow has been measured to be up to 10 degrees F warmer than Clear Branch inflows. Warm water may discourage attraction to fish trap.
Rationale for Priority Ranking: This study is part of a temperature management plan to address
Schedule: 2002 or 2003. MFID began collecting additional continuous temperature data in 2001.
Cost-share and other partners: ODFW, CTWS, USFS, US Fish & Wildlife Service, DEQ, HRWG

WQ-14. Long Term Water Quality Monitoring

Priority: Medium Lead Entity: Hood R. Soil & Water Conservation District (other agencies and entities also monitor temperature and other parameters on a long term basis)
Subwatershed: Various Estimated Cost: $1500 per year for HRWSCD alone
Description: Continue monitoring water temperature, nutrients, pH, turbidity, bacteria, dissolved oxygen, and if appropriate, macro-invertebrate communities in selected streams, to compare to baseline data and identify water quality trends. Pesticide monitoring is listed separately because of the cost and toxicological expertise required.
Benefits to Endangered Species Act Listed or Target Species: Water quality monitoring will help insure that actions are taken to protect and improve habitat conditions for aquatic life including listed species bull trout and steelhead.
Habitat Concerns: Water temperatures exceed state standards in several stream segments. High pH was found in the mid-1990s in the Hood River below Powerdale Dam. Elevated fecal bacteria, nitrogen, and phosphorous concentrations are measured in several tributaries including Odell, Lenz, Baldwin and numerous other creeks.
Rationale for Priority Ranking: Would help gage success of the Hood River Agricultural Water Quality Area Management Plan, and cumulative effect of water quality improvement measures.
Schedule: Ongoing
Cost-share and other partners: DEQ, US Bureau of Reclamation Pacific Northwest Laboratory. US Forest Service, Irrigation Districts

WQ-15. Bacterial Contamination Monitoring

Priority: Medium Lead Entity: Hood R. Soil & Water Conservation District
Subwatershed: Odell, Whiskey, Lower East Fork Estimated Cost: $500
Description: Identify sources of bacteria contamination in creeks that consistantly exceed state standards using genetic or other analyses. Assess the feasibility of an ordinance requiring that failing septic systems be upgraded at time of property sale. Identify potential funding source to upgrade failing septic systems for low-income property owners.
Benefits to Endangered Species Act Listed or Target Species: Fecal bacterial contamination

mostly poses a health risk to humans. However, high bacteria counts indicate a source of animal or human waste that can coincide with nitrogen and phosphorous levels which stimulate excessive growth of algae, and alter benthic macro-invertebrate species diversity.
Habitat Concerns: Bacterial contamination is excessive in some streams. Failing on-site septic systems are suspected as a contributing factor in some areas but no confirmation is available.
Rationale for Priority Ranking: Would help to gage the success of the Hood River Agricultural Water Quality Area Management Plan, and cumulative effects of water quality measures.
Schedule: 2003
Relation to other projects: The results from this measure will help inform bacteria and nutrient monitoring under *WQ-14: Long term Water Quality Monitoring.*
Cost-share and other partners: Hood R. County Health Department. There is a possibility that the US EPA may be able to provide some lab assistance.

WQ-16. Promote Onsite Stormwater Infiltration and Retention

Priority: Medium Lead Entity: Hood R. Soil & Water Conservation District
Subwatershed: Odell Cr, Indian Cr Estimated Cost: not determined
Description: Work with local developers and Planning and Building Departments to promote development ordinances and standards that require on-site storage, retention and infiltration of stormwater in urbanizing areas and larger development projects.
Benefits to Endangered Species Act Listed or Target Species: This measure would mostly help protect habitat on smaller streams for cutthroat trout and resident trout, and in some cases streams used by coho and steelhead.
Habitat Concerns: Stormwater from impervious surfaces has historically been ditched and piped directly to streams. This is causing higher peak flows, bank erosion, and contamination, and siltation of streambeds in affected areas. Increased flooding of downstream property can result.
Rationale for Priority Ranking: Taking the opportunity to address this problem now through development standards will help avoid costs and damages to downstream habitats and property.
Schedule: 2003
Relation to other projects: A small bioswale demonstration project was completed at Stonegate.

WQ-17. Sediment Basin Overflow

Priority: Medium Lead Entity: Middle Fork Irrigation District
Subwatershed: Evans Creek Estimated Cost: $48,235
Description: Build an 18-inch diameter, 12,000 foot long pipeline to transport silty overflow discharge from the Eliot Branch and the MFID settling pond facility and return it into the Middle Fork Hood River. The overflow channel flows into upper West Evans Creek, which is an intermittent stream.
Benefits to Endangered Species Act Listed or Target Species: This project will improve water quality conditions in lower Evans Creek for threatened steelhead.
Habitat Concerns: Glacial silt enters the non-glacial, intermittent channel of West Fork Evans Creek and increases downstream turbidity.
Schedule: 2006
Sequence in relation to other projects: This project will complete the glacial silt removal benefits ***of FP-4. Glacier Ditch/Evans Creek Fish Passage and Water Quality Improvement*** scheduled for construction in 2002.
Cost-share and other partners: To be determined
Monitoring: To be determined

WQ-18. East Fork Hood River Quarry Treatment

Priority: Low
Lead Entity: U.S. Forest Service
Subwatershed: East Fork Hood River
Estimated Cost: $100,000
Description: Close the quarry by recontouring the site to an agle that matches the surrounding landscape as closely as possible, installing appropriate erosion control structures, and revegetate, with native and/or sterile, weed free grasses, shrubs, etc.
Benefits to Endangered Species Act Listed or Target Species: Remove a chronic source of fine sediment to the East Fork Hood River will reduce the overall amount of fine sediment therein.
Habitat Concerns: Erosion and sediment runoff
Rationale for Priority Ranking: Compared to other sediment sources in the watershed this quarry is quite small with a relatively small amount of sediment produced.
Schedule: Once funded it would take approximately 1.5 years to complete the restoration design, NEPA and implementation.
Cost-share and other partners: None identified at this time although ODOT is a potential partner.
Monitoring: Photo points.

WQ-19. Rehabilitate Dispersed Streamside Recreation Sites on National Forest

Priority: Low
Lead Entity: U.S. Forest Service
Subwatershed: Upper East Fork Hood River
Estimated Cost: $250,000
Description: Close up to 50 unnofficial camp sites that are degrading streambanks. Delineate and improve 50 existing sites, associated roads, and install latrine facilities. Primary target area is upstream of Pollalie Creek. Incorporate sites into USFS campground/NW Forest Pass system.
Benefits to Endangered Species Act Listed or Target Species: Minimize erosion and devegetation of streambanks and limit potential disturbance of spawning fish by humans.
Habitat Concerns: Erosion and sedimentation, riparian vegetation removal
Rationale for Priority Ranking: Compared to other sediment sources throughout the watershed, such as roads, the sediment produced from these sites is small. Many of these sites are infrequently used so fish disturbance is a concern but likely not a major problem.
Schedule: Depends on funding. The rehabilitation of each site likely would take from ½ to one full day, depending on the design. NEPA and design would take 3-6 months, again depending on the scope of the project (less sites would take less time).
Cost-share and other partners: None identified at present.
Monitoring: Photo points a representative sampling of sites.

Streamflow Restoration

Goal: Improve streamflows where opportunities exist that also protect senior water rights; meet instream water rights where established by the state and where possible to do so; minimize alteration of natural hydrology; and protect and restore the hydrologic functioning of upland, wetland and riparian areas.

The Hood River Valley has mountain snow, glaciers, spring-fed streams, and more rainfall than areas further east. Despite this, during summer and fall when diversions are greatest and rainfall is lowest, some stream segments experience depleted streamflows that impair fish habitat. Instream water rights are established at 7 locations but are reliably met at only two of these. These rights are held in trust by the State for public uses such as recreation, pollution control, and fish and wildlife maintenance or enhancement. Because of their priority date (date established), instream water rights are junior to most other water rights in the watershed. As a result, the flow restoration measures in this Plan rely on voluntary efforts by irrigators and other water users.

Adequate water supplies are essential for agriculture, residential and commercial use, and the area economy in general. By modernizing irrigation delivery systems -- and reducing

waste – we have the potential to leave more water in our rivers and streams without detrimental impact to water users. Miles of open, unlined canals and ditches still carry water to orchards and pasture around the Hood River valley. Some ditches are up to100 years old and leak water. Others spill water at the lower end ("end-loss") so that all pumps work when operating simultaneously. (Unlike in some other agricultural regions, leakage and end loss in the Hood River valley is not generally relied upon to supply other water users.) In some areas, excessive water line pressure leads to over-application and premature wear of nozzles and fixtures, lower crop or pasture production, and contaminated runoff. Only a small part of irrigation water use is metered, and few diversions or canals are outfitted with automated controls or measuring devices.

Irrigation districts have converted miles of open ditch to pipe (as limited funds allowed) to improve operation and maintenance or to eliminate leakage. For example, Farmers Irrigation District (FID) has replaced 60 percent of their original canals and ditches with pressurized pipe, greatly enhancing irrigation efficiency and eliminating end-loss. By piping and on-farm efficiency measures, FID has been able to return approximately 3,000 acre-feet of water to instream flow.[5] Most efficiency measures have generated secondary benefits such as lower pumping costs, improved crop production, and higher power generation revenues for those irrigation districts operating small hydropower plants.

The following strategy and actions will promote more efficient use of our water resources and healthier streams and fish populations.

Streamflow Restoration Strategy

- Increase water use efficiency on orchards, pasture, and all other land uses by:
  - ✓ *Educational activities* to promote water conservation awareness and efficiency on farms, pastures, and in residential or commercial uses
  - ✓ *Technical and financial aid* for agricultural landowners to upgrade hardware (flow restrictors, nozzle replacement, micro-head systems)
  - ✓ *Technical and financial support* for improved irrigation practices (soil moisture sensors, other techniques to water based on actual need)
- Upgrade irrigation delivery systems by piping open ditches and canals
- Improve metering, measurement, and monitoring capabilities

[5] J. Bryan, Manager, Farmers Irrigation District

- Correct excessive irrigation water system pressures where they exist

- Support development of water conservation plans by water providers and continue to implement the Farmers Irrigation District Water Conservation and Management Plan (1995) and Sustainability Plan (2000)

- Raise minimum stream flow levels below Powerdale Dam per agreed hydropower license mitigation or license surrender requirements

- Restore healthy watershed hydrologic conditions (floodplain and riparian storage, wetlands, mature forest canopy, low road density) where feasible to slow runoff, promote aquifer recharge, and increase summer stream flows

- Help insure that legal water right amounts are not exceeded and that water uses are authorized

- Prioritize flow restoration in stream reaches identified as streamflow restoration priorities by Oregon Department of Fish and Wildlife and Oregon Water Resources Department as outlined in Measure IV.A.8 of the Oregon Plan for Salmon and Watersheds

Streamflow Restoration – List of Proposed Actions

Ref. No	Project Name	Priority	Schedule
1	Raise Minimum Flows Below Powerdale Dam	High	2002-3
2	West Fork Hood River Flow Restoration	High	ongoing
3	Middle Fork Hood River Flow Restoration	High	ongoing
4	East Fork Hood River Flow Restoration	High	ongoing
5	City of Hood River Water Line Improvements	Med	2003
6	Discourage Illegal Water Uses	Med	ongoing
7	Volmer Ditch Replacement	Low	2006
8	Eliot Ditch Replacement	Low	2006

Project Descriptions

S-1. Increased Minimum Flows Below Powerdale Dam

Priority: High
Lead Entity: PacifiCorp
Subwatershed: Hood River
Estimated Cost: No cost to power production due to proposed adjustment in winter diversion

Description: Increase spring, summer and fall minimum instream flow requirements by up to 150 cubic feet per second below Powerdale Dam. This measure was jointly proposed by PacifiCorp, resource agencies and Confederated Tribes of Warm Springs Reservation to improve fish habitat conditions as part of the Federal Energy Regulatory Commission power licensing process.
Benefits to Endangered Species Act Listed or Target Species: Habitat conditions for adult and juvenile fish with the 3-mile long bypass reach would be greatly improved by the proposed increased minimum flows. Restoring a greater wetted stream width, water depth, and velocity will offer more adult holding and juvenile rearing habitat area, improve upstream adult migration over gravel bars, and assist juvenile outmigration through the bypass reach. Models predict that the proposed flows would effectively prevent exceedance of the State 64 degree F water temperature standard. Affected native fish species include listed bull trout and steelhead, as well as resident rainbow and cutthroat trout, sea-run cutthroat trout, spring chinook, coho and fall chinook salmon, sucker, and Pacific lamprey.
Habitat Concerns: Spring, summer, and fall minimum instream flow levels are too low to protect water quality and habitat. Summer water temperatures below the dam exceed state standards.
Rationale for Priority Ranking: All salmon and steelhead, as well as bull trout produced in the Hood River must migrate through the 3-mile long bypass reach on their way upstream to spawn, or to move downstream to the Columbia or the ocean. It is important that habitat space, water temperature, and water quality encountered in this reach are adequate. Some adult steelhead and chinook stay in the bypass reach for several weeks before moving above the dam.
Schedule: As of June 2002, this FERC licensing process for Powerdale Dam is still in a delay mode. In early 2002, PacifiCorp notified FERC of an intention to file an application to surrender its power license and decommission the hydropower project due to economic factors. FERC or other parties are expected to seek interim flows while the fate of the power license is worked out.
Monitoring: Resource agencies have requested that a stream gage or some other method be employed to measure compliance with minimum flow requirements below the dam.

S-2. West Fork Hood River Flow Restoration

Priority: High
Lead Entity: Farmers Irrigation District
Subwatershed: Green Pt, Dead Pt, West Fk Hood R
Estimated Cost: To be determined

Description: Conduct various actions to restore streamflows and increase system and user efficiency. Increase the summer minimum flow in Green Point Creek to 14 c.f.s. from its present 10 c.f.s. average low flow and absolute minimum of 3 c.f.s. Specific measures include:

1. Replace open canal with pipeline: Highline, Lowline, and Farmers canals
2. Replace open ditch/laterals with pressurized pipeline:
    - Avalon Unit
    - Country Club Road Unit
    - Orchard Road Unit
    - High School Line
    - Markham Unit
    - Tucker Road Unit

- Belmont Unit
- Upper and Lower Farmers Canal Units

3. Continue Water Use Education and Communications Program
4. Install on-farm soil moisture sensors and solid-set micro-head sprinkler systems
5. Complete reservoir reduction and enhancement program
6. Eliminate North Pine, South Green Point, Cabin, Rainy, and Phelps creeks diversions
7. Eliminate subdivisions from District and complete 8- Acre Minimum Service Unit
8. Develop District Watershed Uplands Program
9. Increase Ditch, Dead Point, and North Green Point instream storage

Benefits to Endangered Species Act Listed or Target Species: Maintaining higher spring-summer fall flows in the lower West Fork Hood River and in the lower 2 miles of Green Point Creek (below the diversion point) would benefit steelhead spawning, rearing and adult migration, including native summer run steelhead whose distribution is limited to the West Fork Hood River and which is among the weakest native stocks in the subbasin. It would also benefit spring chinook migration, spawning, and rearing.
Habitat Concerns: Instream water rights in the West Fork Hood River are frequently not met in late summer and fall. Water is over-allocated from an ecological standpoint in Green Point Creek, in particular, summer flow levels are too low.
Rationale for Priority Ranking: Preliminary data collected by ODFW suggests that steelhead production in the Hood River is correlated with high summer streamflows. Maintaining higher April-October flows will improve spawning, rearing, and adult and juvenile migration conditions for several fish species including steelhead, and benefit other stream ecosystem functions.
Schedule: Conservation education and assistance to district water users is ongoing. Final schedules for piping and other construction or restoration projects are not yet available.
Relationship to other projects: Dee, Farmers, and Middle Fork I.D. staff are considering the potential feasibility and operational benefit of supplying the Dee I.D. with an alternative supply recovered by system efficiency measures (*S-3 Middle Fork Hood River Flow Restoration*). This approach could restore up to 13 c.f.s. and eliminate the need for a new intake structure on the West Fork *(FP-9 Dee Irrigation District Diversion Fish Passage Improvement)*, however, water rights and a number of other issues to be resolved first.
Cost-share and other partners: BPA, CTWS, NRCS, others to be determined
Monitoring: The district system includes telemetry monitoring of inflows and diversions; and conducts streamflow monitoring.

S-3. Middle Fork Hood River Flow Restoration

Priority: High Lead Entity: Middle Fork Irrigation District
Subwatershed: Middle Fork Hood R, Clear Br Estimated Cost: To be determined
Description: Series of projects including piping open canals to eliminate leakage; install appropriate measurement and monitoring devices: install flow restrictors; user education, and conduct other activities to increase delivery system or on-farm efficiency. In consultation with the USFS and ODFW, augment releases at Clear Branch Dam when needed to protect steelhead incubation in early summer months as water supply conditions allow.
Benefits to Endangered Species Act Listed or Target Species: Projects that restore streamflow to the Middle Fork and Clear Branch will improve water quality conditions and spawning and rearing habitat for listed steelhead and bull trout populations.
Habitat Concerns: Low streamflows impair fish habitat at times during summer and instream water rights are not reliably met in the Middle Fork Hood River.
Rationale for Priority Ranking: Maintaining higher April-October streamflows will improve spawning, rearing and migration conditions for several fish species including steelhead and bull

trout, and will benefit the stream ecosystem generally.
Schedule: ongoing
Relationship to other projects: Projects S-6 and S-7 below contribute to the goals of this project.
Cost-share and other partners: Bonneville Power Administration, CTWS, NRCS, others to be determined
Monitoring: To be determined

S-4. East Fork Hood River Flow Restoration

Priority: High Lead Entity: East Fork Irrigation District
Subwatershed: East Fork Hood River Estimated Cost: To be determined
Description: Continue to convert open laterals and canals to pipe and pursue other efficiency measures as opportunities arise. Develop a long term strategic plan/ water conservation plan. Improve flow monitoring capability. Promote on-farm water use efficiency including use of low flow sprinkler heads, soil moisture sensors, pressure reducing valves, and other techniques.
Benefits to Endangered Species Act Listed or Target Species: Maintaining higher streamflow during the low flow season will improve habitat and water quality conditions for juvenile and adult steelhead migration and rearing. Steelhead are listed as a threatened species. Other species expected to benefit include coho salmon and resident cutthroat trout.
Habitat Concerns: The East Fork Hood River instream water rights (100 c.f.s. in July-September and 150 c.f.s. in October-June) are typically not met during summer and early fall. Summer flow can become depleted from the diversion just upstream of Toll Bridge Park to the Middle Fork confluence when dry conditions coincide with peak withdrawals. High water temperatures (70 degrees F) have been measured in this reach.
Other Concerns: If in the distant future the EFID Main Canal is piped, it may be necessary to assess effects on certain leakage-augmented wetlands.
Rationale for Priority Ranking: The EFID system serves a large area but a relatively small proportion of its distribution system is piped. Opportunities exist to improve system and farm efficiency and use the saved water to keep higher flows in the East Fork Hood River.
Schedule: Ongoing
Sequence in relation to other projects: A final engineering design for the 4.3 mile long Central Canal Upgrade project is being completed. This study will estimate the amount of leakage to be saved from that particular project that could be available for instream flow restoration.
Cost-share and other partners: BPA, CTWS, NRCS, others to be determined
Monitoring: To be determined

S-5. Discourage Illegal Water Uses

Priority: Medium Lead Entity: Oregon Water Resources Department
Subwatershed: Entire Watershed Estimated Cost: Included in existing program
Description: Assess problem locations of illegal water use, including unauthorized ponds. Promote education about water rights and impacts of unauthorized uses.
Benefits to Endangered Species Act Listed and Target Species: A greater awareness of and compliance with water rights laws would help protect stream flows needed for bull trout, steelhead, coho, chinook, and resident salmonids including cutthroat and rainbow trout.
Habitat Concerns: Illegal water use can exacerbate summer low flow conditions that are harmful to salmonids. Impoundment of water may result in stream temperature increases.
Rationale for Priority Ranking: Increasing compliance with water rights laws helps protect stream flows needed for bull trout, steelhead, coho, chinook, and resident cutthroat and rainbow

trout.
Schedule: ongoing
Relationship to other projects: As part of their ongoing activities, most irrigation districts work to educate users and help insure compliance with legal water right amounts.
Cost-share and other partners: Irrigation districts and water suppliers, HRSWCD

S-6. City of Hood River Water Supply Improvements

Priority: Medium
Lead Entity: City of Hood River
Subwatershed: Lake Branch, West Fork Hood R.
Estimated Cost: $9 million
Description: Replace the aging City water transmission main from the spring source to the Riverside Drive water storage reservoir, and add flow metering/telemetry monitoring capabilities at the spring site. This project will enable improved water resource management such as matching instantaneous withdrawals to actual in-city water demand, thereby leaving more water in the upper Hood River for fish.
Benefits to Endangered Species Act Listed or Target Species: By eliminating continuous discharge at the Riverside Drive Reservoir, the project will allow water not needed to meet customer demand to remain in lower Lake Branch Creek and the West Fork Hood River. This project would return an estimated average of 4 c.f.s. year round to key spawning and rearing reaches for threatened summer-run steelhead and spring chinook salmon. This will help insure that the instream water right continues to be met in Lake Branch.
Habitat Concerns: The existing water line is in poor condition and must carry a steady surplus flow, bypassing key steelhead and chinook spawning reaches of Lake Branch and the West Fork Hood River. This water is spilled at Riverside Drive 15 miles downstream of the collection site.
Rationale for Priority Ranking: The City's Cold Springs and Stone Springs sources discharge to lower Lake Branch which is reported as especially significant spring chinook spawning habitat.
Schedule: Construction begins Summer 2003 and will be completed by 2005.
Cost-share and other partners: Ratepayer and bond financed, low interest loans.

S-7. Volmer Ditch Replacement

Priority: Medium
Lead Entity: Middle Fork I.D.
Subwatershed: Trout Creek
Estimated Cost: $191,612
Description: Replace 7,500 feet of existing open ditch with 14 inch diameter high density polyethelyne pipe and revegetate the disturbed area with native trees and shrubs.
Benefits to Endangered Species Act Listed or Target Species: Conserved water would remain instream or result in higher return flows made available for streamflow. Would have the effect of returning approximately 0.56 to 1.67 c.f.s. to the Middle Fork Hood River mainstem.
Habitat Concerns: Sediment-laden overflow from the MFID settling pond periodically runs down the ditch and erosion associated with the ditch and culvert system increases turbidity in Trout Creek. The County Forestry Department reports that the ditch impairs the root systems of timber stands along the ditch line.
Rationale for Priority Ranking: Trout Creek is not an anadromous stream, however, sediment discharge could affect resident trout habitat in Trout Creek.
Schedule: 2004
Cost-share and other partners: To be determined
Monitoring: Turbidy monitoring plan to be developed.

S-8. Eliot Ditch Replacement

Priority: Low Lead Entity: Middle Fork I.D.
Subwatershed: Middle Fork Hood River Estimated Cost: $259,700
Description: Replace 4,500 feet of open ditch with 30 inch diameter pipe for more efficient water delivery, to improve maintenance, and to reduce the risk of canal failure.
Benefits to Endangered Species Act Listed or Target Species: Potential water streamflow in areas used by listed bull trout (adult migration and for rearing) and steelhead for spawning, migration and rearing. It would also help reduce the risk of sedimentation in downstream areas due to canal failure during storm events.
Habitat Concerns: Ice freezing and ditch failure and sediment source is a concern. An estimate of water conservation savings will be made and the location of flow restoration will be identified.
Rationale for Priority Ranking: Eliot Ditch at present carries up to 25 c.f.s. and is an important delivery line for the Middle Fork I.D.
Schedule: 2005
Sequence in relation to other projects: This project could be accomplished in conjunction with the Eliot diversion ***project FP-17: Eliot Branch Diversion and Fish Screen Improvements.***
Cost-share and other partners: To be determined

Fish Habitat Protection and Restoration

Goal: Protect, restore or enhance complex stream structure (e.g., large instream wood supply, side channels, pools); restore channel interaction with historic floodplains where compatible with existing land use; protect and restore streamside vegetation and the natural hydrology of upland, wetland, and riparian areas.

Log drive splash dam at Punchbowl Falls - West Fork Hood River c. 1904
Photo by C..J. Shepler, courtesy of Hood River County Historical Museum.

The top priority in maintaining healthy streams is to prevent damage or loss of habitat areas that are already in good condition. Land use plans, forest management plans, development and regulatory standards, and adequate enforcement are necessary tools for habitat protection. In addition, voluntary measures such as conservation easements, land donations, and incentive programs can help interested landowners further protect habitat.

In restoring degraded habitat, scientists emphasize that efforts should be directed at maintaining or restoring the natural processes that build and maintain habitat. These natural processes include upland hydrology, flow regimes, sediment movement and deposition, delivery of organic matter such as leaves, wood, and fish carcasses, and the natural interaction between a stream and its floodplain including channel meandering. Several projects are directed at restoring these natural processes.

Channelization, road and bridge fill, and bank armoring has confined some streams, cutting off use of floodplains and limiting meander patterns. Channel confinement can lead to shorter and steeper stream channels, higher water velocities, entrenchment, reduced flood retention and aquifer recharge, and aggravated flooding and property damage in some cases. Several streams in the Hood River valley show these effects.

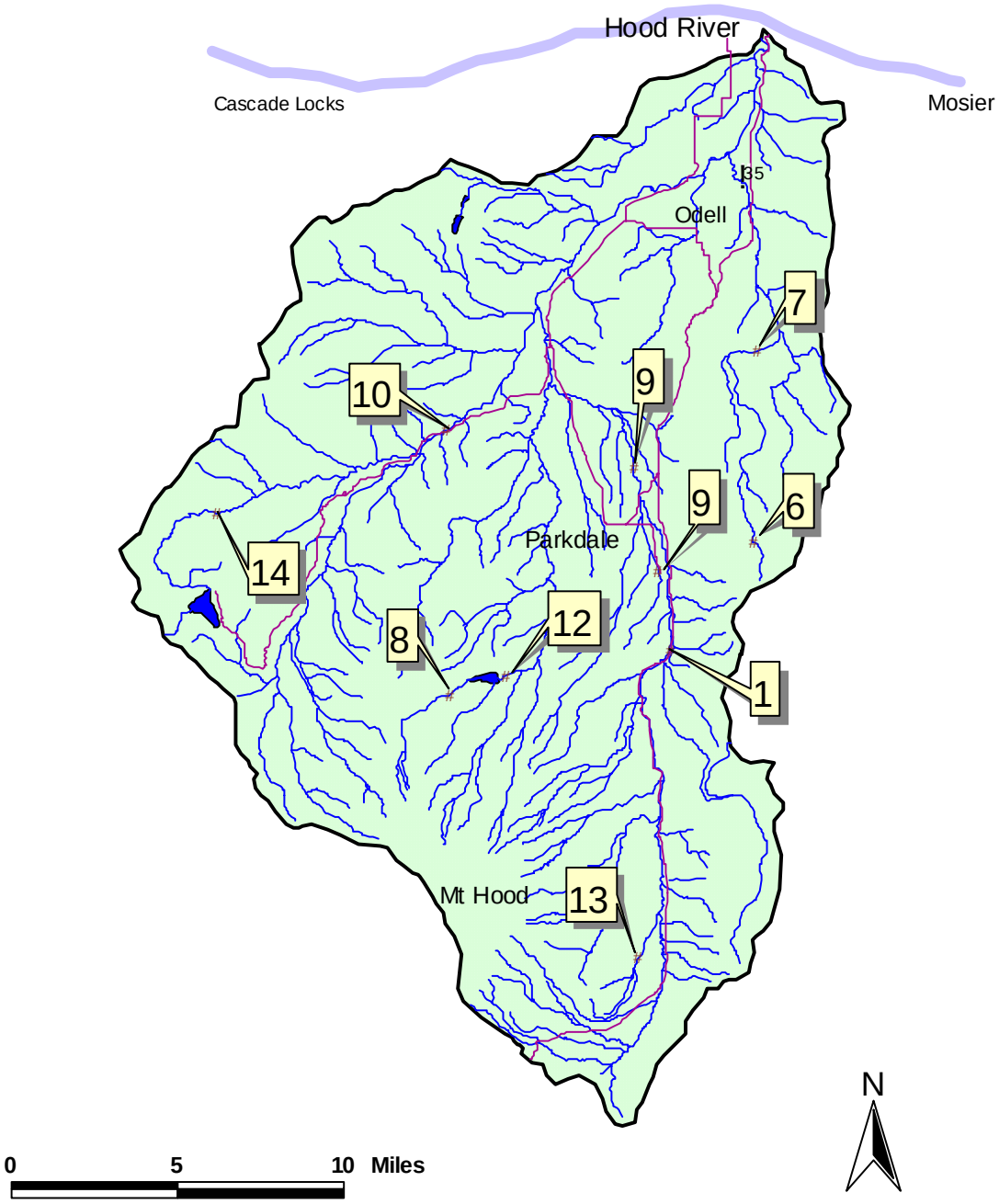
Historic timber and stream clearing practices have cut the natural supply of large wood debris in most streams, reducing the number and depth of pools compared to natural conditions. Large wood is a key structural element in Cascade streams like the Hood River. Large wood helps to slow water velocities, trap gravel, and create pools and sloughs that form high quality fish habitat. When wood is not available to slow the water and trap gravel, spawning-size gravel tends to wash up on stream banks at high water where it becomes unavailable for salmon, steelhead, and trout spawning at moderate and low flows. Flood refuge areas and side-channel nursery habitats are also fewer compared to natural conditions, making suitable habitat less available for young fish.

Habitat Protection and Restoration Strategy

- First protect areas of good, intact habitat rather than allow degradation and attempt to restore it later on. Encourage careful land use planning, forest management plans, adequate enforcement of regulatory standards, and use of voluntary measures by landowners that supplement habitat protection rules.
- Stop or remove the human-caused impacts that degrade habitats and biological conditions. Allow watersheds or habitats to recover naturally over time.
- If a habitat area cannot recover quickly enough on its own, then pursue restoration activities that will accelerate return to a healthy condition where natural processes are functioning.
- Maintain and restore natural processes that create and maintain habitat. These natural processes include hydrology, flow regimes, sediment deposition and transport, riparian and floodplain interactions, delivery of organic matter such as leaf and needle litter, instream large woody debris and fish carcasses.

Habitat Protection and Restoration - List of Proposed Actions

Ref. No.	Project Name	Priority	Schedule
1	Highway 35 Corridor Maintenance Alternatives Feasibility Study	High	2002
2	Revise Floodplain Mapping and Ordinance	High	2003
3	Update Comprehensive Land Use Plan for Statewide Planning Goal 5	High	2002-3
4	Wetland Inventory and Functional Assessment	Med	2004
5	Promote Incentive-Based and Voluntary Protection for Sensitive Habitat Areas on Private Lands	Med	ongoing
6	Upper West Fork Neal Creek Riparian and Stream Improvements	Med	2002
7	West Fork Neal Creek Floodplain and Channel Restoration	Med	2006
8	Complete Upper Clear Branch Large Woody Debris Placement	Med	ASAP
9	Lower and Middle East Fork Hood River Restoration	Med	2002-7
10	West Fork Hood River Large Wood Placement	Med	2005
11	Reduce Risk of Catastrophic Wildfire	Med	2003-7
12	Monitor Spawning Gravel Supply Below Clear Branch Dam	Low	Ongoing
13	Robinhood Creek Riparian Restoration	Low	2006
14	Lake Branch Fish Habitat Improvement	Low	2006



Fish Habitat Restoration Actions

Habitat protection measures (numbers 2-5 and 11) are not shown on map

Project Descriptions

H-1. Highway 35 Corridor Maintenance Alternatives Feasibility Study

Priority: High
Lead Entity: Federal Highways Adm.., Or. Dept. of Transportation
Subwatershed: East Fork Hood River
Estimated Cost: $200,000
Description: Examine feasibility of alternative treatments within the Highway 35 corridor from Baseline Road to the White River including road realignment at problem segments, moving dikes, adding new structures such as bridge spans, culverts, and overpasses. Develop an improved maintenance plan and an impact mitigation and stream enhancement plan.
Benefits to Endangered Species Act Listed or Target Species: Opportunities may exist to restore floodplain habitat for threatened steelhead and for cutthroat trout, and reduce impairment of natural river processes by the highway and maintenance activities. This project could identify ways to avoid or reduce chronic emergency repairs that adversely affect floodplain and stream habitats used by threatened steelhead and other fish.
Habitat Concerns: The river channel is confined and modified by Highway 35 construction and maintenance. Development of braids, meander bends, and complex floodplain habitats have been curtailed. Frequent rip-rapping and emergency repairs after floods and debris torrents result in chronic disturbance and habitat losses.
Rationale for Priority Ranking: Flood damages are aggravated by the highway location on unstable alluvial fans and in the East Fork floodplain. Emergency road repairs have become a chronic occurrence over the last few decades.
Schedule: Final report to be completed Fall 2002.
Cost-share and other partners: USFS has contributed $20,000 with the remainder funded by the Federal Highway Administration. The USFS, CTWS, ODFW and SWCD/HRWG have participated in study scope development as interested parties.

H-2. Revise Floodplain Maps and Ordinance

Priority: High
Lead Entity: To be determined
Subwatershed: Watershed --scattered sites
Estimated Cost: To be determined
Description: Upgrade available floodplain maps to replace existing coarse-level Federal Emergency Management Agency maps prepared in 1984. Develop an ordinance change to incorporate channel migration hazards in key areas.
Benefits to Endangered Species Act Listed or Target Species: This project could help protect and maintain remaining floodplain habitats used by threatened steelhead and other salmonid species and protect critical floodplain areas from unwise development.

Habitat Concerns: Existing floodplain maps are insufficient and the flood ordinance does not address channel migration hazards. There is a risk of continued inappropriate land use in flood-prone areas and those subject to channel changes. This can lead to further loss of stream-floodplain interaction, side channels, high water refuges, and other productive habitats.
Rationale for Priority Ranking: Floodplains along Neal Creek and the East Fork Hood River are vulnerable to channel migration, and continue to be at risk for incompatible development. Development in floodprone areas is a risk to human life and property. Floodplain habitats function as productive fish and wildlife habitat areas. During high flows, floodplains allow for sediment deposition, groundwater aquifer recharge to help maintain streamflows and water supplies. Floodplain habitat is naturally limited in the Hood River system but is very important.
Schedule: 2003 or as soon as feasible
Relationship to other projects: Incentive programs, acquisition, or measures in Project H-4. *Promote Incentive-Based and Voluntary Protection for Sensitive Habitat Areas on Private Lands* might be applied if appropriate and necessary to help protect channel migration zones.
Cost-share and other partners: Hood River County is the appropriate lead agency for this project. The HRWG and SWCD may assist in pursuing a grant to develop technical information or mapping if needed.

H-3. Update Comprehensive Land Use Plan for Statewide Planning Goal 5

Priority: High
Lead Entity: HRC Planning Dept
Subwatershed: All
Estimated Cost: To be determined
Description: Prepare riparian corridor and wildlife habitat, wetland, and hazard area inventories as needed to identify significant lands and resources, update the comprehensive land use plan and revise county ordinances as required by statewide planning guidelines or requirements.
Benefits to Endangered Species Act Listed and Target Species: Adequate land use plans, development ordinances and protection standards will help maintain habitat areas and functions necessary to protect resident and anadromous salmonids including threatened steelhead as well as sensitive birds, mammals and amphibians.
Habitat Concerns: Given continued population growth and land development, sensitive areas may be at risk of incompatible development or increasing conflict between wildlife and people.
Rationale for Priority Ranking: Hood River County is behind schedule in completing updates to its comprehensive land use plan and implementing ordinances. As of June 2002, the County plans to complete specific tasks addressing riparian corridors and wetlands towards fulfilling Statewide Planning Program Goal 5, and has agreed on a work plan with the Oregon Department of Land Conservation and Development.
Schedule: Beginning in 2002.
Relationship to other projects: The County plans a riparian corridor inventory in 2002 and completion of an associated riparian ordinance, which will largely meet the objectives of Project No. WQ-2 *Extend Streamside Vegetation Protection to All Land Uses*. For Goal 5 wetlands requirements, the county plans to adopt the StatewideWetland Inventory map and add associated language to the Comprehensive Land Use Plan. The Planning Department recognizes the need to address flood hazards from river channel migration and may do so in the future. Work conducted under Project H-2. *Revise Floodplain Maps and Ordinance* would contribute information to address this issue in future planning. The Planning Department has no current plans to conduct a wildlife habitat inventory but may do so as part of future periodic reviews or updates to the comprehensive plan.
Cost-share and other partners: DLCD, HRSWCD

H-4. Promote Incentive-Based and Voluntary Protection for Sensitive Habitat Areas on Private Lands

Priority: Medium
Lead Entity: HR Soil and Water Conservation District
Subwatershed: All
Estimated Cost: Can be done within existing program
Description: Match interested private landowners with appropriate financial incentive or other voluntary programs to augment existing regulatory protection of floodplains, stream corridors, wetlands, and wildlife habitat areas. Identify opportunitites to work with interested landowners and land trusts to acquire easements or land donations to land trusts to conserve important or unique habitats. Available programs include the USDA Conservation Reserve Enhancement Program, Wetlands Reserve Program, and the State Riparian Tax Incentive Program, and land trust conservation easement or fee simple purchase or donations. All of these are aimed at voluntary protection of sensitive private lands.
Benefits to Endangered Species Act Listed and Target Species: This project could help protect and maintain sensitive habitat used by threatened steelhead, other salmonids, and wildlife.
Habitat Concerns: The amount of undeveloped valley bottom and lower elevation lands in the Watershed is limited. Voluntary private land conservation would compliment existing land use protections and may provide financial offsets for landowners.
Rationale for Priority Ranking: Few incentive programs seem to be a perfect fit for the valley, but we will keep looking. For small acreage landowners, most federal programs have low compensation rates. Unfortunately, the Oregon Dept. of Fish and Wildlife riparian tax incentive program excludes lands with rural residential zoning.
Schedule: Ongoing
Cost-share and other partners: NRCS, ODFW, USFWS, Columbia Land Trust

H-5. Wetland Inventory and Functional Assessment

Priority: Medium
Lead Entity: HR Soil and Water Conservation District
Subwatershed: Various
Estimated Cost: $18,000
Description: Review Statewide or National Wetland Inventory (NWI) maps, soil survey data, and conduct aerial photo interpretation and field surveys to identify wetlands on non-federal lands in the Hood River Valley. Determine functions, values and characteristics of wetlands. Identify and prioritize opportunities for voluntary wetland protection and restoration.
Benefits to Endangered Species Act Listed and Target Species: Wetlands are important for filtering contaminants, groundwater recharge, summer streamflow support, flood attenuation and wildlife habitat. Wetlands contribute to a healthy watershed for threatened steelhead and other salmonids as well as birds and amphibians.
Habitat Concerns: Available wetland inventory maps are believed to mis-identify or under-represent actual wetlands in the Hood River Valley. A lack of good inventory information makes it difficult to prioritize opportunities to enhance, protect or restore wetlands.
Rationale for Priority Ranking: Information developed in this inventory will help identify voluntary opportunities for wetland protection and restoration in the Hood River Valley to supplement existing information.
Schedule: 2003
Relationship to other projects: The County Planning Department may adopt Statewide Wetland Inventory maps to fulfill state planning requirements as part of Project H-3 *Update Goal V in Comprehensive Land Use Plan*. This measure would compliment that effort by expanding upon existing information.
Cost-share and other partners: In consultation with the County Planning Department, the HRSWCD will seek grant funding for this project.

H-6. Upper West Fork Neal Creek Riparian and Stream Improvements

Priority: Medium Lead Entity: US Forest Service
Subwatershed: West Fork Neal Cr Estimated Cost: $14,000
Description: Fence off the riparian zone in the Forest Service cattle grazing allotment lands in the upper West Fork of Neal Creek, and enhance habitat by adding large wood along the floodplain
Benefits to Endangered Species Act Listed and Target Species: Cutthroat and resident rainbow trout use this part of Neal Creek.
Habitat Concerns: Livestock have uncontrolled access to stream, causing streambank erosion and loss of vegetation During low flows, cattle create disconnected pools in stream channels that trap fish, making them vulnerable to predation and warm temperatures. Habitat quality suffers from low levels of instream wood debris.
Rationale for Priority Ranking: Channel habitat types include moderately steep narrow valley and low to moderate gradient headwaters. Fish are noted to be relatively abundant in the headwater stream and meadow areas.
Schedule: Summer 2002
Cost-share and other partners: FY02 USDA Title II funds have been secured.

H-7. West Fork Neal Creek Floodplain and Channel Restoration

Priority: Medium Lead Entity: Confederated Tribes WSR or HRWG Group
Subwatershed: West Fork Neal Creek Estimated Cost: $70,000
Description: Improve degraded habitat along 1.5 miles of West Fork Neal Creek where the County plans to permanently vacate Neal Creek road due to flood damage. A total 3.6 acres of old roadbed would be obliterated. Actively eroding areas of road fill encroaching on the stream would be pulled back. The road bed would be decompacted and ditches filled to restore a natural bank slope and channel cross section. Large log and woody debris structures would be installed to increase pool habitat. Approximately 5.2 acres of riparian area would be revegetated.
Benefits to Endangered Species Act Listed or Target Species: These treatments are intended to accelerate natural recovery processes and improve fish habitat in the degraded channel. This project will improve spawning and rearing habitat for threatened winter steelhead, coho salmon, resident cutthroat, and rainbow trout.
Habitat Concerns: Habitat quality in this reach is poor, with pools and large woody debris volumes severely low. The old county road restricts stream access to the floodplain and interferes with natural processes including riparian development, sediment movement and deposition, meander, and large wood recruitment. Project objectives are to restore the channel to a more natural condition; restore stream access to the floodplain; increase the depth and number of pools to improve fish habitat; increase instream cover, gravel retention, and overall habitat complexity; and prevent eroding road fill and fine sediment from entering stream.
Rationale for Priority Ranking: The treatment area encompasses the lower gradient portion of the West Fork Neal Creek historically used by anadromous fish and the road vacation provides a unique opportunity to restore channel geometry and natural habitat processes. A more natural channel cross section will be restored. Hydraulic interaction between the stream, riparian zone and floodplain will be increased. Flood and bank storage capacity will be restored to a more natural condition than that which now exists. Bank erosion and sedimentation will be reduced.
Schedule: A feasibility study was completed by Inter-Fluve, Inc. in 2000. Completion is not anticipated until 2006.
Sequence in relation to other projects: This project should be postponed until Project FP- 3

Central Canal Upgrade/Neal Creek Inverted Siphon is completed so that work is carried out after streamflows are restored to natural levels. The EFID now uses this reach to convey 45 cubic feet per second for irrigation, whereas the natural low flow is around 5 cubic feet per second.
Cost-share and other partners: County Public Works Department, County Forestry Department, Oregon Department of Fish and Wildlife, US Forest Service.
Monitoring: The number and depth of pools, channel cross section measurements, and riparian vegetation will be measured annually for 5 years after project completion and compared to a baseline habitat survey. Snorkel surveys will estimate distribution and numbers of salmonids.

H-8. Complete Upper Clear Branch Large Woody Debris Placement

Priority: Medium Lead Entity: U.S. Forest Service
Subwatershed: Clear Branch Estimated Cost: $ 250,000
Description: Place additional large wood in untreated reach in upper Clear Branch. Project would involve helicopter placement of 500 to 1000 pieces of large wood in wetted channel and in riparian zone in the area between 0.7 and 1.5 miles above Laurance Lake. The downstream 0.7 miles to the Lake was treated in 2000.
Benefits to Endangered Species Act Listed and Target Species: This project will increase the availability of pool habitat, spawning gravel, and hiding cover for threatened bull trout and for resident cutthroat trout.
Habitat Concerns: The stream channel is incised and widened, and is characterized by low complexity of instream habitat.
Rationale for Priority Ranking: The Forest Service ran out of wood in 2000 and was not able to complete the treatment as planned.
Schedule: ASAP- Project schedule depends on opportunity to find a wood supply. All environmental documentation and permits have been completed.
Cost-share and other partners: To be determined.
Monitoring: Would be combined with existing monitoring on completed sections.

H-9. Lower and Middle East Fork Hood River Restoration

Priority: Medium Lead Entity: CTWS
Subwatershed: East Fork Hood R, Lower East Fork Hood R Estimated Cost: to be determined
Description: Evaluate opportunities for instream and floodplain restoration such as adding large wood, restoring side channels, and increasing bridge spans, including conducting a systematic fluvial geomorphology review as needed. In the lower East Fork Hood River , work with interested landowners where opportunities to restore side channels and riparian wetlands exist.
Benefits to Endangered Species Act Listed and Target Species: This measure could increase the availability of shallow riffle habitat important to early or newly emerged juvenile steelhead. It would increase flood refuge habitat, gravel retention, and the number and depth of pools and cover for steelhead juveniles and adults. It could improve stream ecosystem diversity and functioning such as sediment transport and deposition and riparian interactions. Winter-run steelhead using the East Fork Hood River are listed as threatened. The project may increase habitat for coho salmon which may spawn and rear in side channels if suitable habitat is restored.
Habitat Concerns: The East Fork Hood River has a very low frequency and volume of pool area. Stream substrate is dominated in most areas by boulders and the supply of spawning gravel is limited. Large woody debris volumes are low, and the river has lost much of its historic habitat diversity due to stream cleanout and highway confinement. The East Fork has frequent flooding and mudflows, and its ability to stabilize itself after these events has been impaired by structures.
Rationale for Priority Ranking: Despite the dynamic and volatile nature of the East Fork Hood

River, it has historically been a productive habitat for winter-run steelhead. The Forest Service has had success in restoring floodplain interactions in the upper reaches. A side channel on private property restored in 1999 has shown excellent success with consistent use by spawning steelhead.
Schedule: 2002-7
Relation to other projects: Aspects of Project H-1 ***Highway 35 Corridor Maintenance Alternatives Feasibility Study*** may identify opportunities to contribute to project objectives.
Cost-share and other partners: ODOT,ODFW, USFS
Monitoring: To be determined

H-10. West Fork Hood River Large Wood Placement

Priority: Medium
Lead Entity: Confederated Tribes of WSR
Subwatershed: West Fork Hood River
Estimated Cost: $150,000
Description: Evaluate the feasibility and potential to place additional large woody debris in the channel and floodplain along riparian areas in depositional sections of the West Fork below Twin Bridges and about one half mile above Moving Falls. Pursue implementation if evaluation is positive.
Benefits to Endangered Species Act Listed or Target Species: Placing large woody debris will increase instream habitat complexity, pool availability, floodplain interactions, spawning gravel retention, flood refuge, and early juvenile rearing habitat for threatened steelhead and for spring chinook salmon.
Habitat Concerns: Stream surveys indicate that the volume of large woody debris is low, except for those locations where the Forest Service has placed cabled wood structures. Pool habitat is below desirable levels in several reaches in the West Fork. Because of the lack of wood and habitat structure, spawning size gravel tends to wash up on streambanks.
Rationale for Priority Ranking:
Schedule: 2005
Sequence in relation to other projects:
Cost-share and other partners: US Forest Service, Longview Fibre Company
Monitoring: To be determined

H-11. Reduce Risk of Watershed Damage by Catastrophic Wildfire

Priority: Medium
Lead Entity: To be determined
Subwatershed: Entire
Estimated Cost: To be determined
Description: Support development of plan for forest fire fuels reduction plan (e.g., controlled burn, stand thinning, other techniques) that focuses on identifying priority risk areas and long term approaches. Work with forest landowners to promote use of an ecologically-responsible, multi-disciplinary approach that considers wildlife needs and the health of the forest ecosystem, and mimics natural fire processes to the extent feasible.
Benefits to Endangered Species Act Listed or Target Species: This measure would help prevent damage to stream systems supporting threatened bull trout and steelhead, as well as spring chinook and coho salmon, and resident trout cutthroat and rainbow trout.
Habitat Concerns: Catastrophic fire can cause severe and persistent watershed damage and damage to streams by removing the forest canopy and increasing runoff and sedimentation.
Rationale for Priority Ranking: Local wildfire experts and land managers agree that local forests are at serious risk for catastrophic wildfire and a cohesive plan should be developed to address this problem.

Schedule: 2003-7
Relationship to Other Projects: Brian Shortt, Hood River business owner, in association with the Waucoma Group (participants in a 2001 forest fire workshop at the Hood Rivers Waucoma Building) received $20,000 in PL 106-393 Title III federal funding via the County for Forest Land Restoration project that could contribute to the goals of this project.
Cost-share and other partners: Would likely include Hood River County, US Forest Service, major forest landowners, Oregon Department of Forestry, and other parties.

H-12. Monitor Spawning Gravel Supply below Clear Branch Dam

Priority: Low
Lead Entity: Middle Fork Irrigation District
Subwatershed: Clear Branch
Estimated Cost: Nominal
Description: Monitor gravel supply and introduce spawning gravel as needed during appropriate instream work dates as per ODFW direction.
Benefits to Endangered Species Act Listed or Target Species: Threatened winter steelhead and bull trout utilize spawning habitat in Clear Branch downstream of Clear Branch Dam.
Habitat Concerns: Clear Branch Dam interrupts natural sediment transport processes, e.g. the downstream movement and replenishment of sediment and spawning gravel below the dam to Coe Branch. Gravel supply and fish spawning habitat is limited in this reach.
Schedule: Ongoing
Cost-share and other partners: US Forest Service, ODFW, Confederated Tribes WSR
Monitoring: Partners and district will cooperate on steelhead and spring chinook spawning or redd surveys in project reach below dam, assess movement and loss of gravel (e.g using scour chains and photo points).

H-13. Robinhood Creek Riparian Restoration

Priority: Low
Lead Entity: U.S. Forest Service
Subwatershed: Robinhood
Estimated Cost: $50,000
Description: Plant riparian area with lodgepole pine to create a frost-resistant shelterwood for other tree species. Add large wood to floodplain area.
Benefits to Endangered Species Act Listed or Target Species: Will improve riparian habitat for cutthroat trout.
Habitat Concerns: Lack of riparian trees, frost pocket within clear cut area inhibits re-growth, low instream wood debris
Schedule: 2006
Cost-share and other partners: To be determined
Monitoring: To be determined

H-14. Lake Branch Fish Habitat Improvement

Priority: Low:
Lead Entity: To be determined
Subwatershed: Lake Branch
Estimated Cost: To be determined
Description: Place additional large wood debris
Benefits to Endangered Species Act Listed or Target Species: Will improve instream habitat for threatened summer-run steelhead and for rainbow trout and spring chinook salmon
Habitat Concerns: Lack of pools and instream habitat diversity
Schedule: 2006
Cost-share and other partners: USFS
Monitoring: To be determined

Public Awareness and Education

Goal: Recommend ongoing education and awareness projects to educate the public about watershed issues and promote improved stewardship of land and water.

The mission of the Hood River Watershed Group is to sustain and improve the Hood River Watershed through education, cooperation, and stewardship. Consistent public education, outreach, dialogue, and broad community involvement are key to the quality of the Hood River Valley streams and watersheds in the long term. Given this importance, all of the measures in this chapter are ranked as a high priority.

Many members of the Watershed Group conduct educational activities as a part of their existing activities. To name prime examples -- the Hood River Grower-Shippers Association, Hood River County Extension Agent, the Mid-Columbia Agricultural Research and Experiment Center, the Natural Resources Conservation Service, and the Hood River Soil and Water Conservation District, regularly sponsor landowner workshops, submit newspaper articles, and distribute written materials on subjects such as irrigation management and spray practices.

Area residents who attend Watershed Group meetings each month hear directly from county, state, federal and tribal representatives about the status of Hood River salmon and steelhead populations, infrastructure upgrades, restoration projects, fisheries enforcement actions, water quality monitoring results, and other issues. Through the Watershed Group, opportunities are provided for people who wish to volunteer time to help in fish salvage operations (from irrigation canals), tree planting and maintenance, noxious weed removal, water quality monitoring, or staffing an outreach booth at the County Fair. Members conduct classroom or outdoor youth activities including Central Cascades Alliance Secrets of Our Forest Home elementary school program.

Still, there is much more that can be done to inform the community about watershed issues. For example, there is a need to prepare appropriate Spanish-language materials and develop outreach activities, since almost a third of the County's population is from Mexico or elsewhere in Latin America.

The following measures are intended to continue and expand public education and outreach, and to generate broader participation in best management practices, protection and restoration activities around the watershed.

Awareness and Education - List of Proposed Actions

Ref No	Project Name	Priority	Schedule
1	Water Conservation Education	High	Ongoing
2	Continue Integrated Fruit Production Program	High	Ongoing
3	Continue the Hood River Watershed Group	High	2003
4	Expand Watershed Awareness and Outreach	High	2003
5	Voices for the Hood River Watershed Interpretive Signs	High	2002
6	Insure awareness of fishing rules and regulations	High	Ongoing
7	Annual Hood River Clean-up Day Event	High	2003-7

E-1. Water Conservation Education

Priority: High
Lead Entity: SWCD
Subwatershed: Entire Watershed
Estimated Cost: Under existing program
Description: Work with water utilities, landscapers, nurseries, and others to develop education materials for rural and urban residential water users, parks, schools, churches, and commercial businesses. Promote the availability of technical assistance where appropriate. Promote improved pasture management practices that also benefit water conservation.
Benefits to Endangered Species Act Listed and Target Species: Increased water use efficiency by all landowners can help maintain or restore streamflows and provide better habitat below diversions that are important to threatened summer and winter steelhead and bull trout, as well as Chinook, coho, resident rainbow and cutthroat trout. Preliminary data from ODFW suggests that higher summer flows increase steelhead production in the Hood River.
Habitat Concerns: Flows in the Hood River system are diminished by water withdrawals.
Rationale for Priority Ranking: Improved water conservation awareness and knowledge of efficiency techniques is important for all water users. While many programs currently target fruit growers, other water users do not receive consistent education about water conservation.
Schedule: Ongoing
Relationship to other projects: Two conservation brochures were completed in 2001 as a start.
Cost-share or other partners: Irrigation and water districts, City of Hood River, Master Gardeners, landscape and garden stores and suppliers

E-2. Continue the Integrated Fruit Production Program

Priority: High
Lead Entity: Mid-Columbia Agricultural Research & Extension Ctr
Subwatershed: Watershed Agricultural Lands
Estimated Cost: To be determined
Description: Continue Integrated Fruit Production research, development and education program, implement technical assistance for more productive and healthier orchard environments.
Benefits to Endangered Species Act Listed and Target Species: Improved orchard practices can help maintain or restore streamflow, protect water quality and habitat for threatened summer and winter steelhead and bull trout, as well as chinook, coho, resident rainbow and cutthroat trout.
Habitat Concerns: Over-watering and over-application of fertilizers and pesticides in orchards can lead to greater stream diversions and lower stream flows, nutrient leaching and other contaminants entering surface and ground water.
Schedule: Ongoing
Sequence in relation to other projects: IFP participants assisted with an intensive effort in Neal Creek to reduce pesticide levels with good results in 2000.
Cost-share and other partners: SWCD will help with grant writing, Grower-Shippers Association

E-3. Continue the Hood River Watershed Group

Priority: High
Lead Entity: SWCD
Subwatershed: Entire Watershed
Estimated Cost: $ 62,700/year
Description: Provide an educational and networking forum to maintain and increase cooperation and stewardship among landowners, business, tribes, and government agencies. Promote development of local solutions to endangered species and natural resource concerns. This projects involves funding a full time coordinator and associated watershed council support with oversight and fiscal management by the HR SWCD.
Schedule: Ongoing

Cost-share and other partners: OWEB, CTWS, EFID

E-4. Continue and Expand Watershed Awareness and Outreach

Priority: High Lead Entities: HRWG and SWCD
Subwatershed: Watershed Entire Estimated Cost: Most included in existing budgets
Description: Conduct educational efforts and on the ground projects with whitewater boaters, fishermen, mountain bikers, realtors, motorized trail riders, building contractors, public officials, and public employees. Conduct annual tree sales or give-aways, school presentations and activities, county fair booth, radio spots, newspaper. Develop Spanish language materials and a speakers bureau. Continue personal contact and outreach to landowners. Continue to connect volunteers including youth with project opportunities and internships.
Schedule: Ongoing

E-5. Voice for the Hood River Watershed

Priority: High Lead Entity: US Forest Service
Subwatershed: Various Estimated Cost: $26,300
Description: This project will design, construct, and place up to 9 interpretive signs at selected stream restoration or other sites to increase public awareness and understanding of aquatic ecology, watershed functions, and the purpose of recent restoration work including large woody debris placement and fish passage remediation in each of fifth-field watersheds within the Hood River watershed. Sign content will be developed with HRWG members and other local partners.
Schedule: 2002
Cost-share and other partners: An OWEB grant award is being sought for this project. Farmers Irrigation District will contribute several thousand dollars in materials and labor for Green Point Creek Restoration signage.

E-6. Insure awareness of fishing rules and regulations

Priority: High Lead Entity: ODFW and Oregon State Police
Subwatershed: Entire Watershed Estimated Cost: Included in existing programs
Description: Ongoing education about fishing regulations, including Spanish language materials and efforts.
Schedule: Ongoing
Other partners: The Forest Service has developed and distributed bilingual materials and posters focusing on bull trout. The Forest Service coordinates with ODFW and OSP on fisheries and wildlife enforcement on federal lands.

E-7. Annual Hood River Clean-up Day Event

Priority: High Lead Entity: HRWG
Subwatershed: Hood River Mainstem Estimated Cost: $300
Description: Hold an annual stream cleanup from Powerdale Dam to the Columbia River to clean up trash and litter in streamside area at popular fishing and picnic sites. Hold the event during the fishing season to increase visibility and try to encourage people not to litter.
Schedule: Begin in 2003
Potential partners: Hood River Chamber of Commerce, SOLV, Oregon Sea Grant

Recommended Projects for Wildlife

Healthy native plant and wildlife communities are part of a sound watershed ecosystem. The Hood River Watershed Assessment discussed selected wildlife and plant community topics, and outlined voluntary opportunities to assist wildlife on private lands. The assessment noted that vegetation, wetlands and wildlife habitats that once existed in the Hood River valley have been substantially altered in the last 150 years. Agricultural, residential uses and roads now dominate the landscape. Lower elevation conifer forest has been replaced with orchards of uniformly-spaced deciduous trees. Deciduous trees do not provide the year-round hiding, thermal and snow accumulation cover or shelter for birds and mammals that conifers provide. As a result, less shelter is available for resident wildlife especially in winter at elevations under 2,500 feet. Another native forest attribute missing from many agricultural and residential properties are damaged live trees, standing dead trees and large downed trees that provide nesting cavities, scanning perches, and insects for birds and other wildlife. The winter range of large migratory animals has been curtailed by human habitation. Half the remaining deer and elk winter range in the watershed is on private land. In most locations, vegetated riparian areas are the last stronghold for wildlife in the Hood River valley.

If we wish to maintain wildlife populations and wildlife habitat diversity in the Hood River Watershed, more effort is needed. Watershed Group members identified the following projects related to wildlife:

W-1. Prevent drowning of small and medium sized mammals in open irrigation canals. Larger irrigation canals can occasionally trap wildlife, which then drown in the swift current. Building small bridges over open canals at known game trail crossings can help, along with building escape ramps in canals to allow animals to climb out to a safe exit.

W-2. Improve survival for wildlife attempting to cross Interstate Highway I-84. The continuous concrete median barriers trap small and medium sized animals in traffic lanes. Some mechanism could be developed to decrease road kill of these animals. One option would be to work with Oregon Department of Transportation to leave regular openings along the median barrier to provide an escape route. Other options may be devices to enable wildlife to climb over lane dividers or tunnel underneath.

W-3. Wetland restoration at Lower Green Point Reservoir. Farmers Irrigation District is considering eliminating the aging reservoir and restoring a ten to thirty-acre wetland in its place. By piping Highline Canal, more than enough water could be saved to replace the water storage volume that would be lost, and the District could avoid the cost of dam rehabilitation required to meet dam safety rules.

W-4. Purchase additional wetland easements from willing landowners. Look for more opportunities, similar to a recent wetland easement and fencing project on Baldwin Creek, to enhance habitat for birds, amphibians, and small animals.

W-5. Identify and purchase important upland wildlife habitats needing protection. Lands could be acquired to prevent further losses of important migration corridors or wintering habitats and control increasing conflicts with humans/dogs/pets. For example, the east valley wall has open meadows and low elevation forest habitat that is facing more encroachment by homes and increased recreational use. Middle Mountain is an important east-west migration corridor for bear, deer, and elk.

Appendix 1: Lists of Known Road Culvert Barriers

Source: ODFW and ODOT, 1998

Culvert Problems on County and State Roads
Hood River Mainstem

County Rd # or State Hwy	Subbasin/Stream	Stream Mile	Species	Habitat Quality	Priority	Comments
101 Brookside	Indian Creek/ Unnamed Cr	1.4	Cutthroat	Poor	Low	Velocity barrier. Juvenile step barrier.
129	Indian Cr	2.4	Cutthroat	Poor	Low	Velocity barrier.
201	Whiskey Cr	2.1	Cutthroat	Fair	Low	
HWY 35	Whiskey Cr	2	Cutthroat	Fair	Low	Step/velocity barrier
202	Whiskey Cr	0.2	Cutthroat	Fair	Low	Velocity barrier. Juvenile step barrier.
306	Neal Cr/ Lenz Cr	0.9	Coho, Cutthroat	Fair	Med	Velocity inhibits/prohibits fish passage.
209	Neal Cr/ Unnamed Cr	0.3	(Steelhead)	Fair	Med	Step/velocity barrier.
209	Neal Cr /Unnamed Cr	2.5	St, Cutthroat	Fair	Med	Velocity inhibits passage. Juvenile step barrier.
315	W. Fk Neal Cr/ Unnamed Cr	0.7	Cutthroat	Poor	Low	High velocity water.
320	Odell Creek	0.2	Cutthroat	Fair	Low	Velocity limits passage. Step barrier for juvenile fish.
322	Odell Cr	1.8	Cutthroat	Fair	Med	New culvert. Velocity inhibits/prohibits fish passage.
305	Odell Creek/ Unnamed Cr	2.3	Cutthroat	Fair	Low	Velocity barrier. Landowner says small culvert leads to flooding.
320	Odell Cr	2.3	Cutthroat	Fair	Low	2 culverts. Velocity barrier. Juvenile step barrier.
West Fork Hood River						
Lost Lake 501	Deer Creek	2.0	Cutthroat	Fair	Low	Velocity/Step barrier.
Middle Fork Hood River						
417	Rogers Cr	0.2	Cutthroat	Good	Low	Lower 10' of pipe is corroded through in a number of places.

Culvert Problems on County and State Roads - East Fork Hood River *Source: ODFW and ODOT, 1998*

County Rd # or State Hwy	Subbasin/ Stream	Stream Mile	Species	Habitat Quality	Priority	Comment
421	Trout Cr	0.5	Cutthroat	Good	Low	Velocity barrier. 20" step out of culvert over dam.
401	Trout Cr	5.4	Cutthroat	Good	Low	Juvenile step barrier. Adults are limited by velocity.
418	Trout Cr	1.6	Cutthroat	Good	Low	Velocity barrier.
423	Trout Cr	3.2	Cutthroat	Good	Low	Velocity barrier.
421	Evans Cr	0.6	St, coho	Good	Med	Retaining wall creates pool, siphons creek through 1'
424	Evans Cr	1.6	St, coho	Fair	Med	Juvenile step barrier. Velocity barrier.
429	Evans Cr	3	St, coho	Fair	Low	Velocity barrier.
421	Evans Cr/ Griswell	1	St, coho	Good	Med	Velocity and step prohibit juveniles, inhibit adults.
426	Evans Cr/Griswell	1.5	St, coho	Good	Med	Step/velocity barrier.
Laurance Lake	W. Fk Evans Cr	14	St, coho	Fair	Low	Velocity barrier.
Cooper Spur 428	Doe Cr	3.3	Cutthroat	Good	Med	Step/velocity barrier.
HWY 35	Tilly Jane Ck.	3.4	Cutthroat	Fair	Low	Step/velocity barrier
Cooper Spur 428	Tilly Jane Ck.	4.6	Cutthroat	Good	Med	Juvenile step barrier. Debris inhibits fish passage.
HWY 35	Crystal Spr. Ck	4.5	St, cutthroat	Fair	Med	Step/velocity barrier
414	East Fk Hood R.	0.2	St, coho	Fair	Med	Step/velocity barrier.
415	Emil Creek	0.8	St, coho	Fair	Med	Velocity inhibits/prohibits fish. Juvenile step barrier.
HWY 35	Baldwin Cr/ Tieman	2.0	Cutthroat	Fair	Low	Velocity barrier
411	Baldwin Cr/	0.6	Cutthroat	Fair	Low	Velocity barrier. Juvenile step barrier.
428	Baldwin Cr	0.3	Cutthroat	Fair	Low	Juvenile step/velocity barrier. 5' concrete slide inhibits
412	Baldwin Cr	0.6	St, coho	Fair	Med	Velocity barrier.
405	Wisehart Cr	0.3	St, coho	Fair	Med	Double culvert. Water cascades down rock for 2' before
406	Wisehart C	0.5	St, coho,	Fair	Med	Velocity barrier.

Continued, **Culvert Problems on County and State Roads - East Fork Hood River** *ODFW and ODOT, 1998*						
County Rd # or State Hwy	**Subbasin/ Stream**	**Stream Mile**	**Species**	**Habitat Quality**	**Priority**	**Comments**
411	Wisehart C	0.9	St, coho,	Fair	Med	Water cascades down rock for 5' before pool.
HWY 35	Meadow Ck	2.1	Cutthroat	Good	Low	Boulders in pool, drop & velocity limit passage
HWY 35	Clark Ck	6.4	Cutthroat	Good	Low	Velocity barrier, double culvert
HWY 35	Ash Ck	1.4	Cutthroat	Good	Low	Juvenile step barrier/ vel. barrier
HWY 35	Pollalie Ck	7.0	Cutthroat	Good	Med	Velocity barrier, double culvert
HWY 35	Unnamed Ck	1.8	Cutthroat	Good	Low	Step/velocity barrier
HWY 35	Birdie Ck	2.6	Cutthroat	Fair	Low	Step/velocity barrier
HWY 35	Engineers Ck	1.8	Cutthroat	Good	Low	Step/velocity barrier
HWY 35	Hellroaring Ck	1.6	Cutthroat	Good	Low	Step/velocity barrier

Culvert Barriers Identified to Date in Stream Habitat Surveys Source: Confederated Tribes of the Warm Springs Reservation 7/25/01			
Stream Name	**River Mile**	**Township, Range, Section**	**Notes**
Baldwin Cr	0.9	T1N, R10E, Section 21 NE	Private driveway and cattle crossing
Baldwin Cr	1.2	T1N, R10E, Section 22 NW	Private Culvert cattle crossing no longer used
Graham Cr	0.1	T1N, R10E, Section 21	County culvert under Leasure Rd
Evans Cr	1.0	T1S, R10E, Section 5 NW	Private- funded- scheduled for summer 2002
Crystal Springs Cr	0.2	T1S, R10E, Section 20	County culvert on unused logging road

Priority Culverts to Replace/repair on the Hood River Ranger District

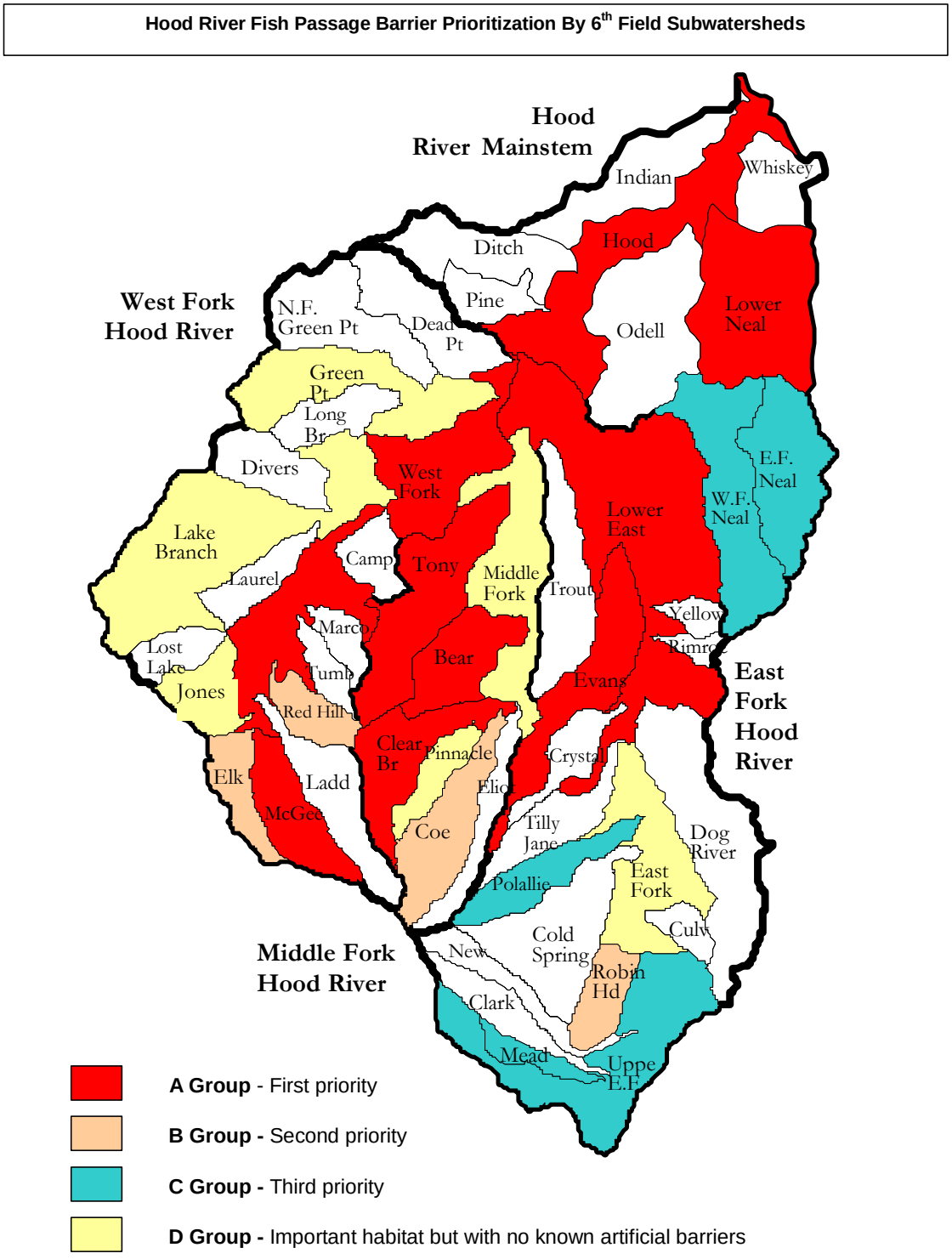
Source: Mt Hood National Forest, 2001

District Priority	Culvert or Road Number	Stream	Fish Species	Miles of Habitat Upstream	Estimated Cost	Notes
1	2840	Pinnacle Cr	Bull trout, cutthroat	2.75	$200,000	Completed
2	3540	East Fork Hood R	Cutthroat	3.75	$100,000	
3	1711630	North Fk Mill Cr	Cutthroat	2.25	$65,000	Not in Hood River drainage
4	3520620	Robinhood Cr	Cutthroat	1.0	$100,000	
5	3500681	Meadows Cr	Cutthroat	1.0	$160,000	

Hood River Ranger District Fish Passage Remediation Culvert Inventory Source: Gary Asbridge, US Forest Service, June 2002					
Culvert ID	Stream Name	RTE NO	Milepost	Species	Habitat Length
1236901876	Little Creek	1610000	0.7	BT, CT, RBT	0.25
1295812722	Bear Creek 2 Trib	1610000	5.1	BT, CT, RBT	0.50
1295812722	Tony Creek- Trib B	1600000	7.6	CT, RBT	0.10
1299706047	Tony Creek- Trib A	1600014	0.1	CT, RBT	0.10
1296605390	Tony Creek- Trib A	1600000	8.4	CT, RBT	0.10
1300448844	Tony Creek	1600000	6.9	CT, RBT	2.50
1310649752	West Fork Neal Creek- Trib B	1700730	0.1	Cutthroat Trout	0.60
1310649752	West Fork Neal Creek- Trib B	1700000	5.1	Cutthroat Trout	0.30
1310649752	West Fork Neal Creek- Trib A	1700110	0.1	Cutthroat Trout	0.60
1316223120	West Fork Neal Creek- Trib A	1710000	0.1	Cutthroat Trout	0.10
1332740383	West Fork Neal Creek	1700000	6.1	Cutthroat Trout	2.25
1344282604	West Fork Neal Creek	1700000	4.8	Cutthroat Trout	1.30
1345370971	West Fork Neal Creek	1700630	0.1	Cutthroat Trout	0.10
1379158832	Neal Creek	1710000	3.7	Cutthroat Trout	0.10
1479662005	North Fork Mill Creek	1711630	2.0	Cutthroat Trout	2.25
1522840637	North Fork Mill Creek	1720193	0.2	Cutthroat Trout	0.75
1492593682	North Fork Mill Creek	1700660	1.5	Cutthroat Trout	0.75
1529146283	North Fork Mill Creek	1700663	0.1	Cutthroat Trout	0.50
1538284633	Tumble Creek 1	4400000	2.0	Cutthroat Trout	0.50
1539002351	Pocket Creek	3540000	2.4	Cutthroat Trout	0.50
1554752394	Engineers Creek	3500640	0.1	Cutthroat Trout	0.40
1554752394	Meadows Creek	3500681	0.1	Cutthroat Trout	0.80
1559680505	Meadows Creek	3545000	0.8	Cutthroat Trout	0.50
1559680505	Meadows Creek	3545000	0.2	Cutthroat Trout	0.25
1559680505	Meadows Creek	3500680	0.1	Cutthroat Trout	0.20
1559680505	Robinhood Creek	3520650	0.2	Cutthroat Trout	1.00
1569998534	Robinhood Creek	3520000	0.3	Cutthroat Trout	0.25

1589839118	Culvert Creek	3500740	0.5	Cutthroat Trout	0.40
1589839118	Culvert Creek	4400000	0.2	Cutthroat Trout	0.25
1641197769	Doe Creek Trib	3510000	2.2	Brook Trout	0.10
1650454260	Doe Creek	3510000	8.0	Brook Trout	0.05
1730550703	Elk Creek	1810000	6.4	Rainbow Trout	0.50
1743718407	McGee Trib	1810000	2.3	Rainbow Trout	0.10
1752555978	McGee Creek	1810000	3.5	Rainbow Trout	0.40
1752555978	Redhill Creek	1800000	5.8	StS, RBT	0.75
1766313424	Tumbledown Creek	1800000	3.9	Rainbow Trout	0.05
1801999581	Marco Creek	1800000	2.9	Rainbow Trout	0.60
1851378382	Marco Creek	1600000	17.4	Rainbow Trout	0.25
1875250687	Laurel Creek	1300620	0.9	Rainbow Trout	0.50
1873064714	Laurel Creek	1350000	0.2	Rainbow Trout	0.50
2002815769	Laurel Creek	1300000	13.5	Rainbow Trout	0.05
2026832505	Divers Creek	1310000	4.5	Rainbow Trout	0.50
2047177526	No Name Creek	1300000	5.5	RBT, BRK	0.30
2051301929	Mosquito Creek	1300000	1.5	Rainbow Trout	0.25
2051437953	Lake Branch- Trib A	1300000	1.2	Rainbow Trout	0.25
2056176893	Indian Creek	1300000	5.3	RBT, BRK	0.30
2071069279	Indian Creek	1311000	2.0	Rainbow Trout	0.05
2071069279	Long Branch	2810000	4.0	Redband	1.50
2089794953	North Fork Green Point Creek Trib	2820000	10.3	ReBT, BRK	0.05
2095141574	North Fork Green Point Creek	2820000	10.5	ReBT, BRK	0.05
2112484629	Gate Creek Trib	2820000	9.8	ReBT, BRK	0.05
2114965732	Green Point Creek Trib	2810000	9.4	ReBT, BRK	0.05
2126190175	Green Point Creek	2810000	7.8	ReBT, BRK	0.60
2114965732	Green Point Creek	2810000	4.9	ReBT, BRK	0.20
2128614877	Green Point Creek	2810000	9.7	ReBT, BRK	0.10
2137263587	Dead Point Creek Trib	2820000	1.4	Rainbow Trout	0.50
				Total Habitat Miles	26.8

Appendix 2: Fish Passage Barrier Prioritization by Subwatershed



Appendix 3: Factors Limiting Aquatic Habitat Productivity

Limiting Factors that limit aquatic habitat productivity in the Hood River Watershed

Natural Watershed Characteristics	Land Use or Management Activity
• Steep stream gradients • Mostly confined, narrow valleys with small floodplains • Seasonal turbidity due to glacial melt • Frequent landslide and debris flows from Mt Hood • Rain on snow flooding	• Passage barriers and inadequate fish screening at diversions • Low summer and fall instream flows • Lack of pools and habitat complexity (e.g., large wood debris) • Impaired water quality • Channel modifications/channelization • Riparian habitat loss and degradation • Increased sediment and turbidity • Loss of marine nutrients[6] • Altered peak flows

Desired future conditions

1. Anadromous or resident fish migration and distribution unimpeded by human factors
2. Excellent water quality
3. Natural streamflow levels and patterns preserved or restored as much as feasible
4. Healthy, mature riparian zones that provide shade and contribute large wood to stream channels
5. Stream channels that are able to access their floodplains during high water
6. Complex habitat structure, i.e., large wood, pools, side channels, diverse lateral habitats
7. Abundant gravel supply
8. Watershed disturbances that are localized and infrequent
9. High diversity and abundance of native species including healthy resident and anadromous fish populations able to provide sport and tribal fishing opportunity

[6] The carcasses of anadromous fish contain marine-derived nutrients important to aquatic and terrestrial food chains. Depressed fish runs reduce the supply of carcasses and limit the biological productivity of fish habitat.

List of Acronyms Used in this Plan

BPA: Bonneville Power Administration

CTWS: Confederated Tribes of the Warm Springs Reservation

DEQ: Oregon Department of Environmental Quality

HRSWCD: Hood River Soil and Water Conservation District

HRWG: Hood River Watershed Group

MHNF: Mount Hood National Forest

NMFS: National Marine Fisheries Service

NPPC: Northwest Power Planning Council

NRCS: Natural Resources Conservation Service

ODA: Oregon Department of Agriculture

ODOT: Oregon Department of Transportation

ODFW: Oregon Department of Fish and Wildlife

OSP: Oregon State Police

OWEB: Oregon Watershed Enhancement Board

SWCD: Hood River Soil and Water Conservation District

USDA: United States Department of Agriculture

USFS: United States Forest Service

USFWS: United States Fish and Wildlife Service