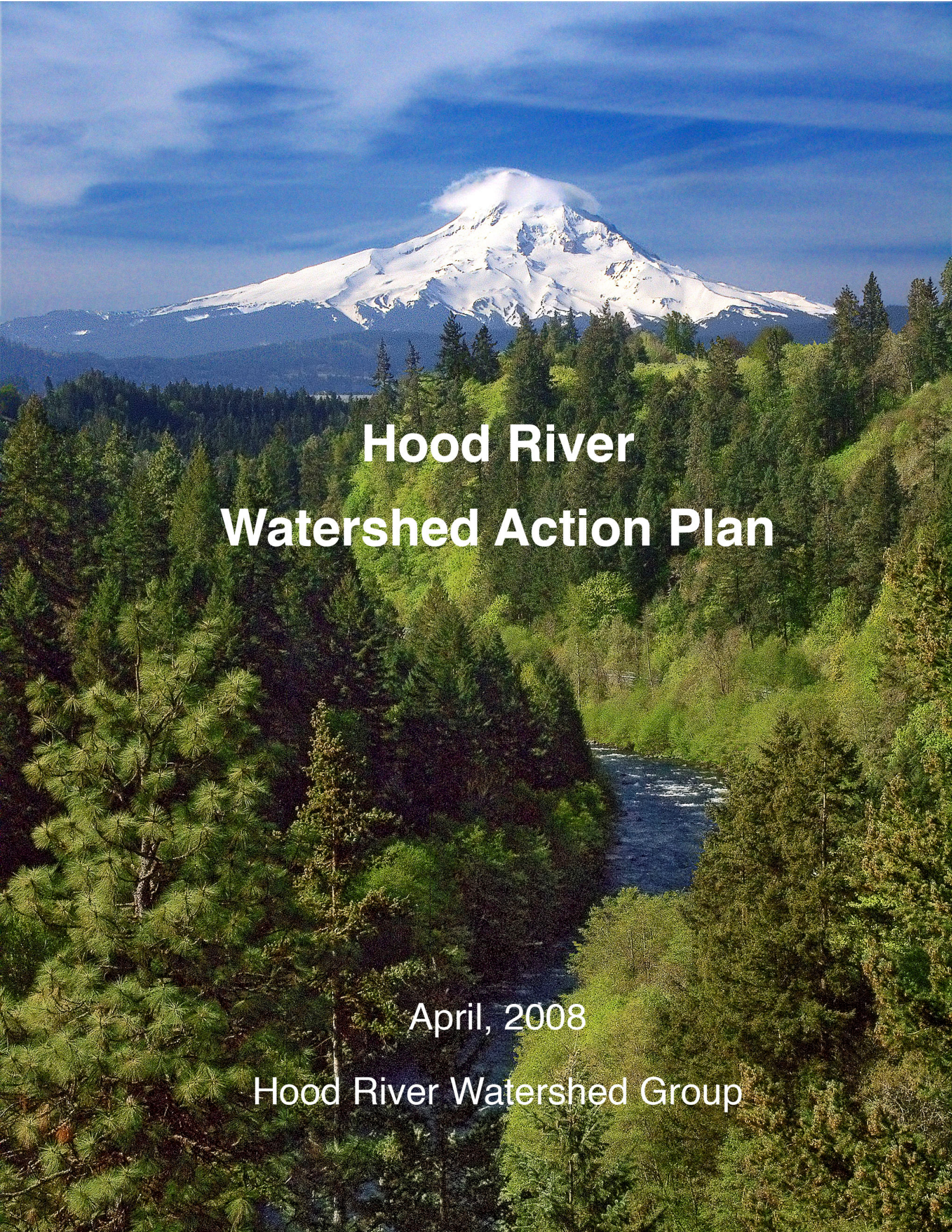

Hood River Watershed Action Plan

April, 2008

Hood River Watershed Group

Hood River Watershed Action Plan

Updated Publication: April 22, 2008
(Original Publication: June 19, 2002)

Edited by:

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Hood River Watershed Group
Technical Advisory Committee (TAC)

Approved by HRWG on April 22, 2008 (PENDING)

For more information or copies of this plan, please visit our website at www.hoodriverswcd.org/HRWG.htm or contact the Hood River Watershed Group at 541-386-6063, or hoodriver@gorge.net

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On-going thanks to Holly Coccoli for her original work on this document.

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Cover art and graphics courtesy of Darryl Lloyd (www.longshadowphoto.com)

Chapter 1. Introduction

The 2008 Hood River Watershed Action Plan identifies cooperative projects, strategies and priorities to improve watershed health, water quality and fish populations in the Hood River watershed of the lower Columbia River basin. The plan is part of a statewide strategy to address endangered species and water quality concerns using locally developed solutions (OWEB, 1997).

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 Oregon, 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 the Endangered Species Act and other concerns. Its purpose is to sustain and improve the watershed through education, cooperation and stewardship. The Hood River Soil and Water Conservation District is the fiscal sponsor for the HRWG.

The Watershed Action Plan builds on local watershed restoration efforts started in the 1980s on the national forest, county and private land. The original Action Plan was developed in 2002 to guide restoration activities for a period of five years. Its measures were based on the 1999 Hood River Watershed Assessment (Coccoli, 1999) that describes watershed conditions and opportunities for ecosystem improvement. The updated 2008 Action Plan incorporates new data and priorities from subsequent planning documents, in particular the Hood River Subbasin Plan (Coccoli, 2004) and the Hood River Basin Aquatic Habitat Restoration Strategy (Shively, 2006). These documents describe watershed conditions, limiting factors and restoration / enhancement opportunities. The Action Plan will be implemented over the next five years, or through 2013.

Many Action Plan measures help address requirements of the federal Endangered Species Act, Clean Water Act and related state legislation. The Plan also supports and compliments state and tribal fish recovery plans for the Hood River and the Northwest Power and Conservation Council's Fish and Wildlife Program. Aside from the regulatory obligations it may help fulfill, the Action Plan intends 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 practices, while preserving a high quality of life in the Hood River valley for future generations. Additionally, measures described in the Plan will contribute to the health of the entire Columbia River basin.

The Hood River Watershed Action Plan was prepared with financial help from the Oregon Watershed Enhancement Board, the Confederated Tribes of the Warm Springs Reservation Oregon, East Fork Irrigation District, Farmers Irrigation District, Middle Fork Irrigation District and the Bonneville Power Administration.

Chapter 2. Background

Vision for the Hood River Watershed

As stated in the Hood River Subbasin Plan for Fish and Wildlife, the overall vision for the basin is:

> ***"a watershed where water is abundant, cool, and clean; where natural systems that create and sustain fish and wildlife and their habitat are respected; and where a healthy economy is compatible with healthy native fish and wildlife populations."***

This vision will be accomplished by protecting and restoring natural ecological functions, habitats and biological diversity where feasible. Economically and environmentally sustainable agriculture and natural resource use will continue to be the foundation of the community. Land uses and developments will occur with respect for agriculture as well as Oregon land use laws. Tribal treaty-reserved fishing and other rights will be honored. The community and those doing business in the watershed will recognize land stewardship as an important responsibility. Actions taken under this plan will be cost-effective, affordable and consistent with a sustainable local economy.

The Hood River watershed will maintain its current diversity of native aquatic and terrestrial species and their habitats. The health and integrity of native habitats will be protected and improved where appropriate. Extinctions will be avoided. Recovery of ESA-listed species will be achieved. Habitat connectivity between forest and riparian areas will be maintained or improved where appropriate. Backcountry recreation and trail use will be managed to consider the needs of wildlife species.

Action Plan Goals

The Hood River Watershed Action Plan was designed to be a "roadmap" for achieving the vision outlined above. The **general goals** of the Action Plan are to:

1. Protect aquatic and terrestrial habitats that are in good condition.
2. Restore aquatic and terrestrial habitats that are currently in degraded condition but with potential to support high-quality habitat and fish / wildlife populations where the impacts and improvement opportunities are known.
3. Recommend ongoing education and awareness projects to inform the public about watershed issues and best management practices for improved stewardship.
4. Recommend further investigation or data collection as necessary.

In addition, **specific goals** include:

Human – Promote economically and environmentally sustainable agricultural practices and natural resource use. Preserve a 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.

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 opportunities.

Stream Flow and Watershed Hydrology – Improve stream flows where opportunities exist while protecting existing water rights. Meet in-stream 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.

In-Stream 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. Restore channel interaction with historic floodplains where compatible with existing land use.

Plants and Wildlife – Protect and enhance native plant communities and terrestrial wildlife populations. Protect undeveloped winter range from incompatible development, and minimize further fragmentation of remaining habitats. Implement actions to retain forested wildlife travel corridors. Prevent the spread of invasive plants and animals. Prevent loss of oak / pine woodlands and other important plant communities.

Hood River Watershed Studies and Plans

The Action Plan is based on the results of the Hood River Watershed Assessment, Western Hood River Subbasin Total Maximum Daily Load (TMDL) report (ODEQ, 2001), Hood River Subbasin Plan for Fish and Wildlife (Coccoli, 2004), and Hood River Basin Aquatic Habitat Restoration Strategy (Shively, 2006). The Watershed Assessment followed the Oregon Watershed Assessment Manual (Watershed Professional Network, 1999) using ecosystem principles and methods to evaluate various aspects of watershed resources, historic conditions, physical and biological constraints, and the needs and opportunities for restoration and protection. The TMDL is a water quality study of the Hood River compiled by the Oregon Department of Environmental Quality for use in setting pollution load limits for water quality-impaired stream reaches.

The Hood River Subbasin Plan built upon the Watershed Assessment and incorporated the entire 2002 Watershed Action Plan as part of its management plan for the watershed. It contains an evaluation of current and historic biological and physical conditions, an inventory of existing fish and wildlife programs and measures, and a management plan outlining measurable biological objectives and prioritized strategies to meet those objectives.

The Hood River Basin Aquatic Habitat Restoration Strategy was developed by the U.S. Forest Service and a collaborating group of local stakeholders. Its intent was to build upon previous planning efforts, especially the Subbasin Plan, to guide stakeholders in prioritizing and implementing restoration projects. The end result was a prioritization of 6th field watersheds in the basin for restoration, based on number of fish species present, water quality and quantity and watershed condition (Appendix 1). It incorporated the primary and secondary altered watershed processes and limiting factors for each 6th field watershed from past watershed analyses and the Hood River Subbasin Plan. Restorative actions were then identified to address the limiting factors.

The studies evaluated various aspects of watershed resources, historical conditions, limiting factors, and needs and opportunities for restoration and protection. Limiting factors are the physical, biological or chemical conditions and associated ecological processes and interactions that prevent full attainment of biological goals for fish and wildlife species (Appendix 2). Agencies and individuals with expertise in Hood River natural resources served as contributors or reviewers to the various studies.

Relationship to Other Planning Efforts

As indicated above, a number of related plans covering the Hood River watershed have been prepared to satisfy specific state, regional, federal and tribal requirements for aquatic or terrestrial species recovery, water quality protection or ecosystem health. These include:

- Northwest Forest Plan (USDA, 1994)
- Western Hood Subbasin Total Maximum Daily Load (DEQ, 2001)
- Hood River Agricultural Water Quality Management Area Plan (ODA, 2006)
- 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 for Fish and Wildlife (Coccoli, 2004)
- Hood River Basin Aquatic Habitat Restoration Strategy (Shively, 2006)
- Oregon Conservation Strategy (ODFW, 2006)

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 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. As another example, an upgrade to an irrigation water diversion on Coe Branch is recommended in the draft Endangered Species Act Recovery Plan for Hood River Bull Trout and is also included in this Plan.

Watershed Conditions

Below is a summary of the key findings of the many studies described above. Unless otherwise referenced, the following information is derived from the Hood River Subbasin Plan.

Limiting Factors

The Hood River and its tributaries are naturally high gradient streams mostly confined by narrow valleys with seasonal turbidity, frequent landslides, and debris flows caused by glacial melting and other factors. These characteristics create a river system that is very dynamic and not always conducive to high fish productivity.

Human disturbance throughout the Hood River basin has further degraded and limited aquatic habitat productivity. Activities such as road building, logging, irrigation and municipal water withdrawals, agriculture and development have contributed to passage barriers, low in-stream flows, lack of habitat complexity and impaired water quality. All of these activities have contributed to reduced native fish populations and inhibited natural ecosystem functions.

Native terrestrial species have also been affected in the Hood River basin by road building, housing development, agriculture and other activities or land uses which have created migratory barriers, loss of nesting and seasonal or permanent loss of habitat.

Fish Populations and Habitat

The Hood River watershed has a wide diversity of anadromous (ocean going) and resident trout species, which includes coastal cutthroat trout, bull trout, rainbow trout, winter run steelhead, summer run steelhead, coho salmon, spring Chinook salmon and fall Chinook salmon. Most of these fish populations are thought to be much lower than historical abundance. Bull trout were federally listed as threatened throughout their range in 1998 under the Endangered Species Act. Steelhead in 1998, Chinook in 1999 and coho in 2005 were federally listed in the Lower Columbia Distinct Population Segments as threatened under the Endangered Species Act. Coastal cutthroat trout are listed as a species of concern in the State of Oregon.

In 1991, a joint state and tribal effort was initiated to rebuild native summer and winter-run steelhead, and reintroduce spring Chinook with Deschutes stock. This is part of an ongoing fish recovery effort called the Hood River Production Program and is funded by Bonneville Power Administration.

Habitat diversity is believed to be lower compared to historic conditions and is an especially significant limitation. Historic riparian timber harvests, splash dams and stream “clean-outs” have resulted in simplified stream channels and riparian zones with low or reduced large wood recruitment potential. Pool area, complexity and frequency are low in most streams. Flood refuge, shelter and cover, over-wintering areas and productive early rearing habitats

(i.e., shallow lateral habitats and side channels) are lacking. Most channels lack structure such as large wood to retain gravel for spawning.

State surveys found 34 county road culverts and 13 culverts on State Highway 35 in need of fish passage remediation. The U.S. Forest Service lists 54 forest road culverts needing remediation on its culvert inventory. Additionally, inadequate fish screens or migration barriers were noted at several other sites that are not on these culvert lists.

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 consist of habitat types classified as "confined." Forty-one percent (41%) of channels are classified as sediment sources, 36% as sediment transport zones and 23% as sediment deposition zones (Coccoli, 1999).

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 are 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 (Coccoli, 1999).

Stream Flow and Hydrology

Stream flow is interrupted or diminished by irrigation, domestic and municipal diversions. The estimated actual consumptive diversion for the peak summer irrigation period is 40% of the average natural flow of the Hood River from July to September. Five irrigation districts account for the majority (≈95%) of the consumptive water use in the basin. Major diversions are located on the East Fork Hood River (RM 6.4), main stem Hood River (RM 11.0), Coe Branch, Eliot Branch, Clear Branch, West Fork Hood River and upper Dog River.

The overall flow regime in the watershed is characterized as "rain-on-snow transitional". The hydrology of the Hood River is characterized by highly variable stream flows and rapid runoff. The relatively short, steep morphology of the drainage basin promotes flood peaks that are brief in duration, a characteristic sometimes described as "flashy." Runoff is especially rapid during early winter storms before freezing conditions occur at high elevations. Rain-on-snow floods are relatively common and occur most frequently between December and February.

Neal, Green Point and Tony creeks are most vulnerable to "rain-on-snow" floods. A high risk of watershed damage exists in the Divers, Trout, Evans and Long Branch drainages due to large openings in forest canopy created by roads and timber harvest (Coccoli, 1999). Lower road density and adequate amounts of mature forest cover help moderate flow changes that can damage stream habitat, and increase landslides and road washouts.

Water Quality

Temperature: Because a number of streams did not meet state water quality standards for temperature (six stream segments were listed on the 1998 303(d) list), a TMDL for temperature was completed in 2002 (ODEQ, 2001). Once the TMDL was approved by EPA, these segments were removed from future 303(d) lists. This delisting does not necessarily mean that temperature standards are now being met, but rather indicates that there is a plan in place to improve temperature conditions over time. On-going temperature monitoring will track future temperature changes. It is expected that flow and riparian condition restoration projects will help lower in-stream temperatures. Locations where water temperatures are of particular concern are Clear Branch below Laurance Lake reservoir, East Fork Hood River below the East Fork Irrigation District diversion, Neal Creek, and the lower Hood River from Powerdale Dam to the powerhouse.

Water Quality Status of Hood River Streams

(DEQ 2004/2006 Water Quality Assessment: http://www.deq.state.or.us/wq/assessment/rpt0406/search.asp#db)

Waterbody Name	Boundaries	Assessment Year	Parameter	Current Status
Clear Branch Hood River	Mouth to Laurence Lake	2002	Temperature (bull trout)	TMDL Plan Approved by EPA. De-listed 2002.
Dog River	Mouth to Headwaters	2004	Beryllium, Iron	Water Quality Limited (303d).
Evans Creek	Mouth to Rivermile 8.0	2004	Beryllium, Copper, Iron	Water Quality Limited (303d).
Hood River	PacifiCorp Powerhouse to East Fork Hood River	2002	Temperature	TMDL Plan Approved by EPA. De-listed 2002.
		2004	Copper	Water Quality Limited (303d).
	Mouth to East Fork Hood River	2004	Beryllium, Iron	Water Quality Limited (303d).
Hood River, East Fork	Mouth to Headwaters	2002	Temperature	TMDL Plan Approved by EPA. De-listed 2002.
		2004	Beryllium, Copper, Iron	Water Quality Limited (303d).
Hood River, Middle Fork	Mouth to Clear Branch	2002	Temperature (bull trout)	TMDL Plan Approved by EPA. De-listed 2002.
		2004	Beryllium, Iron	Water Quality Limited (303d).
Hood River, West Fork	Mouth to Lake Branch	2002	Temperature	TMDL Plan Approved by EPA. De-listed 2002.
		2004	Beryllium	Water Quality Limited (303d).
Indian Creek	Mouth to Headwaters	2002	Temperature	TMDL Plan Approved by EPA. De-listed 2002.
		2004	Chlorpyrifos	Water Quality Limited (303d).
Lake Branch	Mouth to Lost Lake	2002	Temperature	TMDL Plan Approved by EPA. De-listed 2002.
Lenz Creek	Mouth to Rivermile 1.5	2004	Arsenic, Beryllium, Chlorpyrifos, Iron, Manganese, pH	Water Quality Limited (303d).
Mitchell Creek	Mouth to Headwaters	2004	Zinc	Water Quality Limited (303d).
Neal Creek	Mouth to East Fork/West Fork Confluence	2002	Temperature	TMDL Plan Approved by EPA. De-listed 2002
		2002	Arsenic, Beryllium, Chlorpyrifos, Guthion, Iron, Manganese	Water Quality Limited (303d).
Neal Creek, East Fork	Mouth to Headwaters	2004	Beryllium, Iron	Water Quality Limited (303d).
Whiskey Creek	Mouth to Headwaters	2002	Temperature	TMDL Plan Approved by EPA. De-listed 2002.

Nutrients and Bacteria: Elevated nitrogen and phosphorus concentrations have been found in Baldwin, Graham, Odell, McGuire, Neal, Lenz, Trout, Wishart, Whiskey and Indian creeks (HRSWCD, 2001 and Coccoli, 1999). Bacteria contamination has been measured in many of the same creeks (Fitch, 2001). Not enough data has been collected for these parameters to be evaluated for 303(d) listing purposes. Data collected from Lenz Creek has indicated violations of the state's pH standard (DEQ, 2006). Elevated pH values can often be cause by excess nutrients, warm temperatures or low flows. An assessment of the cause of the pH problem in Lenz Creek has not been conducted.

Pesticides: Pesticides are used in orchards, residential / commercial properties, forests, roadways and power line corridors. A monitoring program assessing concentrations of organophosphate insecticides was initiated in 1999, and has continued to the present. Based on the results of this program, chlorpyrifos and/or azinphos methyl (i.e., Lorsban and Guthion) were found to exceed state standards or federal guidelines in Neal, Indian and Lenz creeks. The monitoring has continued to show that these streams exceed water quality standards, although the concentrations and frequency of detection have generally declined in recent years. Monitoring and promotion of improved pesticide application practices and alternatives is continuing.

Other Toxics: The most recent DEQ 2004 / 2006 Water Quality Assessment lists a number of 303(d) listings for a variety of additional chemicals including arsenic, beryllium, copper, iron and manganese. The beryllium and iron listings occur throughout the watershed, including relatively non-impacted areas such as Dog River and West Fork Hood River. These may be naturally occurring. Lenz Creek and Neal Creek have the most listings of the streams evaluated. A future assessment should be done to determine possible sources of these chemicals and if management changes need to take place to address these parameters.

Sediment Sources

Natural sediment sources include glacial runoff, landslides and debris flows originating from the slopes of Mt. Hood. Landslides and debris torrents are relatively frequent in Newton, McGee, Ladd, Coe, Compass, Eliot, Polallie and Clark drainages and their contributing watersheds (Coccoli, 1999).

Turbidity and sediment inputs from human activities include: a) runoff from forest roads and recreation use areas, b) irrigation water inter-basin conveyance, c) flushing from settling basins, d) irrigation overflows and return flows, e) exposed soils in livestock areas adjacent to streams, f) winter sanding of roads and parking lots and g) landslides from forestry or irrigation ditch failures.

Riparian Conditions

Riparian shade and large woody debris recruitment potential were assessed along 170 miles of streams in the lower main stem Hood River, East Fork and Middle Fork Hood River watersheds using aerial photos and spot field verification (Nelson, 2000 and Salminen,. 1999a). Large woody debris recruitment (supply of big trees with the potential to fall in-stream and build fish habitat) was unsatisfactory along 64% of the stream length assessed in

the lower Hood River and its tributaries, compared to 54% in the East Fork and Middle Fork watersheds. A similar assessment in Bear, Tony, Trout, Middle Fork, Lower East Fork, Baldwin, Emil and Evans drainages found comparable results (Nelson, 2000).

Shade levels were medium (70-40% shade) along 21%, and low (<40% shade) along 28% of total stream length. DEQ conducted a detailed assessment of riparian vegetation using the temperature model during their TMDL study. The model predicted that daily stream temperatures in the East Fork Hood River, main stem Hood River and Neal Creek could be reduced by improving riparian shade (DEQ, 2001).

Wetland Conditions

A total of 783 wetlands covering 1,950 acres were identified in the basin by the 1981 National Wetland Inventory (NWI). This value indicates that less than 1% of the watershed is occupied by wetlands, but this was viewed as an underestimate (Salminen, 1999b). Historic wetlands have been drained for agriculture and other land uses but data about the extent of wetland loss is unavailable and not taken into account by the NWI. Outside of federal lands, the most significant wetland habitat is a sizable complex of forested and emergent wetlands located at a former river bend along the Hood River near RM 2.5. A wetlands inventory and functional assessment was prepared for lands within the City of Hood River's Urban Growth Boundary (Wetlands Consulting, 2003). No wetland field inventory is available for other non-federal lands in the Hood River basin.

Channel Modifications

Road systems and impervious surfaces are assumed to affect the hydrology of drainage basins by intercepting surface and subsurface water flow, altering runoff patterns, and constraining stream channels from natural movement and adjustment patterns.

An assessment done in 2000 found that roads and railroads were the most common stream channel modification affecting a total stream length of 21 miles (Coccoli, 1999). The assessment did not include other problem sites (e.g., erosion, channel shifting, etc.) or confinement by bridge crossings. Road construction, bank stabilization and channelization have altered Neal Creek, confining the stream in places and isolating it from its floodplain.

The construction and maintenance of State Highway 35 is considered a significant and chronic impact to the East Fork Hood River and its floodplain, as well as Newton and Clark creeks.

Action Plan Implementation

Since the original Action Plan was developed in 2002, it has been used by watershed residents, land managers and natural resource professionals to guide watershed restoration activities. Between the time the Plan was developed and 2007, Hood River Watershed Group partners successfully completed a total of 29 significant watershed enhancement projects. A table, map and full description of each project (including project name, sponsor, date completed, cost, description, key outcomes and partners) is included in Appendix 5.

Funding Sources

Over the past five years, Hood River Watershed Group has found that securing funding has been one of the primary limiting factors to implementing watershed enhancement projects. A cooperative partnership approach has been and will continue to 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 USFS, 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 the Bonneville Power Administration, Oregon Watershed Enhancement Board, U.S. Forest Service, Oregon Department of Land Conservation and Development, U.S. National Marine Fisheries Service, U.S. Environmental Protection Agency, Oregon Department of Environmental Quality, U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, U.S. Natural Resources Conservation Service, American Farmland Trust and Oregon Department of Fish and Wildlife.

The 2008 Action Plan Update Process

The 2008 Action Plan project solicitation, prioritization and adoption process began in summer of 2006. In mid-2006 and into 2007, the HRWG created a strategy for updating the plan and began soliciting new project ideas from the watershed community. Project solicitation included posters, press releases and requests for project ideas during monthly Watershed Group meetings. Throughout 2007 and early 2008, Watershed Group and agency staff provided assistance to project proponents in developing and formatting project proposals. HRWG staff tracked new and continuing Action Plan project ideas and status.

The HRWG Technical Advisory Committee met in February 2007 to devise a review process to be used during the 2008 Action Plan update. This process was needed to technically rate projects in the draft project list, and eventually assign ranks to 2008 Action Plan projects.

Ranking of the 2008 Watershed Action Plan projects using *High, Medium and Low* prioritizations was accomplished using a two-phase strategy. First, an initial rating of projects was completed using 6th field watershed location and limiting factors as rating criteria. Projects located in top priority 6th fields (as defined and prioritized in the 2006 Hood River Basin Aquatic Habitat Strategy, Appendix 1) were given higher rating than those in lesser ranked basins. Similarly, projects that addressed multiple limiting factors were given a higher rating based on the number of factors addressed. A draft project priority list was constructed based on this initial analysis. The second phase of the rating process was conducted by the HRWG Technical Advisory Committee during a meeting in March 2008. This work involved making fine adjustments in the initial list using consensus decision-making, and based on consideration of the following criteria:

- Does the project compliment past, present or expected restoration activities in the basin?
- Does the project display technical merit (well defined objectives, proven treatment practices, good maintenance and monitoring plan, measurable outputs and outcomes)?
- Is the project ready to implement (i.e., landowner permission, level of planning, engineering, design, permits and funding)?
- Will the project result in a high number of project outcomes (benefits) versus project costs (i.e., how cost per unit compares to other projects, and level of cost-share)?
- Does the project promote economically and environmentally sustainable agricultural practices and natural resource use, and preserve a high quality of life in the Hood River valley for future generations?
- Other factors discussed later in this section.

Final adoption of the 2008 Hood River Watershed Action Plan was granted by the Hood River Watershed Group on April 22, 2008, following attainment of two consecutive meeting approvals (i.e., “dual consensus”). This approval process consisted of bringing the draft plan before the HRWG during both March and April 2008 regular meetings. This allowed the group to discuss the plan and make modifications to either the text or the project prioritizations earlier established by the technical advisory committee.

Other Factors Used in Project Prioritization

Protection Versus Restoration: The HRWG believes that protection of high quality and productive habitats is the most effective and least costly approach to watershed enhancement. Therefore, initial efforts will work to protect natural systems that are functioning properly, thus discouraging degradation and the need for subsequent costly restoration. Secondary efforts will focus on identifying passive restoration opportunities or instances where cessation of disturbance will result in natural recovery of the system. Finally, in situations where causative disturbance factors have been eliminated, but habitat recovery is expected to be delayed, active restoration will be used to accelerate return to functioning condition.

Geographic Prioritization: As described above, Action Plan activities are prioritized geographically using the Aquatic Habitat Restoration Strategy method based on 6th field watersheds. While needs and opportunities exist in all 12 Hood River sub-watersheds, the Strategy identifies 6th field watersheds that are particularly important from a biological standpoint.

Cost-Effectiveness: Action Plan priorities are based principally on natural resource needs as identified in the Hood River Subbasin Plan and the Aquatic Restoration Strategy. However, cost-effectiveness or "bang for the buck" is also important in sequencing projects. Projects that are low cost and deliver high benefits are preferred over projects that are high cost and have low benefit.

Accurately predicting project benefits and biological outcomes is difficult. Some measures of benefit (e.g., the increase in number of fish resulting from an individual project) are easily compromised by outside variables such as flooding, drought years, ocean conditions, fish harvest and other impacts outside the watershed. A number of Action Plan projects satisfy legal requirements and are needed to comply with state or federal laws regardless of how they would rank in a cost / benefit analysis. Cost and benefit information is not available for all projects at this time, and many project costs are roughly estimated.

Given the above, HRWG members did not elect to prioritize projects according to common cost / benefit formulas. Instead, the group 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 Plan project as high priority does not necessarily mean that it will be completed before certain lower priority projects. In this Plan, a high priority ranking means that a project has high intrinsic value, but may be delayed for specific reasons including:

- Complete project funding has not been secured,
- Other projects may need to be completed first to achieve full benefits (e.g., completing downstream culvert remediation before addressing upstream culverts),
- Landowner and other permits and permissions have not yet been secured or
- A practical or cost-saving opportunity exists to proceed ahead of original ranking.

Chapter 3. Proposed Strategies and Actions

This chapter represents a compilation of specific projects that the Hood River Watershed Group is targeting for implementation during the next five years (2008 through 2013). The chapter is divided into six Watershed Action Plan elements, each representing main components of the watershed. These elements include a) aquatic passage, b) water quality, c) stream flow / water quantity, d) stream & riparian habitat, e) terrestrial habitat and f) watershed education & technical assistance.

Note that many of the projects listed address multiple goals and objectives. For example, a specific pipeline project may serve both to improve water quality by eliminating water exposure to land applied chemicals (water quality element), and also conserve water by reducing ditch infiltration and evaporation (stream flow / water quantity element). To avoid duplicating information in this plan, the project is listed only once and under the element heading that is deemed most central.

Each project is listed using common descriptors, including project name, sponsor, location, main issues, objectives, proposed actions and cost. Because a thorough understanding of these terms is critical to use of this document, some of the most important project descriptors are described below.

Project Number: The sequence of letters and numbers before the project name indicates the unique 2008 Action Plan project number / identifier. The two character letter code at the beginning identifies project type (e.g., FP for fish passage, AH for aquatic habitat, etc.). The middle number indicates project sequence within each plan element, and the last two digit number indicates the year of the plan / update. Finally, note that the previous project number(s) denoted behind the project name refer to any prior number / code that the project may have been referred to in the 2002 Watershed Action Plan or 2005 project priority update document.

Sponsor: Identifies who will be the key party(ies) responsible for planning, fundraising, designing, permitting, implementing and monitoring of the project. This often represents a partnership.

General Location: Generally describes where the project is located, and / or the river mile (RM) location. River mile number represents the distance (in miles along the stream channel) to the project from the mouth of the creek or river.

6^{th} Field Watershed: Defines the hydrological location of the project within the Hood River watershed, based on USFS mapping and planning (REO, 2002). A 6^{th} field map of the basin and coding information is provided in Appendix 1. There are a total of twelve 6^{th} field watersheds in the Hood River watershed. Note that the superscript appearing behind each 6^{th} field watershed code indicates the overall restoration priority assigned to that watershed by the Aquatic Restoration Strategy (USFS, 2006). The lesser the superscript value, the higher the restoration priority.

Limiting Factors Addressed: Specifies (by code) what aquatic and terrestrial limiting factors are addressed by the project. Aquatic limiting factors were earlier identified in the Subbasin Plan and Aquatic Habitat Restoration Strategy documents. A separate list of limiting factors was developed for projects that address terrestrial habitats. In both cases, the TAC assigned their interpretation of what limiting factors would be remedied by each project. See Appendix 2 for a list of limiting factors and project coding information. Note that the order that the limiting factors are listed in the project descriptions does not indicate relative importance.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Describes what artificial causes are likely responsible for deteriorated ecosystem functions and the nature of resultant problems (i.e., statement of need). This section also documents pertinent regulatory listings (e.g., ESA, 303(d), etc.) which may be important in devising project responses.

Objectives: Ideally lists specific and measurable outcomes to be expected from the project. These statements indicate the desired improvements to natural functions expected after project completion. (Example: "Meet Oregon water quality standards by reducing the water temperature in Joe Creek to 14 degrees C by year 2048").

Proposed Actions and Schedule: Describes the specific project actions (i.e., outputs or tasks) that will be implemented to achieve the project objectives. (Example: "This project will plant 2,000 trees within 50 feet of Joe Creek (RM 0.0 -1.2) in year 2008, and eventually result in 90% canopy coverage").

Total Project Cost (and Matching Partner Contributions): Lists the expected cost of implementing the proposed actions. In some cases, good cost estimates are derived from Chapter 3 of the Hood River Basin Aquatic Habitat Restoration Strategy (Shively, 2006). Most figures represent only educated estimates from project sponsors because most projects have not been planned, designed or permitted at the time of this writing. If information is available, the contribution of each partner is listed in parenthesis.

Planning Element 1: Aquatic Passage

Goal: Improve the long-term viability of fish and other aquatic species in the basin by reestablishing passage where stream conditions have been artificially changed.

Background

Artificial physical structures impede the natural range of aquatic species at a number of sites in the Hood River watershed. Typical aquatic life impediments include road culverts, water diversions and dams. Water diversions and dams redirect and impound water from streams and rivers for crop irrigation, hydroelectric power, domestic water and other purposes. Impeded passage has been identified as a significant limiting factor to fish production in the basin (Coccoli, 2004). The most obvious species of concern include ESA-listed salmon and steelhead, but there is evidence that less studied species such as lamprey may also be impacted by barriers (see species list in Appendix 3).

Aquatic passage barriers typically impact fish survival and viability during both upstream and downstream migration life stages. Upstream passage barriers typically occur at dams and culverts where the vertical drop impedes the organisms' ability to pass above it. Even if large fish of a certain species are able to negotiate these drops, other species or life stages may be hindered. Upstream passage barriers also occur in culverts that are angled too steeply, where water velocities exceed the swimming or crawling ability of aquatic species present. Downstream passage barriers also occur where water drops have been artificially increased and can cause injury or death to downstream migrating aquatic life (usually juvenile fish). Finally, unscreened water diversions represent downstream aquatic passage barriers, where fish and other organisms may be drawn into pipelines or irrigation canals resulting in stranding, impingement and loss.

Strategy

The HRWG aquatic passage strategy is intended to reconnect river, creek and slack-water habitats that are disconnected by human activities. This will remedy significant factors decreasing productivity and allow full utilization of the basin's aquatic habitat.

Oregon state law requires that artificial obstructions being altered or upgraded must meet state fish passage criteria, where native migratory fish are currently or were historically present. In 2003, the HRWG partnered with ODFW, USFS, NOAA and OWEB to develop a model fish passage prioritization method in the Hood River basin for regional use.

Inventories of road-related barriers at stream crossings on most road ownerships have been completed, but data gaps remain for rural driveways and private timber lands. Fish migration conditions at all USFS road crossings were surveyed in 2000, and on Hood River County public and forest roads and state highways in 1999 and 2000. A list of all currently known fish passage remediation needs at road crossings is included in Appendix 4.

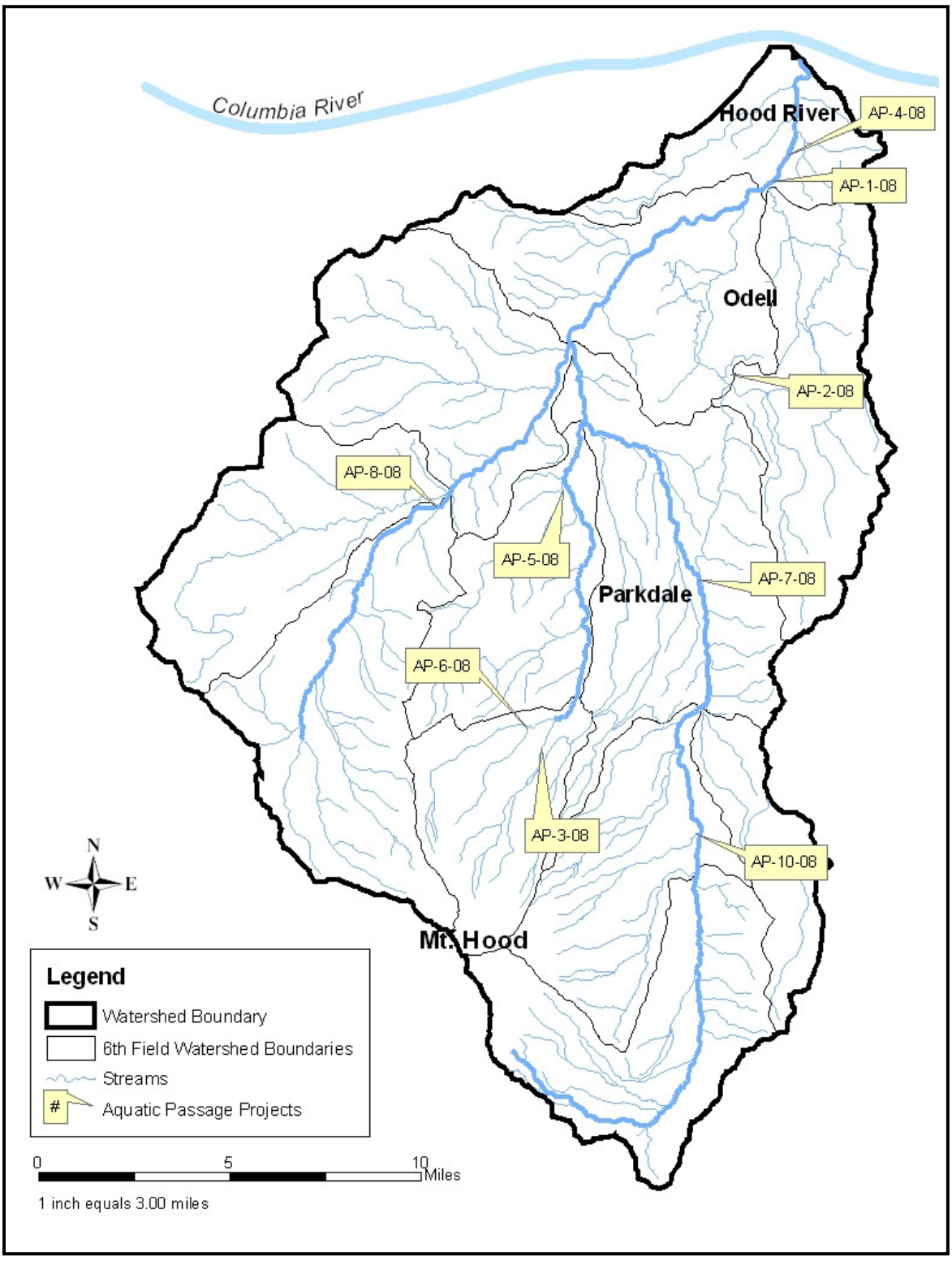
The immediate goal of the aquatic passage element is to address currently identified artificial fish passage barriers based on priority rankings assigned by ODFW and the USFS. Where priorities are not assigned to specific culvert projects, ODFW and the CTWSRO will determine the relative priority of a barrier. Factors used to determine the priority ranking of a fish passage barrier will 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 above the barrier.
- Whether the barrier is within a priority watershed area.
- Proportion of stream flow diverted (for screening projects only). This affects the number of fish likely to encounter the diversion.

As a practical matter, opportunity 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.

Aquatic Passage Projects

Project No.	Project Name	Priority	Schedule
AP-1-08	Powerdale Hydroelectric Dam Removal	High	2012
AP-2-08	Central Canal Pipeline	High	2009
AP-3-08	Coe Branch Diversion and Fish Screen Improvement	High	2008
AP-4-08	Lower Powerdale Corridor Floodplain and Wetland Restoration	High	unscheduled
AP-5-08	Dee Mill Diversion and Fish Screen Upgrade	High	unscheduled
AP-6-08	Clear Branch Dam Fish Passage Improvement	High	2010-2012
AP-7-08	East Fork Main Canal Diversion Upgrade	High	2012
AP-8-08	Dee Irrigation Diversion Passage and Ditch to Pipeline Upgrade	Medium	unscheduled
AP-9-08	Improve Fish Passage and Fish Screens on Private, County, State, and Federal Lands	Medium	ongoing
AP-10-08	State Highway 35 Polallie Creek Culvert Upgrade	Medium	2008 - 2009



Map of Aquatic Passage Project Locations

Numbers correspond to the project number listed in the table on the previous page.
Projects with multiple sites are not shown on map.

Aquatic Passage Project Descriptions

Powerdale dam has limited fish access in the Hood River since 1923, and is scheduled for removal by 2012. *Photo by Steve Stampfli*

AP-1-08. Powerdale Hydroelectric Dam Removal (*High Priority*) (Previous FP-1-02, FP-10-02, FP-15-02, SF-1-02, FP-1-05).

Sponsor: PacifiCorp, Powerdale Hydroelectric Project Settlement Agreement Parties.

General Location: Lower Hood River (RM 1.0 – 4.0) / *6th Field Watershed*: LHR[2] / *Limiting Factors Addressed*: O, F, T, HQ.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Since 1923, Powerdale Dam has limited upstream and downstream migration of ESA-listed bull trout, summer steelhead, winter steelhead, spring Chinook, fall Chinook and coho, and non-listed Pacific lamprey, sucker (two species), coastal cutthroat, sea-run cutthroat, rainbow and mountain whitefish. Significantly, the dam limits access to 96% of all available aquatic habitats in the watershed. Poor passage potential is attributed both to an inadequate screen and fish ladder. The same fish species are impacted by reduced late season flows in the bypass channel between RM 1.0 and 4.0, due to diversion of up to 500 cfs (up to 80% of river flow) to a pipeline that links the dam and powerhouse. Finally, water quality is degraded in the 3 mile bypass reach, and temperatures may become elevated above state standards partially as a result of reduced flows.

Objectives: a) Eliminate the lowest and most significant barrier to upstream and downstream fish migration in the watershed, b) Provide improved access to 144 miles of upstream habitat, c) Achieve compliance with Oregon water quality temperature standards on the lower 4 miles of the Hood River, d) Increase spring, summer and fall minimum flows up to 500 cfs in the lower 4 miles of the Hood River.

Proposed Actions and Schedule: On June 16, 2003, PacifiCorp signed a settlement agreement with several state, federal and local interests agreeing to decommission the 6 megawatt Powerdale hydroelectric project in 2012. As part of the settlement, PacifiCorp agreed to remove the dam, several flumes and portions of the pipeline. The company also agreed to transfer its non-consumptive water right back to Oregon, and have the water assigned a senior in-stream water right. Finally, the company agreed to transfer ownership of the 400+ acre "Powerdale lands corridor" to an entity willing to take ownership and manage the property for continued wildlife and fish habitat, existing types of recreation and public education (see AH-2-08). Perpetuation of these goals will be assured via assignment of a conservation easement to the property.

Total Project Cost (and Matching Partner Contributions): $2,400,000 (PacifiCorp - $2,400,000).

AP-2-08. Central Canal Pipeline (*High Priority*) (Previous FP-3-02, FP-3-05, WQ-5-05)

Sponsor: East Fork Irrigation District (EFID).

General Location: Beginning at Middle Valley and extending to Neal Cree RM 5.0 / *6th Field Watershed*: LEHR[1], NLC[11] / *Limiting Factors Addressed:* F, O, SL, C, HQ.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Irrigation withdrawals on the East Fork Hood River may extract over 75% of the available late summer flows This may significantly impact ESA-listed coho, winter steelhead and Chinook populations. Improved EFID irrigation conveyance and application efficiency can alleviate this problem, if a portion of the saved water is reallocated to in-stream rights. Additionally, the current EFID system conveys high levels of total suspended solids (tss) to Neal Creek from the Upper Eastside Lateral. This causes significant habitat degradation and impacts to aquatic health along the lower 7.5 miles of Neal Creek. Water quality and aquatic health may also be impacted by exposure of water in open canals to pesticide drift. Finally, the current Lower Eastside Lateral diversion from Neal Creek at RM 5.4 is a partial barrier to coho and winter steelhead migration to 4.8 miles of upstream habitat.

Objectives: a) Permanently increase flows in the East Fork Hood River by 3.44 cfs, b) Eliminate a partial upstream barrier and downstream barrier (inadequate fish screen) to ESA-listed coho and steelhead, and provide an additional 4.8 miles of upstream habitat, b) Eliminate introduction of 3,700 tons of sediment annually to Neal Creek to achieve compliance with state water quality standards.

Proposed Actions and Schedule: The Central Canal Pipeline Project will result in the direct linkage of the EFID Main Canal with the Lower Eastside Lateral, and eliminate use of Neal Creek and open canals for conveyance. A total of 4.7 miles of large diameter pipeline and an inverted siphon below Neal Creek will be installed during three primary construction phases. The final portion of the pipeline will be completed in 2008. The Lower Eastside Lateral diversion and screen will be removed upon project completion in 2009.

Total Project Cost (and Matching Partner Contributions): $11,000,000. (EFID - $3,800,000 (includes ODEQ low interest loans for $3,250,000), OWEB - $2,100,000, USDI Water 2025 - $600,000, ODEQ - $260,000, HR County/USFS Title II - $1,201,000, CTWSRO/BPA - $3,012,736, other - $25,000).

AP-3-08. Coe Branch Diversion and Fish Screen Improvement *(High Priority)* (Previous FP-7-02, FP-6-05)

Sponsor: Middle Fork Irrigation District (MFID), U.S. Forest Service (USFS).

General Location: Coe Branch (RM 0.7) / *6th Field Watershed*: UMHR[4] / *Limiting Factors Addressed*: O, HQ, SL.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The Middle Fork Hood River (including Coe Branch) supports the only remaining population of bull trout (ESA-listed 1998) in the entire Mt. Hood National Forest. Less than 300 adult fish are estimated to inhabit the entire Middle Fork system. MFID's existing Coe Branch diversion (on USFS land) provides limited safe upstream and downstream passage for bull trout. The diversion also blocks access to an additional 3 miles of upstream bull trout habitat on Coe Branch and Compass Creek (an important clear water tributary to Coe). The existing diversion also utilizes a flushable sediment storage bay to partially settle sediment out of irrigation water prior to transfer. When flushing occurs, turbidity levels in Coe Branch may be elevated more than 10% above background, possibly exceeding Oregon water quality standards.

Objectives: a) Provide safe upstream passage of adult bull trout in the Coe Branch, b) Provide safe downstream passage for juveniles and adult bull trout, c) Provide an added 3 miles of upstream habitat on Coe Branch and Compass Creek, d) Achieve compliance with state water quality standards in the lower 0.7 miles of Coe Branch.

Proposed Actions and Schedule: MFID worked with partners to install a temporary fish ladder in 2006. Final installation of a new facility is planned in 2008 via stabilizing 100 feet of channel adjacent to the diversion using engineered rock veins (upstream and downstream passage feature), creating a perpendicular entrance channel to the diversion, installing a Farmer's Conservation Alliance (FCA) designed horizontal flat plate fish screen, and installing a naturalized rock return channel (downstream fish passage feature). The new diversion and screen will continually route sediment and use a smaller settling tank, to reduce the potential for elevated turbidity downstream.

Total Project Cost (and Matching Partner Contributions): $1,600,000 (MFID - $300,000, CTWSRO - $500,000, OWEB - $598,000, HRC Title II - $150,000, ODFW - $75,000, HRWG - $2,000).

AP-4-08. Lower Powerdale Corridor Floodplain Access and Wetland Restoration (*High Priority*) (New)

Sponsor: Oregon Department of Fish and Wildlife (ODFW), Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO), PacifiCorp, Columbia Land Trust (CLT), Mt. Hood Railroad (MHRR).

General Location: RM 1.0 and other locations along the Powerdale lands corridor / *6th Field Watershed*: LHR[2] / *Limiting Factors Addressed:* O, HQ, HD, R, FP.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The floodplain along the Powerdale corridor has been altered by a number of developments and land uses including roads, a railroad, hydroelectric plant, pipeline and flumes. Since construction of this infrastructure, fish access to important off-channel wetland complexes has been lost, and much of the floodplain is now constrained. An example is the floodplain / wetland complex on the east side of the river at RM 1.0. This now isolated complex consists of one 0.75 acre pond, one 0.25 acre pond and approximately 20 acres of mixed hardwood / marsh. Consequently, a significant loss in essential off-channel rearing for juvenile Chinook, coho and steelhead has resulted. Other diminished floodplain / wetland functions have occurred at this (and other) points along the lower Hood River, including diminished delivery of marine derived nutrients, natural flushing, attenuation of pollutants, flood storage, sediment accretion and channel dynamics. All of these factors are likely responsible for reduced aquatic, waterfowl and other natural productivity.

Objectives: a) Reconnect 21 acres of off-channel pond and wetland habitat to the lower Hood River and reestablish critical rearing habitat for 3 ESA-listed fish runs, b) Remove pipeline and other infrastructure impeding floodplain function for the benefit of fish, waterfowl, amphibians, invertebrates, song birds and other wetland inhabitants.

Proposed Actions and Schedule: Prescriptive actions for the lower Hood River include reconnection of off-channel habitats and removal of floodplain infrastructure. For the specific project at RM 1.0, work will likely include installation of a river level culvert(s) or bridge(s) underneath both the track and access road to provide continuity with the river. This project is currently in early stages of development. Work proposed during the planning period will include discussion with land and easement holders to determine initial support for the project. If opportunity exists, partners will then assess project benefits, develop a list of project options, select a preferred option and finally complete a preliminary engineering plan. For related projects including removal of infrastructure (e.g., pipeline), preliminary planning and coordination is being initiated via the land transfer process involving the Powerdale Lands Stakeholders group.

Total Project Cost (and Matching Partner Contributions): ≈$1,500,000 (Undetermined contributions from ODFW, CTWSRO, PacifiCorp, CLT, OWEB, HRWG and MHRR).

AP-5-08. Dee Mill Diversion and Fish Screen Upgrade (*High Priority*) (Previous FP-6-02, FP-5-05)

Sponsor: Andy von Flotow (diversion owner), Longview Timberlands (LT), Oregon Department of Fish and Wildlife (ODFW).

General Location: Lower Tony Creek (RM 0.5) about 3 miles SSW of the Dee Mill / *6th Field Watershed*: LMHR[3] / *Limiting Factors Addressed:* O, HQ.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Fish passage is identified as a primary limiting factor in the Hood River basin. Tony Creek represents an important winter steelhead spawning and rearing tributary of the Middle Fork Hood River. The importance of Tony Creek was recently elevated after the formation of two new falls on the Middle Fork in November 2006. Fish access on Tony Creek may currently be limited by a zero to 2.5 cfs diversion and fish screen located at RM 0.5. Fish may be delayed or may be blocked from migrating to upstream habitat because of a variable zero to 18-inch high step barrier at the diversion dam. Also, the current bypass channel may not provide safe downstream passage. Finally, although the diversion screen has operated without issue for many decades, it may not meet current ODFW screening and passage criteria.

Objectives: a) Determine the actual and potential population of winter steelhead, Chinook and coastal cutthroat in Tony Creek, b) Evaluate potential barrier to upstream and downstream passage of these species, c) Possibly provide improved passage to approximately 5 miles of upstream habitat on Tony Creek.

Proposed Actions and Schedule: ODFW and HRWG will work with the owners to a) evaluate the actual and potential populations of winter steelhead, Chinook and bull trout in Tony Creek, b) evaluate the condition and function of the current diversion, fish bypass and screen, c) if needed, evaluate technical alternatives for improving the system, d) if needed, help procure financial and technical assistance (i.e., cost-share, construction design and permitting) for the project and e) if needed, implement a cooperative project that will upgrade the system. Project implementation is currently unscheduled.

Total Project Cost (and Matching Partner Contributions): ≈$20,000 (undetermined contributions from ODFW, CTWSRO and diversion owner).

AP-6-08. Clear Branch Dam Fish Passage Improvement *(High Priority)* (Previous FP-11-02, FP-2-05, FP-4-05)

Sponsor: Oregon Department of Fish and Wildlife (ODFW), U.S. Forest Service (USFS), Middle Fork Irrigation District (MFID), U.S. Fish and Wildlife Service (USFWS).

General Location: Clear Branch Dam located at RM 0.6 on Clear Branch / *6th Field Watershed*: UMHR[4] / *Limiting Factors Addressed:* O, HQ.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Clear Branch Dam is a complete upstream migration barrier to all fish and at least a partial barrier to downstream migration. The main species impacted include ESA-listed bull trout and steelhead, and resident cutthroat and rainbow. Important spawning and rearing habitat for all four species is located below the dam, in Laurance Lake and above the dam in upper Clear Branch and Pinnacle Creek. A fish trap was installed below the dam in 1996 to provide for upstream passage of bull trout. However, periodic operation of the trap has collected few bull trout and adult steelhead, although resident trout were caught regularly when the trap was operating. It is unclear if few bull trout migrated up to the dam during periods of trap operation or if the trap is ineffective. A group of stakeholders, including the sponsors listed above, have been developing a fisheries management plan related to MFID operations approved by a USFS special use permit. Restoring fish passage at the dam has been identified as one of the top priority actions in the upper Middle Fork Hood River watershed to aid in the recovery of fish stocks.

Objectives: a) Improve fish populations by providing unimpeded upstream and downstream fish passage at the dam, b) Enable MFID to efficiently provide irrigation water to users in the district.

Proposed Actions and Schedule: Fisheries management plan stakeholders are investigating several options to provide dam passage including a bypass channel, fish ladder, or fish trap at the base of the dam (either the existing trap or a new one). A feasibility study is being considered to determine if a bypass channel around the dam is possible. Once evaluated, the scope of work and estimated costs will be determined. If the bypass channel is not feasible, other options will be considered. The feasibility study is tentatively scheduled for 2010-2012.

Total Project Cost (and Matching Partner Contributions): undetermined cost (contributions from MFID, USFS, ODFW, USFWS and others).

AP-7-08. East Fork Main Canal Diversion Upgrade (*High Priority*) (Previous FP-12-02, FP-11-05)

Sponsor: East Fork Irrigation District (EFID).

General Location: Main EFID irrigation water out-take on East Fork Hood River (RM 6.4) / *6th Field Watershed*: LEHR[1] / *Limiting Factors addressed:* O, HQ.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The East Fork Hood River provides spawning and rearing habitat for ESA-listed lower Columbia winter steelhead and coho. Fish migration is currently limited above RM 6.4 due to difficult passage conditions at the current "push-up" irrigation diversion. To facilitate diversion of up to 132.76 cfs (EFID - 120.11 cfs, and MHID -12.65 cfs) into its main delivery canal, EFID currently builds their dam prior to the irrigation season or during very low flows by placement of rock, cobble and gravel using heavy equipment. This project will eliminate frequent in-stream disturbance caused by heavy machinery to maintain the existing diversion in-take, and improve adult fish passage past the diversion. The existing diversion does not meet passage criteria and will require modification or replacement. Because a new fish screen and return bypass was installed in 1996 in the canal, new juvenile fish protection facilities are not required.

Objectives: a) Achieve functional passage for winter steelhead, Chinook and coho, b) Provide enhanced access to 20+ miles of upstream anadromous fish habitat.

Proposed Actions and Schedule: EFID and partners began discussing alternative diversion designs and completed a topographic survey of the current diversion channel and floodplain in 2005. Design of the new diversion is expected to begin in 2010 utilizing a professional engineer and agency input. Construction of the project is expected to take approximately 3 months in fall of 2011.

Total Project Cost (and Matching Partner Contributions): ≈$1,000,000 (undetermined contributions from EFID, MHID, OWEB, CTWSRO, OWT, ODFW, USFS and HRWG).

AP-8-08. Dee Irrigation Diversion Passage and Ditch to Pipeline Upgrade (*Medium Priority*) (Previous FP-9-02, FP-8-05)

Sponsor: Dee Irrigation District (DID).

General Location: West Fork Hood River (RM 6.0) / *6th Field Watershed*: LWHR[6] / *Limiting Factors Addressed:* O ,F, HQ.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The Dee Irrigation District (DID) diverts approximately 12 cfs from the West Fork Hood River at RM 6.0 from July through September to provide irrigation water to orchards and farms in the mid-valley region. Currently, the diversion may delay or impede fish passage at low flows. The diversion consists of a push-up dam made from large boulders placed perpendicular to the flow of the river. The spawning and rearing habitat above the diversion on the West Fork and its tributaries is of high quality. Summer steelhead are listed as threatened under the ESA and almost exclusively utilize the West Fork Hood River. Spring Chinook also use the West Fork for spawning and rearing. The tribe and state have an ongoing effort to increase the spring Chinook population in the West Fork Hood River. The tribe and HRWG have evaluated solutions other than diversion modification including a connection to the MFID system. Subsequent to a 2004 investigation, this alternative was deemed uneconomical. West Fork Hood River in-stream flows are also reduced by 25% during the late season due to orchard and municipal diversions. Conversion of the DID open canal to closed pipeline would allow better conservation of stream flows. Since piping is not expected to result in a pressurized system, however, end of line losses will not be corrected.

Objectives: a) Provide unimpeded passage for adult spring Chinook, summer steelhead and resident trout to the upper West Fork Hood River via improvements to the DID diversion, b) Improve water conveyance efficiency and water quality by piping open canals to conserve water.

Proposed Actions and Schedule: DID may work with project partners to design and construct an alternative intake system and / or location to replace the existing boulder push-up dam where the district diverts 12 cfs from May though October each irrigation season. The district will also work with the HRWG to explore options for piping the remaining one (+) mile of their main ditch. This project is not firmly scheduled.

Total Project Cost (and Matching Partner Contributions): ≈$500,000 (undetermined contributions from DID, ODFW, OWEB, BPA and CTWSRO).

AP-9-08. Improve Fish Passage and Fish Screens on Private, County, State, and Federal Lands (*Medium Priority*) (Previous FP-14-02, FP-19-02, FP-10-05)

Sponsor: Private landowners, Hood River County (HRC), Oregon Department of Transportation (ODOT), U.S. Department of Transportation (USDOT).

General Location: Basin-*wide* / *6th Field Watershed*: All / *Limiting Factors Addressed:* O, HQ.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Artificially impeded fish passage is rated as a key factor limiting fish production in the Hood River basin. These situations typically limit both spawning and rearing habitat on small streams that are important to ESA-listed steelhead and coho, and resident species such as cutthroat and rainbow. Barriers can also limit fish access to areas that are important for over-wintering and flood refuge. The most common types of fish migration barriers include perched or inadequately sized road and driveway culverts, improperly screened irrigation out-takes (including poorly screened pumps) and dams behind small ponds. Some of the best project opportunities for improvement are on Baldwin, Graham, Tieman and Evans creeks.

Objectives: Eliminate all artificial fish passage barriers including unscreened diversions and pumps.

Proposed Actions and Schedule: CTWSRO and ODFW will continue to survey important fish bearing waterways in cooperation with landowners to inventory project needs. The HRWG, HRSWCD, CTWSRO and ODFW will also work to expand cost-share and technical assistance opportunities to private landowners to help them voluntarily address fish passage needs. In general, projects will be prioritized to correct downstream barriers before addressing upstream needs. Additionally, work targeting streams with anadromous fish will be prioritized over those hosting resident species. Specific projects targeted for completion include the Lameka Culvert Replacement Project on Graham Creek scheduled for 2008 and the Hood River County sponsored Evans Creek Culvert Replacement Project scheduled for 2009-10.

Total Project Cost (and Matching Partner Contributions): $300,000 (undetermined contributions from HRSWCD, CTWSRO, ODFW and OWEB).

AP-10-08. State Highway 35 Polallie Creek Culvert Upgrade (*Medium Priority*) (New)

Sponsor: Oregon Department of Transportation (ODOT).

General Location: Highway 35 Polallie Creek culvert (RM 7.0) south of Cooper Spur Road intersection / *6th Field Watershed*: MEHR[10] / *Limiting Factors Addressed:* O, HQ, HD.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The capacity of the existing Polallie Creek double culvert under Highway 35 is not adequate to carry flood and debris flows. Inadequate capacity has resulted in culvert and highway damage and compromises the integrity of the highway at the location. The culverts are also upstream migration barriers to fish and are prone to future blockage. If the culverts fail, as ODOT believes is likely, the highway could be severely damaged and block public transportation.

Objectives: a) Provide aquatic passage for all species and life stages, b) Provide unimpeded routing of water, sediment and wood (to the extent possible), c) Provide safe and reliable highway access.

Proposed Actions and Schedule: ODOT will replace the current culverts with a newly engineered bottomless arch culvert. Work is anticipated to occur in 2008-2009.

Total Project Cost (and Matching Partner Contributions): ≈$350,000 (undetermined contributions from ODOT, USFS and others).

Planning Element 2: Water Quality

Goal: Improve water quality in the basin by reducing artificial contamination to protect human health, aquatic life and other beneficial water uses. Meet or exceed state and federal water quality standards and aquatic criteria.

Background

Elevated levels of water temperature, pesticides, nutrients, pH, bacteria and turbidity have been measured in several segments of the Hood River system. Summer and fall water temperatures exceed state water quality standards in several reaches. Power lines, roads, railroad, livestock, forestry, residential lands and agricultural uses have historically impacted riparian vegetation patterns and density. This has led to decreased shade, higher summer water temperatures, accelerated bank erosion, decreased attenuation of pollutants in land runoff, and lower water retention and groundwater recharge. Reduced stream flow caused by water withdrawals also contributes to higher than normal water temperatures.

Natural glacial melt and frequent landslides on Mt. Hood contribute sediment to Hood River streams on a seasonal and episodic basis. However, sediment from human activities persistently raises the amount and duration of turbidity in Hood River streams. Human influenced sedimentation include forest road runoff, bank and ditch erosion, recreational trails, off-road travel, landslides associated with roads, canals, culverts, and use of waterways for transport of irrigation water from glacially derived sources.

Strategy

The water quality element strategy is intended to restore water quality in all waterways to meet Oregon water quality standards and aquatic life criteria. Similar to other elements of this plan, improvements in water quality will be achieved using a combination of strategies including on-ground actions, technical assistance and community education.

Several specific strategies are intended to remedy *elevated stream temperatures* in the basin. First, the group will work to apply the Hood River Agricultural Water Quality Area Management Plan (ODA, 2000) and rules contained in OAR 603-095-1100 through 603-095-1160. Second, efforts will target extension of streamside vegetation buffers to optimal widths. Third, efforts will target maintaining and restoring adequate summer stream flows through water conservation education, and conveyance efficiency improvements. Finally, partners will work to implement water quality management plans outlined in the Western Hood Subbasin Total Maximum Daily Load study (ODEQ, 2001).

Elevated levels of *pesticides and other artificial chemicals* will be addressed via five specific strategies during the next five years. First, the HRWG will support education and research by OSU Extension and Mid-Columbia Agricultural Research and Extension Center leading to improved chemical application, irrigation and other orchard practices

that improve water quality and fruit production. Second, the group will work with NRCS and CGFG to implement cost-share programs for growers that promote use of bug scouting, beneficial insect releases, soil and leaf analyses, and other practices that reduce pesticide exposure to streams. Third, efforts will support continuation of the Columbia Gorge Fruit Growers Integrated Fruit Production (IFP) program and related grower outreach efforts. Fourth, the group will encourage continued pesticide monitoring within the basin's waterways to assess whether pesticide concentrations in surface waters are adversely affecting aquatic life. Finally, efforts will attempt to determine the mechanisms by which pesticides are reaching waterways, and then select BMPs that prevent water pollution.

Watershed strategies aimed at reducing the introduction of fine, artificially generated *sediment* into the basin's waterways will be approached using several key methods. First, HRWG partners will promote improved road design, road management and road maintenance (including gating, permanent closure and restoration) on all land ownerships. Second, efforts will try to eliminate use of streams to convey irrigation water. Finally, partners will pursue piping of open ditches and canals to eliminate the threat of landslides and return flows carrying silt to streams.

Reduction in levels of excess *nutrients (nitrogen and phosphorus) and bacteria* will be accomplished using three key strategies. First, Hood River Watershed Group partners will work to apply the Hood River Agricultural Water Quality Area Management Plan (ODA, 2000) and meet the rules specified in OAR 603-095-1100 through 603-095-1160. Second, the HRWG will implement projects with landowners, conduct education activities and promote BMPs designed to control pollution of ground and surface waters caused by domestic animal, residential housing and artificial fertilizers. Finally, HRWG partners will continue water quality monitoring to identify nutrient and bacteria sources to facilitate assessment of long term trends and improvement needs.

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Water Quality Projects

Project No.	Project Name	Priority	Schedule
WQ-1-08	Lower East Fork Hood River Water Quality, Riparian Area and Fish Habitat Enhancement	High	ongoing
WQ-2-08	Water Quality and Quantity Project Implementation on Agricultural Lands	High	ongoing
WQ-3-08	County, State and Federal Road Design and Maintenance	High	ongoing
WQ-4-08	County, Federal, Timber Company and Small Private Forest Road Design and Maintenance	High	ongoing
WQ-5-08	Lower Hood River and Tributaries Water Quality and Fish Habitat Enhancement	High	ongoing
WQ-6-08	BPA Power Line Stream Crossing Water Quality and Fish Habitat Enhancement	High	ongoing
WQ-7-08	Long Term Baseline Watershed Monitoring for Adaptive Management	High	ongoing
WQ-8-08	Improvements to Recreational Trails	High	ongoing
WQ-9-08	Indian Creek Water Quality, Fish Passage, Riparian Zone and Community Enhancement	High	ongoing
WQ-10-08	Basin-Wide Pesticide Monitoring	High	Ongoing
WQ-11-08	Inventory, Restoration and/or Closure of Dispersed Streamside Camping and OHV Sites	Medium	ongoing
WQ-12-08	Clear Branch Riparian Reforestation – Spillway Reach	Medium	2009-2010
WQ-13-08	Evaluation of Alternative Irrigation Water Management at Laurance Lake to Reduce Downstream Clear Branch Temperature	Medium	2007 - 2009
WQ-14-08	Storm Water Retention and Infiltration	Medium	ongoing

Water Quality Project Descriptions

WQ-1-08. Lower East Fork Hood River Water Quality, Riparian Area and Fish Habitat Enhancement (*High Priority*) (Previous WQ-4-02, WQ-8-05)

Sponsor: Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO), Hood River Soil and Water Conservation District (HRSWCD), U.S. Forest Service (USFS), Hood River County (HRC), private landowners.

General Location: East Fork Hood River and tributaries / *6th Field Watershed*: LEHR[1] / *Limiting Factors addressed:* T,C,FP,HD,HQ,SL,CS.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The lower East Fork Hood River (including tributaries Baldwin, Graham, Tieman, Evans and Emil creeks) has been significantly impacted by past land uses including orchards, farming, timber harvest, water withdrawal, power lines and road construction. This has resulted in degraded riparian vegetation, livestock waste, low shade, low habitat complexity, channel modifications, blocked passage, wetland loss, high temperatures and high nutrient levels. These creeks are accessible or were historically accessible to anadromous fish, and are low gradient habitats with potential for improved spawning, rearing and over-wintering use by fish species including winter steelhead, coho and cutthroat. Juvenile coho have been sampled in several of these creeks in the last decade by ODFW.

Objectives: a) Decrease water temperatures by increasing canopy shade to target levels specific to stream width, b) Decrease concentrations of agricultural chemicals and nutrients to meet state water quality standards / guidelines (where applicable), c) Increase area and frequency of pools, access to side channels, large wood and other fish habitat criteria that are below target (where possible).

Proposed Actions and Schedule: Sponsors will coordinate various projects such as riparian fencing, reforestation of stream corridors, removal of barriers to side channels, correction of failing septic systems and more in cooperation with private landowners along the segments listed above. Work will also target increased delivery of landowner education / technical assistance and water quality monitoring. Specific projects proposed during the planning period include riparian planting and other measures to improve habitat and water quality where the BPA power lines cross the streams listed above.

Total Project Cost (and Matching Partner Contributions): ≈$4,070,000 (undetermined contributions from CTWSRO, USFS, HRSWCD, OWEB, DEQ, HRC, landowners and others).

WQ-2-08. Water Quality and Quantity Project Implementation on Agricultural Lands (*High Priority*) (Previous WQ-1-02, WQ-1-05)

Sponsor: Hood River Soil and Water Conservation District (HRSWCD).

General Location: Basin-wide lands in agricultural production / *6th Field Watersheds*: LEHR[1], LHR[2], LMHR[3], UMHR[4], HR/ODC[5], LWHR[6]; NLC[11] / *Limiting Factors addressed:* F, T, SL, C, O, R.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Water quality and quantity is currently degraded in some stream segments, partially as a result of agricultural activities. Temperatures are exceeding standards in Indian Creek, Neal Creek, Whiskey Creek and the lower Hood River. Two orchard chemicals (chlorpyrifos and azinphos

methyl) exceed state water quality criteria in Neal, Whiskey and Lenz creeks. High rates of sedimentation, addition of nutrients and above standard levels of fecal coliform bacteria also impact waterways. Stream flow is severely limited by irrigation withdrawals, especially in the lower East Fork and lower main stem. Fish habitat and screening problems also currently impact ESA-listed and resident fish.

Objectives: a) Increase stream flows in all depleted reaches, b) Improve water quality to achieve compliance with state temperature, turbidity and toxics standards, c) Improve fish screening and passage, d) Enhance fish habitat.

Proposed Actions and Schedule: The HRSWCD, in cooperation with NRCS, ODA and OSU Extension will continue to provide educational, technical and financial assistance to valley agricultural producers to implement agricultural best management practices. Using mechanisms such as the Environmental Quality Incentives Program, OWEB Small Grant Program, Integrated Fruit Production program and others, landowners will improve irrigation efficiency, exclude livestock from waterways, implement pasture management techniques, reduce and / or target pesticide use, plant riparian buffers and implement other practices to improve water quality, water quantity and aquatic habitat. These programs will also serve to implement the Hood River Agricultural Water Quality Area Management Plan and Rules

Total Project Cost (and Matching Partner Contributions): $400,000 annually (NRCS - $100,000, HRSWCD - $50,000, OSU Extension - $50,000, OWEB - $50,000, landowners - $150,000).

Orchardist installing redosier dogwood "live stakes" along Thomson Road ditch to establish buffer between orchard and water. *Photo by Steve Stampfli.*

WQ-3-08. County, State and Federal Road Design and Maintenance (*High Priority*) (Previous WQ-5-02, WQ-6-02, WQ-15-05)

Sponsor: Hood River County (HRC), Oregon Department of Transportation (ODOT), U.S. Department of Transportation (USDOT).

General Location: Basin-wide / *6th Field Watersheds*: All / *Limiting Factors addressed:* CS, FP, HD, SL, C, F.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: An extensive network of public roads has been developed in the Hood River valley since the 1860s to allow access to homes, farms, businesses, recreation opportunities and other aspects of the economy. Proper road system design and maintenance is critical to many important watershed functions, most notably watershed hydrology, surface water quality and aquatic populations. Though uncommon, severe impacts can result from improper management activity. In 1999, Chinook fry died 45 minutes after herbicide was applied to a road ditch leading to the Parkdale hatchery water supply. In November 2006, severe damage to Highway 35 was sustained consequent to flooding and inadequate river access to historic floodplains and relief channels. Critical aspects of road system operation in the Hood River basin include a) properly constructed and sized road ditches, bridges, culverts and other cross-drain structures to provide fish passage, access to important flood relief channels, natural water runoff patterns and minimal sediment generation, b) proper application and timing of herbicides to minimize surface water contamination, c) roadside revegetation to stabilize cut and fill slopes and buffer sediment and chemicals originating from road corridors and between roads and other land uses (e.g., orchards), d) periodic resurfacing of aggregate road surfaces to minimize dust, erosion and sediment generation, e) abandonment and restoration of unused roads to restore natural hydrologic conditions and stream access to relief channels and floodplains and f) use of storm water detention structures and bio-swales to accelerate road water recharge and capture / treat road sediments and chemicals.

Objectives: a) Provide safe roads for the benefit of the public, b) Operate the road system to comply with applicable state and federal rules that are intended to protect water quality, fish populations and hydrologic functions.

Proposed Actions and Schedule: ODOT has modified roadside management practices subsequent to the Oregon Plan for Salmon and Watersheds and the federal fish requirements under the Endangered Species Act. In 2003, ODOT also completed an investigation of Highway 35 road corridor enhancements, which identified projects at 7 important road segments (Clark, Newton, The Narrows, Polallie, Dog River Baseline #1 and Baseline #2). All of these projects are intended to decrease future flood damage via improving cross-drainage and floodplain capacity. In addition to specific projects, the county and state will continue to provide training opportunities to staff relating to the application of current best management practices.

Total Project Cost (and Matching Partner Contributions): undetermined cost (contributions from ODOT, USFS and HRC).

WQ-4-08. County, Federal, Timber Company and Small Private Forest Road Design and Maintenance (*High Priority*) (Previous WQ-6-02, WQ-7-02, WQ-8-02, WQ-6-05)

Sponsor: Hood River County (HRC), U.S. Forest Service (USFS), Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO), timber companies, private landowners.

General Location: Basin-wide / *6th Field Watersheds*: All / *Limiting Factors addressed:* CS, FP, HD, SL, C, F.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Forestland management occurs on 80% of the watershed's land base. As a result of this land use, an extensive road network has been developed for managing timber resources and various ancillary activities including recreation, water supply and tourism. Forest roads were identified in a 2001 road inventory conducted by the HRWG (using ODF and ODFW survey protocols) as a major source of fine sediment delivery to streams. The survey indicated that sedimentation was increased by poor road conditions, use during wet weather and wash-outs during culvert failures. Proper road system operation and maintenance is critical to many important watershed functions, most notably watershed hydrology, surface water quality and aquatic populations. Important aspects of forest road operation include a) properly constructed and sized road ditches, bridges, culverts and other cross-drain structures to provide fish passage, access to important flood relief channels, natural water runoff patterns and minimal sediment generation, b) proper application and timing of herbicides to minimize surface water contamination, c) roadside revegetation to stabilize cut and fill slopes and buffer sediment and chemicals originating from road corridors and between roads and forest chemical applications; d) surfacing of native dirt roads with aggregate, and resurfacing of other roads to minimize dust, erosion and sediment generation, e) decommissioning and restoring unused roads and fills to restore natural hydrologic conditions and stream access to relief channels and floodplains, f) gating of infrequently used roads to control public use during periods of wet soil and / or periods critical to wildlife and g) use of storm water detention structures and bio-swales to accelerate road water recharge and capture / treat road sediments and chemicals.

Objectives: a) Provide safe roads for the benefit of timber operations and public, as applicable, b) Protect water quality, fish populations and hydrologic functions by implementing road system BMPs.

Proposed Actions and Schedule: All roads should be managed in accordance with federal and state recommended BMPs, with special attention to reducing sediment, properly sizing culverts and cross drains, and defining proper herbicide use. Partners will use the 2001 road inventory to develop a maintenance plan and project list as a starting point to identify roads that are the most likely to result in stream sedimentation. Another principle action proposed under this project is closure and decommissioning of surplus roads. Note that the USFS is currently proposing road closures and decommissioning in several watersheds over the next 1-5 years, including the upper Middle Fork Hood River and Lake Branch watersheds.

Total Project Cost (and Matching Partner Contributions): undetermined cost (contributions from HRC, USFS and timber companies).

WQ-5-08. Lower Hood River and Tributaries Water Quality and Fish Habitat Enhancement (*High Priority*) (Previous WQ-11-02, WQ-10-02, WQ-7-05)

Sponsors: Private landowners, Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO), Hood River Soil and Water Conservation District (HRSWCD).

General Location: Lower Hood River valley / *6th Field Watersheds*: LHR[2], HR/ODC[5], NLC[11] / *Limiting Factors Addressed:* T, C, R, FP, HD, SL, CS.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The lower Hood River valley has been significantly impacted by past land uses including orchards, farming, forest harvest, water withdrawal and road construction. DEQ completed a TMDL for

temperature in 2002 that outlines the need for reduced stream temperatures in streams around the watershed, including the lower Hood River, Neal Creek, Indian Creek and Whiskey Creek. Certain waterways are also 303(d) listed for exceeding standards for chlorpyrifos, azinphos methyl and iron. Neal Creek upstream of Dethman Ridge Road has low riparian shade, high summer water temperatures, nutrient runoff, poor pool area and frequency, and low overall habitat complexity. The creek currently supports populations of coho, steelhead, rainbow and cutthroat. It is potentially a very important fish producing tributary due to low elevation, low natural sediment loading, high specific conductivity and close proximity to the Columbia River. Water quality in Odell Creek is degraded by high nitrogen, high phosphorus levels and high summer stream temperatures. Odell Creek also shows low riparian shade, livestock damage to stream banks and riparian areas, animal waste runoff, high rates of storm runoff, discharges from inadequate or poorly maintained on-site sewage systems and water quality impacts from growing urban encroachment. Improving Odell Creek will elevate habitat for native fish including rainbow and cutthroat, and also contribute to improved downstream water quality in the Hood River for threatened aquatic species.

Objectives: a) Decrease water temperatures by increasing canopy shade to target levels appropriate for stream width, b) Decrease concentrations of pesticides, bacteria and nutrients to meet state water quality standards and guidelines, c) Increase area and frequency of pools, large wood and other habitat criteria that are below target.

Proposed Actions and Schedule: Project sponsors will work during the next five years to enact a series of water quality and habitat improvement projects with private landowners, timber companies, CTWSRO, HRC and the USFS. Proposed work will include removal of abandoned road fills, re-activation of floodplains, riparian reforestation, improved implementation of pesticide BMPs, solid and hazardous waste removal, riparian thinning, planting and hardwood conversion to encourage growth of large trees, large woody debris placement, riparian fencing, septic system upgrades, planting of appropriate vegetation along streams that intersect large power lines and other measures.

Total Project Cost (and Matching Partner Contributions): ≈$1,280,000 (undetermined contributions from HRC, ODFW, CTWSRO, OWEB, USFS, HRSWCD and landowners).

WQ-6-08. BPA Power Line Stream Crossing Water Quality and Fish Habitat Enhancement (*High Priority*) (Previous WQ-12-02, WQ-10-05)

Sponsors: Bonneville Power Administration (BPA), Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO), U.S. Forest Service (USFS).

General Location: Multiple lines bisecting the basin in a generally east – west direction / *6th Field Watersheds*: LEHR[1], LMHR[3], UWHR[7], NLC[11] / *Limiting Factors Addressed:* RP, FP, T, CS, HD, HQ, SL, I.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: BPA is responsible for effectively managing the vegetation and access roads along its right-of-ways in the basin. Vegetation under or near transmission lines can cause system failures, start fires and endanger lives. Vegetation is controlled chemically and mechanically. Vegetation management and access roads may impact stream channels, riparian zones, water quality and habitat along approximately 1,200 feet of low gradient, unconfined habitat around high quality spawning and rearing areas in the West Fork Hood River, tributaries Elk and McGee creeks, Neal Creek, lower East Fork Hood River, lower Middle Fork Hood River and other waterways. BPA access roads ford creeks and can contribute sediment to downstream spawning habitat. These impacts are

greatly amplified by unauthorized use of corridor lands and roads by ORVs. Waterways beneath power line corridors may also exhibit lack of pools, riparian cover, shade and large woody debris. These factors impact summer steelhead, coho and spring Chinook.

Objectives: a) Improve fish populations by placing 24"+ dbh trees in-stream to decrease stream width/depth, increase pool frequency and other fish habitat criteria, b) Decrease water temperatures by increasing canopy shade where appropriate, c) Reduce generation of fine sediment by better management of roads and recreational access.

Proposed Actions and Schedule: BPA will continue yearly road condition surveys to identify correctable soil erosion, avoidable impacts to streams and riparian vegetation, and rehabilitation opportunities. This information will be shared with HRWG partners. Where significant opportunities exist, BPA and partners will perform installation of adequate culverts, water bars, re-surfacing, grass revegetation and other measures to control fine sediment. Riparian shade will be maximized, and the need for future intensive vegetation management minimized by planting low growing species such as Douglas spirea, snowberry and other acceptable species where line clearance allows. Partners will attempt to implement at least one rehabilitation project at a top priority site each year. Other high priority opportunities will include consideration of BPA power corridor access issues during the HR County Recreational Trails Committee Master Planning process. Barricading, reclaiming or alternative strategies for managing car and ORV routes leading to BPA corridors from private, timber company, county and federal land will be pursued. The "Big Eddy" cooperative agreement involving HRC may be used as a future management template. Finally, the CTWSRO will continue working closely with BPA to cooperatively manage riparian vegetation and invasive plants along the West Fork power corridor.

Total Project Cost (and Matching Partner Contributions): ≈$40,000 annually (undetermined contributions from BPA, CTWSRO, HRC, timber companies, USFS and landowners).

WQ-7-08. Long Term Baseline Watershed Monitoring for Adaptive Management (*High Priority*) (Previous WQ-14-02, WQ-13-05)

Sponsor: Oregon Department of Fish and Wildlife (ODFW), Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO), Hood River Watershed Group (HRWG), U.S. Forest Service (USFS), Bonneville Environmental Foundation (BEF).

General Location: Basin-wide / *6th Field Watershed*: All / *Limiting Factors Addressed:* C, T, SL, R, FF, C.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: There is a need to increase HRWG ability to accurately monitor current (baseline) and future (outcome) watershed parameters such as water quality, flows and fish populations to evaluate progress toward the HRWG's many objectives. While partners are relatively confident that parameters like water-born pesticides are decreasing in basin waterways, a lack of long-term funding has rendered this and other conclusions very difficult to evaluate. The same uncertainty applies to documenting the success of efforts aimed at a) reducing water temperatures, nutrients and bacteria, b) increasing stream flows, c) elevating future large woody debris recruitment potential and riparian shade and d) enhancing fish, aquatic macro-invertebrate and wildlife populations. While partners are accomplishing some water quality and fish monitoring, the ability to concentrate and consolidate these efforts is limited. Without coordinated watershed scale effectiveness monitoring, there is little ability to quantify success and consequently modify restoration actions or improve strategies where necessary.

Objectives: a) Establish a minimum 10 year adaptive monitoring / restoration program that will

enable tracking of water quality, fish populations, stream flows and habitat changes in relation to ongoing restoration actions, b) Incorporate effectiveness monitoring results into HRWG planning processes (e.g., action plan, county comprehensive plan, USFS plans, Hood River Agricultural Water Quality Area Management Plan, etc.).

Proposed Actions and Schedule: The HRWG will continue to work with BEF to develop an effectiveness monitoring plan and proposal for long term funding of monitoring actions. In the meantime, partners will seek other sources of funding for baseline monitoring of such parameters as pesticides, temperature, pH, dissolved oxygen, coliform bacteria (especially in HR/ODC and LHR), nutrients, macro-invertebrates and stream flow.

Total Project Cost (and Target Partner Contributions): ≈$30,000 annually (undetermined contributions from BEF, irrigation districts, chemical companies, USFS, OWEB, CTWSRO, ODFW and ODEQ).

WQ-8-08. Improvements to Recreational Trails (*High Priority*) (New)

Sponsor: Hood River County (HRC), U.S. Forest Service (USFS), timber companies, private landowners.

General Location: Primarily managed forest lands including Post Canyon, Neal Creek and other road accessible areas / *6th Field Watersheds*: All / *Limiting Factors addressed:* SL, R, C, I.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Many recreational trails in the county are user-created, built prior to modern standards and are consequently poorly located or constructed. Many miles of trail have never been inventoried and in many areas trail densities far exceed biological capacity. Heavy trail usage and density, bad location and poor conditions of the trails have resulted in fragmentation of wildlife corridors, impaired water quality, soil erosion, stream bank instability, invasive weed infestations and loss of habitat for aquatic and terrestrial plant and animal species.

Objectives: a) Improve water quality by decreasing sedimentation of waterways, b) Increase streamside vegetation for bank stabilization, future large wood recruitment and shade, c) Protect wildlife corridors, d) Reduce the threat of wildfire, e) Reduce risk of introduction and spread of invasive plant species, f) Minimize negative impacts of human encroachment on native plant and animal populations.

Proposed Actions and Schedule: Large-scale land managers including USFS, HRC and timber companies will work to develop strategies and / or management plans that balance human needs with watershed health. HRC will continue its existing work with HRSWCD, ODFW, user groups, Oregon State Parks, USFS and other regional representatives in the HR County Recreational Trails Committee. Priority actions include: a) complete the Master Plan for trails on Hood River County Forest Land indicating proposed future construction, permitted uses for trails, and trail density standards, b) develop a County-wide Master Plan that integrates trail systems on county, city, state, federal and private lands, c) inventory areas currently used for trails, dispersed camping and other recreation, d) identify poorly located and constructed trails and associated areas to be targeted for closure, relocation or reconstruction, e) maintain trails on a regular basis to improve drainage and reduce erosion, f) identify, prioritize and implement restoration of sensitive areas, g) erect signage to indicate permitted trail uses, trail directional information and information on closure and regulations, h) develop and implement a public outreach and education component for trail users, i) develop and / or improve associated roads, staging areas and sanitation facilities in accordance with accepted guidelines and j) pursue available funding opportunities to implement these tasks.

Total Project Cost (and Matching Partner Contributions): ≈$60,000 annually (undetermined contributions from USFS, HRC, HRSWCD, OPRD, trail user groups, ODF and ODFW).

WQ-9-08. Indian Creek Water Quality, Fish Passage, Riparian Zone and Community Enhancement (*High Priority*) (Previous FP-18-02)

Sponsor: Hood River Watershed Group (HRWG), Farmers Irrigation District (FID), Columbia Gorge Community College (CGCC), Hood River Valley Parks and Recreation District (HRVPRD), other cooperators.

General Location: Indian Creek confluence with lower Hood River to upper Kingsley Road headwaters (RM 0.0–5.5) / *6th Field Watershed*: LHR[2] / *Limiting Factors Addressed:* O, R, HQ, C, T, SL.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Indian Creek represents a once important native fish producing waterway that transects the City of Hood River and lower Hood River valley. Fish production is currently limited by several artificial barriers. Water quality is severely limited by high temperature, sediment, solid waste, urban runoff and agricultural chemicals (303d listed in 2002). Riparian zones, wetlands and channel morphology are also degraded due to degraded riparian buffers, excess fine sediment, lack of pools, few large trees and artificial channel restrictions.

Objectives: a) Increase riparian shade and future large wood recruitment by establishing large trees and shrubs, b) Improve fish passage at road crossings and other artificial barriers, c) Establish wide riparian buffers and remove streamside solid waste to attenuate sediment and chemicals in runoff, d) Work with partners to ensure watershed-compatible development of corridor buildings, trails and roads, e) Increase environmental education and community enjoyment opportunities

Proposed Actions and Schedule: FID will actively work to improve fish passage, water quality and water conservation by replacing irrigation suction pumps and open ditches along Indian Creek with pressurized pipelines. HRWG will assist HRVHS and the CGCC in development of the new Indian Creek campus to address site runoff, riparian enhancement, solid waste removal, recreation opportunities and education programs. Specific actions will address the old Diamond Fruit Dam, recreational trail development, community based clean-ups and riparian planting. Other partnership projects will include Providence Hood River (riparian reforestation), HRVHS (riparian reforestation) and HRVPRD (Barrett parcel trail / riparian restoration). Work is proposed throughout the planning period.

Total Project Cost (and Matching Partner Contributions): ≈$50,000 (undetermined contributions from HRWG, CGCC, HRVPRD, HRVHS and others).

WQ-10-08. Basin-Wide Pesticide Monitoring (*High Priority*) (Previous WQ-3-02, WQ-3-05)

Sponsor: Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO), Oregon Department of Environmental Quality (DEQ).

General Location: Basin-wide in areas where pesticides are applied / *6th Field Watersheds*: LEHR[1], LHR[2], LMHR[3], HR/ODC[5], LWHR[6], NLC[11] / *Limiting Factors Addressed:* C.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: A preliminary study in 1999 found that concentrations of chlorpyrifos and azinphos methyl

(organophosphate pesticides), exceeded the state standard in Neal and Indian creeks. Concentrations of, azinphos methyl, also exceeded the state standard at the mouth of the Hood River. Organophosphate insecticides potentially interfere with normal hormone function in salmonids including steelhead, and alter species composition and abundance of the aquatic insect community. Monitoring since 1999 has continued to find levels in excess of state standards in Neal, Indian and Lenz Creeks.

Objectives: Decrease levels of pesticides in surface waters throughout the basin to meet ODEQ water quality criteria.

Proposed Actions and Schedule: Continue pesticide and macroinvertebrate monitoring in selected streams in consultation with the grower community. The timing of sample collection will be coordinated with spray operations. Continued yearly monitoring is needed to confirm whether contamination levels are decreasing and whether improved application practices and alternatives are proving effective.

Total Project Cost (and Matching Partner Contributions): $30,000/year (CTWSRO - $30,000).

WQ-11-08. Inventory, Restoration and/or Closure of Dispersed Streamside Camping and OHV Sites (*Medium Priority*) (Previous WQ-19-02, WQ-19-05)

Sponsor: U.S. Forest Service (USFS), Hood River County (HRC), timber companies.

General Location: Forest lands in the watershed accessible via roads / *6th Field Watersheds*: All / *Limiting Factors Addressed:* SL, R, C.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Dispersed camping and OHV use on public and private forest lands can result in loss of streamside vegetation, decreased shade, damage to soils, proliferation of solid waste and introduction of fine sediment and bacteria to waterways. While water quality impacts are usually not as severe as those resulting from forest roads, dispersed recreation activities are still an important water quality, habitat and wildlife issue in the Hood River watershed.

Objectives: a) Improve water quality by decreasing delivery of fine sediment to waterways, b) Benefit aquatic life by increasing streamside vegetation for future large wood recruitment and shade, c) Reduce harassment of terrestrial wildlife, d) Reduce the threat of wildfire.

Proposed Actions and Schedule: Large-scale land managers including USFS, HRC and timber companies will work to inventory areas currently used for dispersed camping and other recreation, then develop strategies and plans that balance human needs with watershed values. HRSWCD will continue its existing work with HRC, ODFW, user groups and others through the HR County Recreational Trails Committee. The USFS is currently in the process of assessing and analyzing OHV travel and access management needs, and dispersed campsite access across the entire forest. Depending on the outcome, some areas now open to OHV and dispersed camping may be closed. This effort is expected to be completed in 2009, although implementation schedule and cost will depend on inventory results and the ongoing USFS OHV access and travel management planning process.

Total Project Cost (and Matching Partner Contributions): undetermined cost (contributions from USFS, HRC, timber companies and others).

WQ-12-08. Clear Branch Riparian Reforestation – Spillway Reach (*Medium Priority*) (New)

Sponsor: Middle Fork Irrigation District (MFID), U.S. Forest Service (USFS), Hood River Watershed Group (HRWG).

General Location: Clear Branch immediately downstream of Clear Branch Dam / *6th Field Watershed*: UMHR[4] / *Limiting Factors Addressed:* R ,T.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The condition of the spillway basin is currently not optimal, and streamside tree canopy density and stream shading is low for a distance of 0.1 mile below Clear Branch Dam. Solar influx may contribute to increased algal growth in waters that support ESA-listed bull trout and winter steelhead below the dam.

Objectives: Decrease algae growth below dam by reconfiguring spillway and planting conifers to increase canopy shade to target levels appropriate for stream width.

Proposed Actions and Schedule: MFID will implement actions to improve the spillway basin, and in cooperation with the USFS will develop a reforestation plan for the banks of Clear Branch below the spillway basin. Some topsoil may need to be imported to some planting areas depending on current conditions and the need to maintain slope stability. Implementation could occur in 2009 or 2010.

Total Project Cost (and Target Partner Contributions): ≈$20,000 (undetermined contributions from MFID, USFS, ODFW, HRWG and others).

WQ-13-08. Evaluation of Alternative Irrigation Water Management at Laurance Lake to Reduce Downstream Clear Branch Temperature (*Medium Priority*) (Previous WQ-13-02, WQ-4-05)

Sponsor: Middle Fork Irrigation District (MFID), U.S. Forest Service (USFS), Oregon Department of Environmental Quality (DEQ).

General Location: Laurance Lake reservoir, four miles SW of Parkdale on Clear Branch / *6th Field Watershed*: UMHR[4] / *Limiting Factors Addressed*: T.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The UMHR sustains the only population of bull trout in the entire Mt. Hood National Forest. The upper limit allowed under state standards for bull trout waters is 12 degrees C. High temperatures affect bull trout's ability to spawn and spawning success (i.e., incubation and emergence timing). Summer heating of the reservoir results in relatively warm water discharge below Clear Branch Dam in late summer and fall. Reservoir outflows can be up to 3 degrees C warmer than Clear Branch upstream of reservoir. Warm water may harm downstream bull trout populations and discourage attraction to the fish trap.

Objectives: Maintain temperatures of dam outflows to meet state water quality standards, and emulate natural thermal profiles as closely as possible.

Proposed Actions and Schedule: MFID will continue working with the USFS and other stakeholders over the next 5 years to evaluate alternative reservoir water management strategies to meet state water quality standards in Clear Branch below the reservoir. Additional temperature modeling efforts involving PSU may be pursued. MFID's preferred alternative is to evaluate several means of modifying reservoir inputs and outputs during the irrigation season to achieve cooler late season outfalls. If changes in management practices can successfully result in the

desired temperature reduction, MFID will be willing to permanently adopt such techniques. Implementation and monitoring of alternative reservoir management strategies will occur during the 2007 – 2011 irrigation seasons.

Total Project Cost (and Matching Partner Contributions): ≈$50,000 (undetermined contributions from MFID, USFS, HRWG, ODFW, DEQ and others).

WQ-14-08. Storm Water Retention and Infiltration (*Medium Priority*) (Previous WQ-16-02, WQ-12-05)

Sponsor: Hood River Soil and Water Conservation District (HRSWCD).

General Location: Urban, commercial, park, recreational, agricultural and rural residential lands / *6th Field Watersheds*: All / *Limiting Factors Addressed*: F, C.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Impermeable land surfaces and highly managed landscapes typically increase rates of surface runoff, thereby causing increased flooding, decreased groundwater recharge, decreased summer base flows and increased transportation of surface contaminants. The use of certain BMPs such as bio-swales, check dams and wetland revegetation can be effective means of increasing surface water infiltration on-site.

Objectives: a) Reduce the rate of runoff and increase groundwater recharge in portions of the basin being impacted by development by providing technical assistance to landowners and working with local governments to enact engineering standards that minimize runoff, b) Increase awareness and stewardship among landowners and local governmental entities to implement storm water BMPs.

Proposed Actions and Schedule: HRSWCD will continue to work with various partners including landowners, OSU Master Gardeners, Hood River Watershed Group and others to provide technical and financial assistance to landowners and developers to employ proper water retention and infiltration measures. The HRSWCD will work with local governmental agencies to incorporate BMPs for storm water management in local building codes. The HRSWCD will also explore development of a fact sheet describing the basics of bio-swale installation, suitable for distribution with building permit forms.

Total Project Cost (and Matching Partner Contributions): $20,000 (HRSWCD - $15,000, OSU Master Gardeners - $1,000, HRWG - $4,000).

Planning Element 3: Stream Flow / Water Quantity

Goal: Improve basin stream flows where opportunities exist, while protecting senior and in-stream water rights. Protect and restore the hydrologic functioning of uplands, wetlands and riparian areas to benefit surface and groundwater quality and quantity. Mimic the natural hydrologic regime where possible.

Background

The Hood River valley is blessed with relatively high snow falls, perennial snowfields, glaciers and spring-fed streams. These features are augmented by higher rates of precipitation than areas further east. Recent evidence surrounding the study of climate change, however, casts doubt regarding the reliability of future water supplies. Future planning, therefore, requires some consideration of the possibility that water availability may diminish in coming years.

During typical summer and fall periods, some stream segments experience depleted stream flows due to water diversion that impairs fish passage and aquatic habitat quality. In-stream water rights are established at 7 locations but are reliably met at only two of these sites. These rights are held in trust by the state for public benefits including recreation, pollution control and fish and wildlife. Because of their priority date (date established), in-stream 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, residences, power generation, commercial use, and ultimately the area's economy. By modernizing irrigation delivery systems and reducing waste, there is a potential to leave more water in our rivers and streams without impacting consumptive 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 their lower end ("end-loss"). Unlike some agricultural regions, leakage and end loss in the Hood River valley is not generally relied upon to supply other water users, and is mostly lost other than providing groundwater recharge, new wetlands and eventual return to lower river segments. In certain parts of the valley, excessive water line pressure leads to wasted water, premature wear of nozzles, lowered crop production and contaminated runoff. Only a small portion of the water is actually metered at the application site. Nevertheless, approximately 70% of the diversions or canals are outfitted with flow indicators, automated controls or other measuring devices.

When affordable, irrigation districts have converted miles of open ditch to pipe to improve operation and maintenance and to conserve water. For example, Farmers Irrigation District (FID) has replaced 80% of their original canals and ditches with pipe, greatly enhancing irrigation efficiency and eliminating end loss (Kleinsmith, 2008). By piping and other conservation measures, FID has been able to return approximately 2,500 acre-feet of water back in-stream (FID, 2006). Most efficiency measures have generated

secondary benefits such as lowered pumping costs, improved crop production, and higher power generation revenues for those irrigation districts operating small hydroelectric plants.

Strategy

The HRWG will continue using a strictly voluntary approach to promoting water conservation and directly increasing stream flows in the Hood River watershed. The group will focus on projects that increase water system and end-use efficiencies in agricultural, commercial and residential settings. Projects that result in decreasing water withdrawals in priority 6th field watersheds as established by the Aquatic Habitat Restoration Strategy are a priority. Likewise, projects that result in permanent water savings at the original point of diversion are prioritized highest.

The group will encourage projects that promote education and outreach actions, provide technical assistance to basin stakeholders for upgrading irrigation system components (e.g., flow restrictors, soil moisture sensors, more efficient nozzles), increase opportunities for cost-sharing system improvements, and restoration activities that result in permanent water savings. The HRWG will also provide assistance to stakeholders such as OWT and irrigation districts to monitor project results, thus insuring that project actions are resulting in stream flow improvements.

Other specific and critical stream flow improvement project strategies will include: a) upgrading irrigation delivery systems by piping open ditches and canals when it can be shown there will be significant permanent water savings and transfer of conserved water in-stream, b) improving metering, measurement and monitoring capabilities, c) correcting excessive irrigation water pressures where they exist, d) supporting development of water conservation plans by water providers and continued implementation of the Farmers Irrigation District Water Conservation and Management Plan (FID, 1995) and Sustainability Plan (FID, 2006), e) restoring healthy watershed hydrologic conditions (floodplain storage, wetlands, mature forest canopies, low density road networks) where feasible to moderate runoff, promote aquifer recharge and increase summer stream flows, f) helping the OWRD ensure that legal water right amounts are not exceeded and that water uses are authorized, g) prioritizing flow restoration in stream segments identified as 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 and h) partnering with Hood River County to develop a comprehensive water resources planning process to inventory existing rights, estimate surface and groundwater availability, and plan for future allocations that will protect existing rights and in-stream needs.

Stream Flow / Water Quantity Projects

Project No.	Project Name	Priority	Schedule
SF-1-08	East Fork Hood River Flow Augmentation	High	ongoing
SF-2-08	West Fork Hood River Flow Augmentation	High	ongoing
SF-3-08	Middle Fork Hood River Flow Augmentation	High	ongoing
SF-4-08	Glacier Ditch Pipeline Project – Phase 3	Medium	unscheduled
SF-5-08	City of Hood River Water Transmission Main Replacement	Medium	2013
SF-6-08	Eliot Ditch Pipeline Conversion	Low	unscheduled

Stream Flow / Water Quantity Project Descriptions

Construction of large irrigation pipe lines to replace leaky open canals represents a vital means of conserving scarce water in the East Fork Hood River and other tributaries. This 2007 photo shows work on the last phase of the EFID Central Canal Pipe Line Project. *Photo by Brian Nakamura.*

SF-1-08. East Fork Hood River Flow Augmentation (*High Priority*) (Previous S-4-02, S-3-05)

Sponsor: East Fork Irrigation District (EFID), Oregon Water Trust (OWT).

General Location: Various EFID facility locations / *6th Field Watershed*: LEHR[1],LHR[2], HR/ODC[5], NLC[11] / *Limiting Factors Addressed:* F, T, HQ.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Up to 75% of the East Fork Hood River is diverted for irrigation during late summer and fall. In-stream water rights (100 cfs in July-September and 150 cfs in October-June) are typically not met during this period. Summer flow can become depleted from the EFID main diversion (upstream of Toll Bridge Park), downstream to the Middle Fork Hood River confluence when dry conditions coincide with peak withdrawals. High water temperatures (21° C) have been measured in this reach. Maintaining higher July-October stream flows is needed for maintained spawning, rearing and migration conditions for ESA-listed winter steelhead, coho and Chinook in the East Fork Hood River.

Objectives: Increase flows in the East Fork Hood River below RM 6.4 by approximately 5 cfs during the next five years.

Proposed Actions and Schedule: EFID will continue working to convert open ditches to closed pipelines, and work with OWRD and OWT to develop agreements that will permanently increase

East Fork Hood River flows. EFID will also pursue other efficiency measures including a long-term water conservation plan, improved flow monitoring, automated water gates, and possible installation of an in-line hydroelectric generation facility to help fund future system improvements. The district will also seek to improve on-farm water use efficiency by promoting the use of low flow sprinkler heads, soil moisture sensors, pressure regulators and other techniques. The Central Canal Pipeline Project (completion scheduled for fall 2009), will result in increased East Fork Hood River flows by 3.44 cfs (see AP-2-08).

Total Project Cost (and Matching Partner Contributions): undetermined cost (contributions from EFID, OWT, OWRD and others).

SF-2-08. West Fork Hood River Flow Augmentation (*High Priority*) (Previous S-2-02, S-1-05)

Sponsor: Farmers Irrigation District (FID).

General Location: Various FID facility locations / *6th Field Watershed*: LWHR[6] / *Limiting Factors addressed:* F ,C, T, HQ.

W*ater Quality, Water Quantity, Species, Habitat and Resource Management Issues*: West Fork Hood River and lower main stem Hood River in-stream flow requirements are frequently not met in late summer and fall consequent to irrigation withdrawal. Flow is especially over-allocated in the lower 2 miles of Green Point Creek (below diversion point), which impacts the lower West Fork. Green Point Creek is a highly productive stream. Preliminary data collected by ODFW suggest that steelhead production in the Hood River correlates positively with high summer flows. Maintaining higher April-October flows will improve spawning, rearing and adult and juvenile migration conditions for several fish species including steelhead. Summer steelhead distribution is limited to the West Fork Hood River, and they are among the weakest native stocks in the Hood River watershed. Increased summer flow would also benefit spring Chinook migration, spawning and rearing.

Objectives: a) Increase summer minimum flow in Green Point Creek to 14 cfs from its present 10 cfs, b) Increase average low flows in Green Point Creek to an absolute minimum of 5 cfs, c) Maintain existing riparian corridors and continued in-stream flow monitoring at the USGS gage site operated by FID.

Proposed Actions and Schedule: FID will work with partners to accomplish various actions to restore stream flows, water quality, riparian zones and wetlands by increasing irrigation system and user efficiency. Specific projects will include:

1. Replace a) Lowline Canal (50% complete) and b) Farmers Canal (20% complete) with pipelines.
2. Replace a) Country Club Road Unit (50% complete), b) High School Line, c) Markham Unit, d) Tucker Road Unit ("Lower District Pressurization Project"), e) Upper and Lower Farmers Canal Units (all laterals) with pressure pipelines.
3. Remove fish passage barrier on system at intersection of Barrett and Methodist roads.
4. Continue Water Use Education and Communications Program.
5. Install on-farm soil moisture sensors and pressure compensating micro-head sprinkler systems.
6. Complete reservoir reduction and enhancement program
7. Eliminate North Pine, South Green Point, Cabin, Rainy, and Phelps creeks diversions
8. Continue establishing urban and suburban Minimum Service Unit regulated water delivery systems

9. Develop District Watershed Uplands Program
10. Increase Ditch, Dead Point, and North Green Point in-stream storage
11. Improve telemetry systems to accurately gauge flows, temperatures and water delivery needs (Basic telemetry infrastructure is in place and enhancement projects are ongoing.)
12. Extend current pipelines to serve orchards and farms that currently extract water from Indian Creek, including the Phase 1 (HRVPRD / Deborde Unit Extension), Phase 2 (Grange Hall / CC Road Unit Extension), and Phase 3 (Sharp / Saxby Unit Extension) projects.

Total Project Cost (and Matching Partner Contributions): ≈$10,000,000 (FID- $2,500,000, OWEB - $300,000, BOR - $600,000, other $6,600,000).

SF-3-08. Middle Fork Hood River Flow Augmentation (*High Priority*) (Previous S-3-02, S-2-05)

Sponsor: Middle Fork Irrigation District (MFID).

General Location: Various MFID facility locations / *6th Field Watershed*: LMHR[3], UMHR[4] / *Limiting Factors Addressed*: F, HQ.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Reduced stream flows in the Middle Fork Hood River caused by irrigation withdrawals can impair fish habitat during summer months. In-stream water rights are not reliably met during this season. Maintaining higher April-October stream flows is needed for maintained spawning, rearing and migration conditions for steelhead and bull trout.

Objectives: Permanently increase flows in the Middle Fork Hood River during the next five years.

Proposed Actions and Schedule: MFID will work with partners to install several projects intended to a) pipe open canals to eliminate water transfer losses, b) install appropriate measurement and monitoring devices, c) install flow restrictors, d) conduct water application education and free water efficiency audits with irrigators and e) other activities to increase delivery system or on-farm efficiency. In consultation with the USFS and ODFW, MFID will attempt to augment releases at Clear Branch Dam when needed to protect steelhead incubation in early summer months as water supply conditions allow. Specific Middle Fork projects will include Eliot Ditch Pipeline Conversion (SF-6-08), Glacier Ditch Pipeline Project – Phase 3 (SF-4-08) and the Emil Creek Pipeline Project that will pipe water from Glacier Ditch to below Emil Pond using 5,800 feet of new pipeline.

Total Project Cost (and Matching Partner Contributions): ≈$100,000 (undetermined contributions from MFID, USFS, ODFW, CTWSRO and others).

SF-4-08. Glacier Ditch Pipeline Project – Phase 3 (*Medium Priority*) (Previous FP-2-02)

Sponsor: Middle Fork Irrigation District (MFID), U.S. Forest Service (USFS).

General Location: Approximately 2 miles east of Laurance Lake / *6th Field Watersheds*: LEHR[1], LMHR[3] / *Limiting Factors Addressed*: F, HQ.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Glacier Ditch currently transmits 5 cfs of irrigation water from Coe and Eliot creeks to irrigators in the east side of the district south of Parkdale. An undetermined volume of this water is currently lost via ditch evaporation and infiltration.

Objectives: a) Increase Middle Fork Hood River stream flow by approximately 1.5 cfs to benefit listed anadromous and native fish, b) Improve irrigation district operations and management efficiency.

Proposed Actions and Schedule: The first two project phases accomplished piping of water from Glacier Ditch below Evans Creek in a 400 foot pipeline, thus avoiding the need to use Evans Creek for conveyance. The project also installed 3.5 miles of pipeline to replace the West Evans Creek Ditch and 2 diversion dams at RM 4.0 and RM 4.5 of Evans Creek, which had blocked fish passage to an additional 2.5 miles of habitat. Phase 3 work will install 13,000 feet of new 18" pipeline from the MFID settling pond to a point near Cooper Spur Road, to replace an equivalent length of Glacier Ditch. This is a continuation of FP-4-02 "Glacier Ditch / Evans Creek Fish Passage and Water Quality" project (2002 Action Plan). Work is currently unscheduled.

Total Project Cost (and Target Partner Contributions): ≈$700,000 (undetermined contributions from MFID, OWEB and others).

SF-5-08. City of Hood River Water Transmission Main Replacement (*Medium Priority*) (Previous S-6-02)

Sponsor: City of Hood River (CHR).

General Location: City pipeline begins at Cold Springs and Stone Springs near RM 2.6 of the Lake Branch, and leads down the west side of the valley to the city's Riverdale Road reservoir / *6th Field Watersheds*: LHR[2], HR/ODC[5], LWHR[6], LBHR[9] / *Limiting Factors Addressed:* F, HQ.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: CHR maintains the right to divert a maximum of 22 cfs from its spring water sources on Lake Branch. The existing CHR municipal water main is in poor condition and not well regulated. This results in the need to transmit 7 cfs flow through the system at all times, although actual current use is only 2.5 cfs. (CHR's capital facilities plan predicts that the water demand at full residential build out within the current Urban Growth Boundary will increase to about 11.5 cfs by 2040). The excess water withdrawn bypasses key summer steelhead and spring Chinook spawning and rearing reaches of the Lake Branch and West Fork Hood River. Water diverted from the springs is carried 15 miles downstream to the Riverdale Road storage reservoir. Current water use inefficiencies are caused by leaks, outdated flow reducers and poor flow metering and telemetry systems at the springs. Upgrades will allow matching withdrawals to actual CHR water demands, thereby leaving more water (estimated 4 cfs at the current level of development in the CHR) in-stream for aquatic life and other in-stream uses. Upgrading will also prevent catastrophic pipeline breaks, which have historically caused erosion and sedimentation.

Objectives: a) Provide long-term stream flow increases in the lower Lake Branch and West Fork Hood River by 4 cfs to continue meeting in-stream water rights, b) Improve water system reliability for city residents, c) Improve fish passage on the West Fork; d) Improve water quality.

Proposed Actions and Schedule: Beginning in spring 2008, the city will replace the aging water transmission main from the spring sources to the Riverdale Road water storage reservoir, and add flow metering/telemetry monitoring capabilities. The project will be implemented in five phases, with completion scheduled for 2013. The city will also explore use of the Conserved Water Program and in-stream leasing through OWRD and OWT to enhance funding opportunities through OWEB and other entities, as well as secure long-term in-stream water savings.

Total Project Cost (and Matching Partner Contributions): $22,201,000 (USDA Rural Development Loan - $22,000,000, OWEB - $200,000, HRWG - $1,000).

SF-6-08. Eliot Ditch Pipeline Conversion (*Low Priority*) (Previous S-8-02, S-6-05)

Sponsor: Middle Fork Irrigation District (MFID), U.S. Forest Service (USFS).

General Location: Pipeline starts at the Eliot Diversion on Eliot Creek (RM 1.2) and extends down to the MFID sediment basin / *6th Field Watershed*: UMHR[4] / *Limiting Factors Addressed:* F, HQ, T, SL.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Eliot Ditch transmits up to 25 cfs to the MFID sediment basin at the head of the Glacier Ditch, and is an important delivery line for MFID. In-stream flow volumes in the upper Middle Fork Hood River are currently reduced in reaches used by bull trout for adult migration and rearing. Steelhead populations may also be limited in spawning, migration and rearing habitat. Although water temperatures are elevated in Eliot Creek and the Middle Fork Hood River due partially to natural conditions, temperature gains may also be related to water withdrawals from Eliot Creek. Finally, open ditches currently elevate water quality degradation (sedimentation) risk in downstream waters due to periodic failure during storm events.

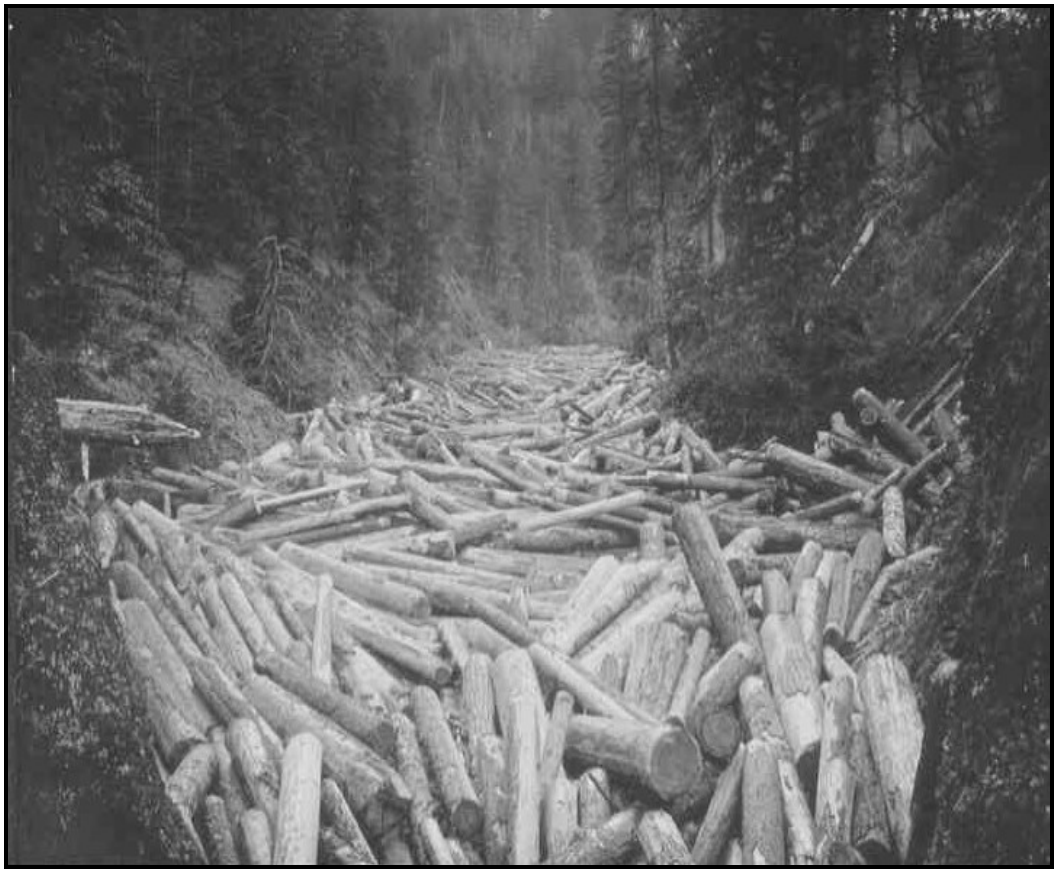
Objectives: a) Permanently return about 0.5 cfs water to the Middle Fork Hood River in summer months by piping Eliot Ditch, b) Decrease water temperatures to help meet standards by reducing the amount of water withdrawn from Eliot Creek, c) Reduce periodic elevations above state turbidity standards caused by ditch failures.

Proposed Actions and Schedule: MFID will work with partners to replace 4,500 feet of open ditch with 30 inch HDPE pipe for more efficient water delivery, to improve maintenance and reduce the risk of canal failure. The pipeline will begin at the new (2007) diversion structure, and end at the MFID Sediment Basin. Project implementation is currently unscheduled.

Total Project Cost (and Matching Partner Contributions): $352,000 (MFID - $90,000, OWEB - $260,000, HRWG - $2,000).

Planning Element 4: Stream & Riparian Habitat

Goal: Protect and restore complex aquatic and riparian habitats through measures that support adequate in-stream habitat complexity, channel / floodplain connectivity, healthy riparian plant communities, and hydrologic functions associated with uplands, wetlands and riparian areas.



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

Background

As stated in Chapter 2, the protection of well-functioning habitats and natural processes is the HRWG's highest goal. It is, therefore, important to cooperatively promote the creation and adoption of sound land management plans by landowners and governments, followed by application of those plans. Good planning is vital to protecting water quality, fish and wildlife habitat, stream flows and other aspects of a productive watershed. In addition, an emerging aspect of the Hood River Watershed Group's work includes partnering with entities interested in promoting voluntary land acquisition through conservation easements, land donations and incentive programs.

In restoring degraded habitat, the HRWG believes that efforts should be directed at bolstering natural processes that sustain habitat. These natural processes include upland

hydrology, flow regimes, sediment movement and deposition, delivery of organic matter (leaves, wood and fish carcasses), and the natural interaction between streams and their floodplains. River channelization, road and bridge fills, and bank armoring activities have confined some waterways, thus eliminating the water's access to floodplains and its ability to form natural channels. Channel confinement also results in shorter and steeper stream channels, higher water velocities, down-cutting, reduced flood water retention, decreased aquifer recharge, higher peak flows and property damage. Many streams in the Hood River valley illustrate these effects.

Large wood is a key structural element in Cascade region streams, including the Hood River. Large wood helps to slow water velocities, trap gravel, and create pools and side channels that represent high quality aquatic habitat. Historic timber and stream clearing practices have diminished the natural supply of large wood in most streams. This has led to a reduced frequency and depth of pools compared to natural conditions. When wood is not available to slow the water and trap gravel, spawning gravel becomes unavailable for salmon, steelhead and trout that spawn at moderate to low flows. Flood refuge areas and side-channel nursery habitats are also diminished compared to natural conditions, a condition that particularly impacts juvenile fish.

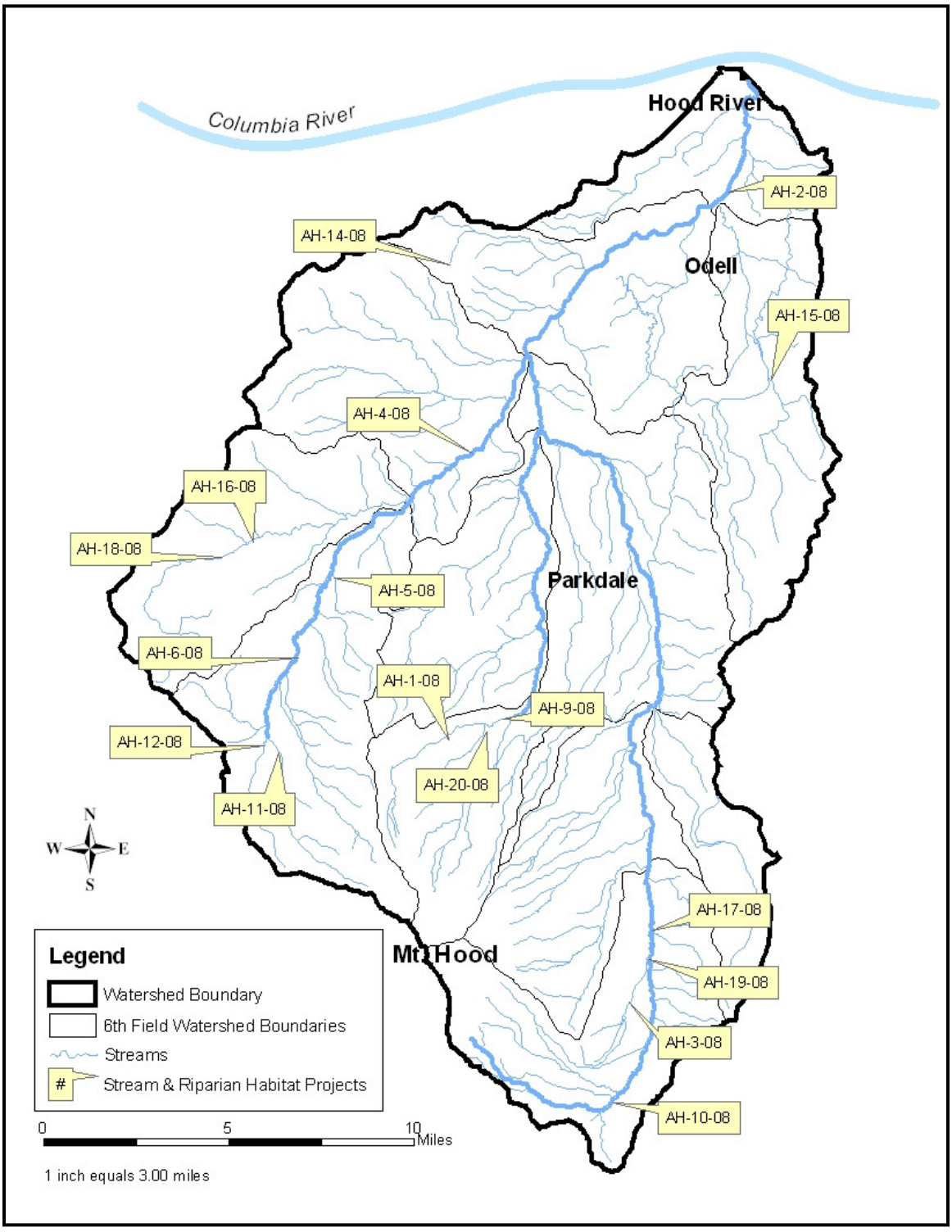
Strategy

Specific strategies to be used by the HRWG will include partnering with landowners and organizations in work that results in: a) protecting watershed functions using voluntary land acquisition approaches, b) restoring optimal riparian zone plant composition, width and complexity, c) reconnecting stream channels with floodplains and off-channel habitats, d) increasing the input of organic material (large wood, leaves and insects), e) increasing nutrients and aspects of channel habitat complexity, f) reducing the occurrence of non-native plant and animal species that invade stream corridors and g) re-attaining natural (i.e., functional) hydrologic regimes and sediment movement.

Stream & Riparian Habitat Projects

Project No.	Project Name	Priority	Schedule
AH-1-08	Upper Clear Branch Large Wood Placement	High	2009 -2012
AH-2-08	Powerdale Corridor Land Transfer and Management Plan	High	2012
AH-3-08	Robinhood Creek Watershed Restoration	High	2009
AH-4-08	West Fork Hood River Large Wood Addition – West Fork Bridge Reach	High	2010 - 2012
AH-5-08	West Fork Hood River Large Wood Addition – Dry Run Bridge Reach	High	2010 - 2012
AH-6-08	West Fork Hood River Large Wood Addition – Marco Creek to Ladd Creek Reach	High	2010 - 2012
AH-7-08	Watershed Wetland Inventory	High	unscheduled
AH-8-08	Lower and Middle East Fork Hood River Fish Habitat Improvements	Medium	ongoing
AH-9-08	Supplementation and Monitoring of Spawning Gravel below Clear Branch Dam	Medium	2008 - 2010
AH-10-08	Highway 35 Enhancements to Improve Resiliency during Food Events	Medium	2011
AH-11-08	McGee Creek Large Woody Debris Addition	Medium	2010 - 2012
AH-12-08	Elk Creek Large Woody Debris Addition	Medium	2010 - 2012
AH-13-08	West Fork Hood River Long Term LWD Recruitment Study	Medium	2010
AH-14-08	Green Point Upper Reservoir Improvement / Green Point Lower Reservoir and Ditch Creek Restoration	Medium	2012
AH-15-08	Neal Creek Riparian and Channel Restoration – Nowhere Bridge to Shooting Range Reach	Medium	2011 - 2013
AH-16-08	Lake Branch Large Woody Debris Addition – Indian Creek to Raker Pit Reach	Medium	2010 - 2012

AH-17-08	East Fork Hood River Floodplain Enhancement – Culvert Creek Reach	Medium	2010 - 2012
AH-18-08	Lake Branch Riparian Thinning	Medium	unscheduled
AH-19-08	Robinhood Campground Floodplain Enhancement	Low	2008 - 2009
AH-20-08	Kinnikinnick Campground Shoreline Stabilization	Low	2010 - 2012



Map of Stream & Riparian Habitat Project Locations

Numbers correspond to the project number listed in the table on the previous page.
Projects that pertain to the entire basin are not shown on map.

Stream & Riparian Habitat Project Descriptions

AH-1-08. Upper Clear Branch Large Wood Placement (*High Priority*) (Previous H-8-02, H-5-05)

Sponsor: U.S. Forest Service (USFS).

General Location: Clear Branch 1.0 to 1.5 miles upstream of Laurance Lake / *6th Field Watershed*: UMHR[4] / *Limiting Factors Addressed*: HD, HQ, FP, CS.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Clear Branch supports the last remaining population of ESA-listed bull trout within the Mt. Hood National Forest, along with cutthroat. Past forest management practices have decreased the amount of in-stream and floodplain LWD below desirable levels, and delayed recruitment of large wood into Clear Branch. This has resulted in simplified habitat, reduced spawning and rearing habitat, incised stream channels, and a loss of connectivity with the floodplain.

Objectives: a) Increase the amount of in-channel LWD to 150-200 pieces per mile and flood plain LWD to 30 pieces per acre, b) Collect, sort and store suitably sized spawning gravel in-stream for bull trout, c) Maintain or improve connection between stream channel and floodplain, d) Increase the amount of pool habitat and hiding cover.

Proposed Actions and Schedule: About half of the planned LWD placement in-stream and floodplain was completed via helicopter in 2000. This project will complete LWD placement in the upper 0.5 miles of the original project reach using a helicopter and wood obtained from other areas. Approximately 400 logs and 100 whole trees (with root wads) will be placed in the channel, along the stream margin, and in the floodplain along Clear Branch. Approximately 0.5 miles of stream and 12 acres of floodplain will be treated. Depending on funding, the project will be implemented in 2009-2012. All environmental permitting is completed (except for DSL and COE).

Total Project Cost (and Matching Partner Contributions): ≈$150,000 (undetermined contributions from USFS, OWEB and others).

AH-2-08. Powerdale Corridor Land Transfer and Management Plan (*High Priority*) (Previous H-2-05)

Sponsor: Powerdale Lands Stakeholders (PLS), PacifiCorp, Columbia Land Trust (CLT), Hood River County (HRC).

General Location: Approximately 400 acres of land bordering the lower Hood River from the powerhouse upstream to Powerdale dam / *6th Field Watershed*: LHR[2] / *Limiting Factors Addressed*: CS, C, F, HD, H/P, HQ, T, I, R, FP.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Lands currently owned by PacifiCorp are intended to be transferred to a new owner subsequent to a 2003 settlement agreement, which includes removal of the Powerdale hydroelectric facility. Land transfer is scheduled in 2012, after the Powerdale Lands Stakeholders (PLS) group's selection of a new owner. The lower Hood River constitutes a vital migration path for 6 ESA-listed fish runs, and lands surrounding the river provide vital habitat to riparian and upland species.

Objectives: a) Transfer all lands currently owned by PacifiCorp to a new stewardship entity(ies) who is willing to sign a conservation easement that perpetuates the 4 goals of the settlement agreement pertaining to future land management, b) Work to expand endowment funds that will be available to manage the lands in the future, c) Assist with the creation of a management plan

that will guide future use and restoration of the corridor.

Proposed Actions and Schedule: The HRWG will continue to coordinate the PLS group with the primary intent of selecting a future owner by December 2008. Current priorities include continued work with CLT and HRC as prospective owners of the lands. Involved parties will also draft a land management plan in partnership with vested stakeholders no later than December 2009. Final land transfer will occur in 2012.

Total Project Cost (and Matching Partner Contributions): ≈$1,000,000 (undetermined contributions from OWEB, PacifiCorp, CLT, CTWSRO, BPA, HRC, USFS, WRC and private landowners).

AH-3-08. Robinhood Creek Watershed Restoration (*High Priority*) (Previous H-13-02, H-13-05)

Sponsor: U.S. Forest Service (USFS).

General Location: Upper East Fork Hood River near USFS Nottingham Campground / *6th Field Watershed*: UEHR[8] / *Limiting Factors Addressed*: O, HD, HQ, CS, FP, R, SL, I.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: This project will address multiple issues in the Robinhood Creek watershed. Robinhood Creek lacks LWD in the stream channel and floodplain due to past timber harvest. As a result, the channel is incised in many areas and fish habitat is degraded. Because of floods and debris flows over the last seven years, it is highly likely that Newton Creek will shift into Robinhood Creek. When this occurs, without adequate channel and floodplain roughness, the channel will continue to incise and bank erosion will be accelerated. In addition, previously replanted areas need thinning to promote faster tree growth and maintain or improve riparian stand health. Because of the recent debris flows, the roads into the area have been closed to vehicles and the decision has been made to keep them closed. To minimize erosion from these roads, additional drainage will be needed in the form of water bars and / or drain dips, culverts removed or maintained, and ditches cleaned. Invasive plant infestations are present along the roads, and those will be treated with appropriate methods prior to road work.

Objectives: a) Increase amounts of LWD in stream channel to 150 pieces per mile, and floodplain amounts to 30 pieces per acre, b) Minimize road-related sedimentation into Robinhood Creek, c) Improve stand health and future large wood recruitment into Robinhood Creek, d) Eliminate or control invasive plants along roads.

Proposed Actions and Schedule: Channel and floodplain restoration, including placement of approximately 600 logs, began in 2007 with the placement of about 200 logs in the upper reaches. The rest of the work is scheduled for the summer of 2008. Also planned for summer 2008 or 2009 are invasive plant treatment and road storm proofing. The project will be completed in summer 2009 with riparian thinning activities.

Total Project Cost (and Matching Partner Contributions): $304,000 (CTWSRO - $15,000, OWEB – 148,000, USFS - $141,000).

Confederated Tribes of the Warm Springs staff completing log anchoring during first phase of the West Fork Large Wood Addition Project in 2006". *Photo by Joe McCanna.*

AH-4-08. West Fork Hood River Large Wood Addition – West Fork Bridge Reach (*High Priority*) (Previous H-4-05)

Sponsor: Confederated Tribes of Warm Springs Reservation Oregon (CTWSRO), U.S. Forest Service (USFS), Longview Timberlands (LT), private landowner.

General Location: West Fork Hood River (RM 2.7 - 4.2) from Moving Falls upstream to 0.5 mile below the West Fork Bridge / *6th Field Watershed*: LWHR[6] / *Limiting Factors Addressed*: HD, HQ, CS, FP, F.

Key Water Quality, Water Quantity, Species, Habitat, and Resource Management Issues: The lower West Fork Hood River is prime spawning and rearing habitat for ESA-listed spring Chinook and summer steelhead. ODFW stream surveys indicate a shortage of large wood within the West Fork Hood River primarily due to past land management practices. This has led to reduced gravel storage, low pool development and reduced channel and floodplain connectivity. The lack of large wood has also increased peak flow erosion and decreased channel stability.

Objectives: a) Increase the amount of in-channel LWD (average size 40'x 25" dbh) to 150-200 pieces per mile and flood plain LWD to 30 pieces per acre, b) Collect, sort and store spawning gravel in-stream of appropriate size (6-102mm) for Chinook and steelhead, c) Maintain or improve connection between stream channel and floodplain.

Proposed Actions and Schedule: This project involves LT lands and another landowner. The USFS will contribute to project design and construction costs. First phase work was completed by the CTWSRO at the BPA power lines in 2007 (project S-10 in the 2002 Watershed Action Plan). The new project will be divided into four distinct sections and will involve the placement of approximately 600 logs and whole trees added to 27 acres of floodplain and an additional 200-

350 logs and whole trees added to the stream channel. In the moderate (3-4%) gradient reaches, in-channel wood will be placed along the margins of the main channel in locations where a floodplain borders one or both sides. No channel spanning logjams will be constructed, although in some areas stream margin LWD could protrude into the channel up to 1/3 of the bank full width. The lower gradient reach (2%) is expected to have two full spanning logjams placed in side channels and one partial channel spanning logjam. Dependant on funding, project will be implemented in 2010-2012.

Total Project Cost (and Matching Partner Contributions): ≈$600,000 (CTWSRO - $25,000, undetermined contributions from USFS, OWEB, LT, ODFW and others).

AH-5-08. West Fork Hood River Large Wood Addition – Dry Run Bridge Reach (*High Priority*) (New)

Sponsor: U.S. Forest Service (USFS), Confederated Tribes of Warm Springs Reservation Oregon (CTWSRO), Longview Timberlands (LT).

General Location: West Fork Hood River (RM 8.2 – 8.6) beginning at Dry Run Bridge and extending 0.4 miles upstream / *6th Field Watershed*: LWHR[6] / *Limiting Factors Addressed:* HD, HQ, CS, FP, F.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The upper West Fork Hood River holds spawning and rearing habitat for ESA-listed spring Chinook and summer steelhead. ODFW stream surveys indicate a shortage of LWD within the West Fork Hood River primarily due to past land management practices. This has led to reduced gravel storage, poor pool development, reduced channel habitat quality and lost floodplain connectivity. The lack of large wood also increases peak flow erosion and decreases channel stability.

Objectives: a) Increase the amount of in-channel LWD (average size 40'x 25" dbh) to 150-200 pieces per mile and flood plain LWD to 30 pieces per acre, b) Collect, sort and store spawning gravel of appropriate size (6-102mm) for Chinook and steelhead, c) Maintain or improve connection between stream channel and floodplain, d) Maintain integrity of Dry Run Bridge.

Proposed Actions and Schedule: This project involves LT lands. Approximately 180 logs and whole trees will be added to 6 acres of floodplain and an additional 100 logs and whole trees added to the stream channel. Given the proximity to Dry Run Bridge, much of the in-channel wood and some of the floodplain wood will be anchored in place. Project is dependant on funding, but will likely be implemented in 2010-2012.

Total Project Cost (and Matching Partner Contributions): ≈$250,000 (CTWSRO - $25,000, undetermined contributions from USFS, OWEB, LT, ODFW and others).

AH-6-08. West Fork Hood River Large Wood Addition – Marco Creek to Ladd Creek Reach (*High Priority*) (New)

Sponsor: U.S. Forest Service (USFS), Confederated Tribes of Warm Springs Reservation Oregon (CTWSRO).

General Location: USFS land from Marco Creek confluence with West Fork Hood River at RM 10.2, to Ladd Creek confluence at RM 12.7 / *6th Field Watershed*: UWHR[7] / *Limiting Factors Addressed:* HD, HQ, CS, FP, F.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The upper West Fork Hood River contains key spawning and rearing habitat for ESA-listed summer steelhead and spring Chinook. USFS stream surveys indicate a shortage of large wood within the West Fork primarily due to past land management practices. This has led to reduced gravel storage and pool development, and reduced channel and floodplain connectivity. The lack of large wood has also increased peak flow erosion and decreased channel stability.

Objectives: a) Increase the amount of in-channel large woody debris (average size 40'x 25" dbh) to 150-200 pieces per mile and flood plain large woody debris to 30 pieces per acre, b) Collect, sort and store spawning gravel of appropriate size (6-102mm) for Chinook and steelhead, c) Maintain or improve connection between stream channel and floodplain.

Proposed Actions and Schedule: This project will install approximately 5-10 log jams of 30-50 logs in the stream channel and associated floodplain. Wood placement will be done using a helicopter. This USFS project is dependant on funding and will likely occur in 2010-2012.

Total Project Cost (and Matching Partner Contributions): ≈$350,000 (CTWSRO - $25,000, undetermined contributions from USFS, OWEB, ODFW and others).

AH-7-08. Watershed Wetland Inventory (*High Priority*) (Previous H-5-02, H-11-05)

Sponsor: Hood River County (HRC).

General Location: Basin-wide / *6th Field Watershed*: All, but primarily LEHR[1], LHR[2], LMHR[3], UMHR[4], HR/ODC[5], LWHR[6]; NLC[11] *Limiting Factors Addressed*: C, F, HD, HQ, I, R, FP.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Development in Hood River County has a direct impact on wetland habitats. Wetland impacts then can affect water quality, water quantity and wildlife habitat. Wetlands function as water filters and improve water quality. Wetlands store water and release it slowly, providing important hydrologic functions. Wetlands also provide wildlife habitat and increase biodiversity. Riparian associated wetlands provide fish rearing habitat, filter in-stream sediments, maintain floodplain function and improve riparian habitat condition. With new development pressures, there is potential for increased loss of wetlands in Hood River County. An accurate mapping of countywide wetland habitats would provide a planning tool for protection and conservation of these valuable habitats.

Objectives: a) Develop GIS map layers delineating wetlands in the watershed using a combination of LIDAR imagery, existing National Wetland Inventory (NWI) data and field verification, b) Where feasible, create a wetland functional assessment to provide additional detail regarding the health and quality of each wetland.

Proposed Actions and Schedule: This project will map existing wetlands on non-federal lands in the Hood River watershed and provide a GIS-based tool for land-use planning, habitat acquisition and protection. The mapping process will involve the following steps: a) analysis of LIDAR imagery, National Wetland Inventory and wetland habitats using GIS, b) creating field maps, c) acquisition of landowner permissions prior to any field surveys, d) field verification of mapping accuracy and wetland types, e) functional assessment of wetlands during field visits, f) updating GIS and addition of wetland attribute information and g) production of accurate wetland maps with evaluation of wetland type and function. Depending of funding, this project will take from 12 to 18 months to complete.

Total Project Cost (and Target Partner Contributions): ≈$80,000 (undetermined contributions from OWEB, HRC, CLT, TNC and CTWSRO).

AH-8-08. Lower and Middle East Fork Hood River Fish Habitat Improvements (*Medium Priority*) (Previous H-9-02, H-6-05)

Sponsor: Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO), Oregon Department of Fish and Wildlife (ODFW), U.S. Forest Service (USFS), private landowners.

General Location: Main stem and tributary fish bearing reaches / *6th Field Watersheds*: LEHR[1], MEHR[10] / *Limiting Factors Addressed*: HD, HQ, SL, FP, CS.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Despite the dynamic nature of the East Fork Hood River, it has historically been a productive habitat for listed winter steelhead and coho. The USFS has successfully restored stream and floodplain interactions in some upper reaches. A side channel on private property restored in 1999 has shown consistent use by spawning steelhead. 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 wood volumes are low, and the river has lost much of its historic habitat diversity due to past stream "cleanouts" and highway confinement. The East Fork Hood River has frequent flooding and debris torrents, and its ability to stabilize itself after these events has been impaired by channel constricting structures such as highways, roads, buildings and the railroad.

Objectives: a) Increase availability of shallow riffle habitat important to early or newly emerged juvenile steelhead, b) Increase flood refuge habitat, gravel retention, and the number and depth of pools and cover for steelhead juveniles and adults, c) Improve stream ecosystem diversity and functions such as sediment transport, deposition and riparian interactions, d) Increase habitat for coho which spawn and rear in side channels, if suitable habitat is present.

Proposed Actions and Schedule: The CTWSRO, ODFW and partners will work with landowners, HRC and others to evaluate opportunities for in-stream and floodplain restoration such as adding large wood, riparian forest enhancement, restoring access to side channels and increasing bridge spans. In the lower East Fork Hood River, cooperators will work with interested landowners where there are opportunities to restore side channels and riparian areas.

Total Project Cost (and Target Partner Contributions): ≈$3,950,000 (undetermined contributions from USFS, ODFW, OWEB, CTWSRO and landowners).

AH-9-08. Supplementation and Monitoring of Spawning Gravel below Clear Branch Dam (*Medium Priority*) (Previous H-12-02, H-12-05)

Sponsor: Middle Fork Irrigation District (MFID), U.S. Forest Service (USFS), Oregon Department of Fish and Wildlife (ODFW).

General Location: Clear Branch downstream of Laurance Lake / *6th Field Watershed*: UMHR[4] / *Limiting Factors Addressed*: HD, HQ.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Clear Branch Dam interrupts natural sediment routing to the lower Clear Branch and Middle Fork Hood River. Gravel supply and therefore spawning habitat is limited in this reach. ESA-listed winter steelhead and bull trout utilize spawning habitat in Clear Branch downstream of Clear Branch Dam.

Objectives: Increase suitable bull trout and winter steelhead spawning habitat in the 3,900 foot reach of Clear Branch below Clear Branch Dam to Coe Branch confluence by mimicking the amount of sediment inflows above the dam.

Proposed Actions and Schedule: MFID will deliver up to 170 cubic yards of coarse substrate (i.e., 1/2- 6" diameter gravel / cobble) to the spillway of Clear Branch Dam annually during the coming three year (2008-2010) work period. MFID will work with ODFW and USFS to determine the best times and locations for coarse substrate additions. ODFW and USFS will cooperatively monitor bull trout, steelhead and spring Chinook spawning in the project reach below dam, and assess movement and loss of gravel.

Total Project Cost (and Target Partner Contributions): ≈$10,000 annually (MFID - $6,000, undetermined contributions from USFS and ODFW).

AH-10-08. Highway 35 Enhancements to Improve Resiliency During Food Events (*Medium Priority*) (Previous H-3-05)

Sponsor: U.S. Federal Highway Administration (FWHA), Oregon Department of Transportation (ODOT), U.S. Forest Service (USFS).

General Location: Highway 35 from Clark Creek SnoPark to East Fork Hood River crossing at Pocket Creek SnoPark / *6th Field Watershed*: UEHR[8] / *Limiting Factors Addressed:* O, HD, HQ.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The current location of Highway 35 lies within the alluvial fan of Newton and Clark Creeks and restricts stream migration and floodplain access during flood events. Debris flows in 2000 and 2006 caused extensive damage to Highway 35 in this reach, interrupted public traffic and resulted in economic loss. The current highway location does not allow both creeks to meander and overflow naturally during high water and debris torrents, resulting in exacerbated erosion, channel incision and degraded habitat conditions relative to natural condition

Objectives: a) Provide unimpeded routing of water, sediment and wood during floods, debris flows and other times, b) Provide safe and reliable transportation on Highway 35.

Proposed Actions and Schedule: The FWHA has yet to determine a preferred alternative for providing less restricted flow of Newton and Clark creeks proximate to Highway 35. Options currently being examined include a series of bridges and culverts, or relocation of the highway east of the East Fork Hood River. An evaluation of alternatives should occur in 2008 or 2009, and project construction may begin in 2011.

Total Project Cost (and Matching Partner Contributions): ≈$25,000,000 (undetermined contributions from USDOT, USFS and others).

AH-11-08. McGee Creek Large Woody Debris Addition (*Medium Priority*) (New)

Sponsor: U.S. Forest Service (USFS), Confederated Tribes of Warm Springs Reservation Oregon (CTWSRO), Longview Timberlands (LT).

General Location: USFS and LT land on McGee Creek RM 0.0 - 1.8 (tributary to headwaters of upper West Fork Hood River) / *6th Field Watershed*: UWHR[7] / *Limiting Factors Addressed*: HD, HQ, CS, FP, F.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The upper West Fork Hood River is prime spawning and rearing habitat for ESA-listed spring Chinook and summer steelhead. Aquatic inventories conducted by the CTWSRO indicate a shortage of large wood within McGee Creek primarily due to past land management practices.

This has led to a decrease in floodplain interactions and slow development of habitat favorable to salmonids. The lack of large wood has also increased peak flow erosion and decreased channel stability

Objectives: a) Increase frequency of in-channel LWD (average size 40'x 20" dbh) to 150-200 pieces per mile, and flood plain LWD to 30 pieces per acre, b) Collect, sort and store spawning gravel (appropriate size of 6-102mm) in-stream for use by Chinook and steelhead, c) Maintain or improve connection between stream channel and floodplain.

Proposed Actions and Schedule: CTWSRO and USFS will implement a project to place 10-15 channel spanning logjams, along with smaller log clusters along channel margins, within the first 1.3 miles of McGee Creek. The project will also add logs to the adjacent 16 acres of LT property to increase floodplain roughness. Finally, the project will modify log sills placed by the USFS between RM 1.3 - 1.8 to allow for juvenile fish passage. Work is scheduled to occur during 2010-2012.

Total Project Cost (and Matching Partner Contributions): ≈$175,000 (CTWSRO - $25,000, undetermined contributions from USFS, OWEB, LT, ODFW and others).

AH-12-08. Elk Creek Large Woody Debris Addition (*Medium Priority*) (New)

Sponsor: U.S. Forest Service (USFS), Confederated Tribes of Warm Springs Reservation Oregon (CTWSRO), Longview Timberlands (LT).

General Location: USFS land on Elk Creek RM 0.0 - 0.5 (tributary to upper West Fork Hood River) / *6th Field Watershed*: UWHR[7] / *Limiting Factors Addressed*: HD, HQ, CS, FP, F.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The upper West Fork Hood River is prime spawning and rearing habitat for ESA-listed spring Chinook and summer steelhead. Habitat surveys indicate a shortage of large wood within Elk Creek primarily due to past land management practices. This has led to a decrease in floodplain interactions and development of habitat favorable to salmonids. The lack of large wood has also increased peak flow erosion and decreased channel stability

Objectives: a) Increase the amount of in-channel LWD (average size 40'x 18") to 150-200 pieces per mile and flood plain LWD to 20 pieces per acre, b) Collect, sort and store suitable sized spawning gravel (6-102mm) in-stream for Chinook and steelhead, c) Maintain or improve connection between stream channel and floodplain, d) Move the lower 0.2 miles of channel back into the shaded riparian corridor and away from BPA power line, e) Allow existing channel to function as a side channel during high flow events.

Proposed Actions and Schedule: Project will install about 10 channel spanning logjams within the first 0.5 miles of Elk Creek (LT land) along with smaller log clusters along channel margins and log placement within floodplain. The lower 0.2 miles of the channel are currently flowing directly under the BPA power line (the channel migrated out from under the narrow, shaded riparian buffer). The creek will be re-routed back into the riparian corridor where there is more vegetation, leaving the existing channel to act as a side channel during high flows. This re-route will be accomplished by placing a large log jam at the avulsion point to direct flow into the old channel. Both channels will be treated with LWD. Dependant on funding, project will be implemented in 2010-2012.

Total Project Cost (and Matching Partner Contributions): ≈$125,000 (CTWSRO - $25,000, undetermined contributions from USFS, OWEB, LT, ODFW and others).

AH-13-08. West Fork Hood River Long Term LWD Recruitment Study (*Medium Priority*) (New)

Sponsor: Confederated Tribes of Warm Springs Reservation Oregon (CTWSRO).

General Location: Anadromous waterways within West Fork Hood River system / *6th Field Watersheds*: LWHR[6], UWHR[7], LBHR[9] / *Limiting Factors Addressed:* R, FP, T, HD.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The upper West Fork Hood River holds spawning and rearing habitat for ESA-listed summer steelhead and spring Chinook. Lack of in-stream large wood, possibly due to past land use practices, has been identified as a limiting factor in the production of salmonids in the West Fork Hood River. Significant effort is currently being put into placement of LWD into the West Fork Hood River. It is recognized that LWD has a lifespan and that natural recruitment of large wood into the stream is the long term desired condition.

Objectives: Enhance the volume and type of LWD recruitment during a 150 year time period by developing site-specific treatment prescriptions targeting enhancement of the West Fork Hood River riparian corridor.

Proposed Actions and Schedule: This project will create a fine-scale map of the riparian zone resources for the project area using LIDAR data, aerial photographs and ground-truthing. Work will sample project stands to obtain stand structure and composition information. The project will then model a) potential for LWD recruitment over a 150 year time frame and b) areas where reach-level LWD enhancement would benefit from potential riparian planting and wood supplementation. The study reach will likely include the approximate 11 mile segment of the main stem West Fork Hood River that is located on private and county lands. The maximum area will include all streams used by anadromous species across all ownerships (including USFS land), or about 35 stream miles. Dependent on funding, assessment, modeling and project planning could be completed by 2010. Restoration project implementation and monitoring could occur between 2010 and 2060.

Total Project Cost (and Matching Partner Contributions): $45,000 - $90,000 (CTWSRO – 45,000 - $90,000).

AH-14-08. Green Point Upper Reservoir Improvement / Green Point Lower Reservoir and Ditch Creek Restoration (*Medium Priority*) (New)

Sponsor: Farmers Irrigation District (FID), U.S. Forest Service (USFS), Hood River County (HRC).

General Location: Green Point Lower Reservoir and Green Point Upper Reservoir near HRC Kingsley Campground / *6th Field Watershed*: HR/ODC[5] / *Limiting Factors Addressed:* R, FP, CS, HQ, HD.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Both of these reservoirs are part of the FID irrigation system. The lower reservoir will not be important to system operation if storage functions are incorporated into the upper reservoir. During late summer, both reservoirs can experience water stagnation (high temperature, low oxygen and potentially bacterial blooms). Since both reservoirs are near the HRC Kingsley Campground, OHV use is high and notably impacts the area around the lower reservoir causing sediment and degraded habitat in Ditch Creek. Ditch Creek is non-anadromous, but supports a population of cutthroat.

Objectives: a) Improve FID irrigation water delivery and maintenance efficiency, b) Expand HRC forest land, c) Reclaim 0.5 mile of aquatic and 600 acres of forest to benefit fish and wildlife habitat and water quality (reduced temperatures and increased dissolved oxygen), d) Provide enhanced HRC recreational opportunities (including fishing) at the upper reservoir, e) Reduce current resource degradation by OHVs around both reservoirs.

Proposed Actions and Schedule: Upper reservoir capacity will be increased by 20% via increasing the current dam elevation by 1.0 foot and by excavating the south portion of the reservoir. The project will also reclaim the lower reservoir by breaching the lower dam, re-contouring the breached slopes to a maximum 3:1 grade, and restoring Ditch Creek channel above the dam by constructing a new channel through the dam footprint. Revegetation measures at the lower reservoir will return the currently submerged reservoir bottom, old rock quarry and roads to forest and grassland vegetation types. OHV and vehicle use will be restricted via road closures, and placement of logs, boulders and berms that will also serve as habitat features. FID will try to maintain a minimum 2 cfs flow in Ditch Creek below the upper reservoir. This project is expected to enhance 0.5 mile of stream (using 100 log placements) and 600 acres of grass and forest land. The project is scheduled to begin in summer of 2010 and be completed by 2012.

Total Project Cost (and Matching Partner Contributions): $1,200,000 (FID - $700,000, USFS - $150,000, HRC - $150,000, OWEB - $200,000).

AH-15-08. Neal Creek Riparian and Channel Restoration – "Nowhere" Bridge to Shooting Range Reach (*Medium Priority*) (Previous H-7-02, WQ-9-05, H-9-05)

Sponsor: Hood River County (HRC), Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO), Hood River Watershed Group (HRWG), U.S. Forest Service (USFS), Oregon Department of Forestry (ODF).

General Location: HRC land along West Fork Neal Creek and Neal Creek, from "nowhere" bridge" upstream to HRC Shooting Range / *6th Field Watershed*: NLC[11] / *Limiting Factors Addressed*: HQ, HD, CS, FP, R.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Habitat quality for winter steelhead, coho, resident cutthroat and rainbow trout is degraded in West Fork Neal Creek and Neal Creek. Contributing factors include past timber harvests and road construction. The target is the 1.8 mile segment of Neal Creek Road on HRC Forestry land (inaccessible to vehicles) that restricts floodplain access, limits riparian forest development, accelerates sediment and wood transport, decreases sinuosity and pools and limits future LWD recruitment. Past riparian tree harvests have also reduced stream shading and LWD recruitment potential proximate to the stream.

Objectives: a) Restore stream structure, gravel retention and floodplain access over a 1.6 mile reach, relative to a yet to be identified reference reach, b) Restore riparian forest composition to one dominated by functional conifers within 40 years to provide shade, channel stability and future large wood recruitment.

Proposed Actions and Schedule: This project will enhance degraded habitat along 1.6 miles of West Fork Neal Creek and 0.2 miles of Neal Creek where HRC vacated the middle section of Neal Creek Road due to 1996 flood damage. A total of 1.6 miles of road (3.6 acres of road area) will be obliterated, including removal of cross drains, re-contouring fill slopes and ditches to achieve natural bank and channel cross sections, and revegetation of soils exposed during re-contouring. All roadbeds will be decompacted prior to planting with riparian trees. Large log and woody debris structures may be installed to improve channel geometry and habitat

complexity. Approximately 5.2 acres of riparian area will be restored by planting trees, riparian thinning and other actions. A feasibility study was completed by Inter-Fluve, Inc. in 2000 which will be used during project design. This project is scheduled for implementation after completion of the EFID central canal pipeline project, due to expected decreases in stream flow. (Note, eventual follow-up work may extend this project an additional 1-5 miles on Neal Creek ("East Fork Neal Creek"), upstream from its confluence with the West Fork).

Total Project Cost (and Target Partner Contributions): ≈$400,000 (undetermined contributions from HRC, CTWSRO, ODF, ODFW, HRWG, USFS and others).

AH-16-08. Lake Branch Large Woody Debris Addition – Indian Creek to Raker Pit Reach (*Medium Priority*) (Previous H-14-02, H-14-05)

Sponsor: U.S. Forest Service (USFS), Confederated Tribes of Warm Springs Reservation Oregon (CTWSRO).

General Location: USFS land on Lake Branch (tributary to the West Fork Hood River) from Indian Creek confluence at RM 1.3 to Raker Pit at RM 3.6 / *6th Field Watershed*: LBHR[9] / *Limiting Factors Addressed*: HD, HQ, CS, FP.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Lake Branch provides spawning and rearing habitat for ESA-listed summer steelhead, spring Chinook, and non-listed rainbow. Past forest management practices have decreased the amount of in-stream and floodplain large wood below desired levels, and have reduced natural recruitment of large wood into Lake Branch. This has led to a decrease in channel and floodplain connectivity and slowed development of habitat favorable to salmonids

Objectives: a) Increase the amount of in-channel LWD (average size 40'x 20" dbh) to 150-200 pieces per mile and floodplain LWD to 30 pieces per acre, b) Collect, sort and store spawning gravel of appropriate size (6-102mm) in-stream for steelhead, c) Maintain or improve connection between channel and floodplain.

Proposed Actions and Schedule: This project will result in approximately 20 logjams in Lake Branch, and additional large woody debris placements along the stream margin and floodplain. In total, approximately 1,500 pieces of large wood will be placed in the 2.3 miles between Indian Creek and Raker Pit, and flood plain roughness will be increased over 55 acres. This project is dependant on funding, but will likely occur in 2010-2012.

Total Project Cost (and Matching Partner Contributions): ≈$450,000 (CTWSRO - $25,000, undetermined contributions from USFS, OWEB and ODFW).

AH-17-08. East Fork Hood River Floodplain Enhancement – Culvert Creek Reach (*Medium Priority*) (New)

Sponsor: U.S. Forest Service (USFS).

General Location: USFS land approximately 0.2 mile above the intersection of Highway 35 and Road 44 / *6th Field Watershed*: MEHR[10] / *Limiting Factors addressed*: FP, SL, F, CS.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The East Fork Hood River is a major conveyor of glacial sediment into the Hood River. Glacial sediment, although natural, can reduce primary productivity, macro-invertebrate populations and fish spawning success. Water-borne sediments also impact irrigation by clogging and eroding

infrastructure. Channel and floodplain LWD can help regulate sediment movement by trapping and holding material for long periods. ODFW stream surveys indicate a shortage of large wood within the East Fork Hood River primarily due to past land management practices. This has led to continuous sediment flushing, decreased channel and floodplain connectivity, and degraded fish habitat. The lack of large wood has also increased peak flow erosion and decreased channel stability

Objectives: a) Enhance fish habitat by increasing floodplain roughness for flood storage of water and sediment, b) Moderate transport of sediment during the irrigation season to improve water quality and irrigation system efficiency.

Proposed Actions and Schedule: Cooperators will place large wood and plant riparian trees and shrubs in the area immediately downstream of the Highway 35 culvert at Culvert Creek. This location sustained wash-out damage during the November 2006 debris flow. Treatment will cover 3 acres, and include placement of large wood in the form of single pieces, small clusters and at least two small channel margin jams. Project design and permitting will be completed by spring of 2008. Project implementation is scheduled for 2010-2012.

Total Project Cost (and Matching Partner Contributions): ≈$220,000 (undetermined contributions from USFS, OWEB and others).

AH-18-08. Lake Branch Riparian Thinning (*Medium Priority*) (New)

Sponsor: U.S. Forest Service (USFS).

General Location: USFS land along upper Lake Branch and its tributaries / *6th Field Watershed*: LBHR[9] / *Limiting Factors Addressed:* FP, R, HD, HQ.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Much of the Lake Branch riparian zone was logged in the mid to late 1900s and later replanted. Little to no vegetation management has occurred since then. The resulting stands are over-stocked, monotypic in terms of tree size, and at risk from disease, wildfire and drought. A riparian thinning project completed in 2006 and 2007 treated approximately 35 acres. The resultant tree spacing has been improved, with optimal spacing to increase stand health, promote faster tree growth and reduce the risk of a stand replacement wildfire. Felled trees were removed and will be used for stream and floodplain restoration projects (such as upper Clear Branch (AH-1-08) and Robinhood Creek (AH-3-08)).

Objectives: a) Improve riparian conifer stand health, resiliency to fire and promote faster tree growth compared to current conditions, b) Enhance aquatic habitat conditions both within and outside the watershed by using some felled trees, where needed to increase in-channel and floodplain large wood levels.

Proposed Actions and Schedule: Riparian thinning, similar to that completed in 2006 and 2007, will likely occur along 4-5 miles of Lake Branch within the USFS boundary. Other opportunities are likely present along tributaries to Lake Branch. The USFS is currently exploring the feasibility and logistics of a large thinning project in the watershed, including riparian areas. Any proposed riparian thinning will be designed for improved riparian stand health. Actual acres to be treated are unknown. Stands will be selectively thinned to increase tree spacing and to leave large trees and desirable species (such as cedar). Some trees removed will be used elsewhere. Others will be felled into stream channels or left on the ground to decompose.

Total Project Cost (and Matching Partner Contributions): undetermined cost (contributions from USFS and others).

AH-19-08. Robinhood Campground Floodplain Enhancement (*Low Priority*) (New)

Sponsor: U.S. Forest Service (USFS).

General Location: USFS Robinhood Campground located 12 miles south of the community of Mt. Hood / *6th Field Watershed*: UEHR[8] / *Limiting Factors Addressed:* FP, CS.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The upper East Fork Hood River holds spawning and rearing habitat for ESA-listed winter steelhead and resident trout. ODFW stream surveys indicate a shortage of large wood within the East Fork, primarily due to past land management practices. This has led to a decrease in channel and floodplain interaction, and slow recovery of habitat favorable to salmonids. The lack of large wood has also increased peak flow erosion and decreased channel stability

Objectives: Increase floodplain roughness for flood storage of water and sediment.

Proposed Actions and Schedule: This project will fall a total of 30 live and dying trees into an abandoned campground and the floodplain of the upper East Fork Hood River. Trees ranging from 12"to 36" dbh will be dropped perpendicular or sub-perpendicular to river flow in locations that do not currently have adequate floodplain roughness. The treatment will cover three acres. This project will be implemented during the summer of 2008 or 2009, contingent on funding.

Total Project Cost (and Matching Partner Contributions): $10,000 (USFS - $10,000).

AH-20-08. Kinnikinnick Campground Shoreline Stabilization (*Low Priority*) (New)

Sponsor: U.S. Forest Service (USFS).

General Location: Laurance Lake about 4 miles SW of Parkdale, OR / *6th Field Watershed*: UMHR[4] / *Limiting Factors addressed*: R.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The Kinnikinnick Campground is on a peninsula that extends along the south shore of Laurance Lake. The windward shoreline is partially devoid of vegetation and is subject to wave erosion. Increased sedimentation from shoreline erosion could be injurious to the reservoir's population of bull trout.

Objectives: Minimize erosion of the windward shoreline along the Kinnikinnick campground to protect the peninsula and reduce sedimentation of the reservoir.

Proposed Actions and Schedule: The USFS will place wood or boulders along 0.2 miles of the west side of the peninsula where the campground is located to dissipate wave energy and decrease erosion. Various methods of reducing runoff and sedimentation from the 12 acre campground will also be pursued. Project implementation is dependant on funding, but will likely be implemented between 2010-2012.

Total Project Cost (and Matching Partner Contributions): $50,000 (USFS - $50,000).

Planning Element 5: Terrestrial Habitat

Goal: Protect and enhance a variety of terrestrial habitats, with an emphasis on conserving populations of native plants, invertebrates, amphibians, reptiles, birds and mammals.

Background

Pacific Northwest watershed restoration efforts have typically revolved around the goal of protecting and enhancing aquatic and riparian habitats. The reasons for this are justifiably linked to the importance of salmon and steelhead to the region's economy and culture. Beyond this, however, the HRWG believes it is important to apply its watershed enhancement efforts to all portions of the valley, and also target the protection and enhancement of terrestrial wildlife and its supporting plant communities. This strategy embodies the all encompassing "river to ridge-top" stewardship philosophy.

The Hood River Watershed Assessment discusses selected wildlife and plant community issues, and outlines voluntary opportunities for improving upland habitat on private lands. The assessment concludes that the quality and extent of important habitats in the valley has diminished during the last 150 years. Agriculture, residential areas, parks, commercial uses and roads now dominate more than 15,000 acres of the landscape. Low elevation conifer / hardwood forests and meadow complexes have been replaced with highly managed landscapes. Plant communities have been altered by suppression of natural fire regimes, and non-native plants and animals have invaded native communities. The altered landscape has lost quality cover, migration routes, food supplies and other factors needed by bird, mammal, amphibian, reptile and invertebrate populations. Portions of the watershed under 2,500 feet in elevation have been particularly impacted. Other forest attributes impacted by development include the density of damaged live trees, standing dead trees and large downed trees, all of which provide food, shelter and habitat for birds and other wildlife. The winter range of large migratory animals has been diminished by human development. It is noteworthy that half the remaining deer and elk winter range in the watershed is on private land.

The Hood River Subbasin Plan lists a vision, biological objectives and strategies aimed at enhancing populations of "focal species," including the northern spotted owl, black-tailed deer, elk, lark sparrow, Clark's nutcracker and western gray squirrel. The HRWG Technical Advisory Committee has also devised an informal list of both priority and non-priority species that will be considered when strategizing projects intended to benefit upland wildlife and plant communities (see Appendix 3).

Strategy

Actions proposed in this section are ultimately aimed at enhancing habitat for all federal and state threatened, endangered and sensitive plant and wildlife species listed in various management plans and wildlife statutes. In a more practical sense, the HRWG Action Plan upland habitat element links its efforts to currently recognized wildlife strategies

prescribed by the ODFW Oregon Conservation Strategy (ODFW, 2006), and the "priority 1 habitat protection and restoration strategies" contained in the Hood River Subbasin Plan (Coccoli, 2004). Beyond this, the group will develop projects in response to specific, locally-recognized challenges using the professional judgment of the TAC. Similar to other elements of this plan, improvements in upland conditions will be achieved using a combination of on-ground actions, technical and financial assistance to landowners and community outreach.

Specific strategies that will be employed to enhance upland habitat will include: a) seeking voluntary protection of important habitats to reduce the effects of land development and fragmentation, b) conducting permanent and seasonal closure of roads and trails, c) controlling off-road motorized vehicles, d) managing forests to include a diversity of stand age and species compositions, e) maintaining uplands for diverse and multiple vegetation layers, f) targeting certain frequencies of standing and downed dead wood, g) managing for functional wildlife corridors, h) protecting big game winter ranges, i) preventing the spread of invasive plants and animals into high value habitats, j) protecting and enhancing low elevation Oregon white oak communities along with higher elevation white-bark pine and aspen communities and k) working with agencies and large landowners to implement management plans aimed at wildlife protection and habitat improvement.

Terrestrial Habitat Projects

Project No.	Project Name	Priority	Schedule
TH-1-08	Oregon White Oak Community Regeneration	High	ongoing
TH-2-08	Habitat / Resource Land / Open Space Preservation Using the Voluntary Acquisition Approach	High	ongoing
TH-3-08	Interstate 84, Highway 281 and Highway 35 Wildlife Crossing Upgrades	Medium	unscheduled
TH-4-08	Gravel Pit and Rock Quarry Maintenance and Final Reclamation	Medium	unscheduled
TH-5-08	Aspen Community Regeneration	Medium	unscheduled

Terestrial Habitat Project Descriptions

TH-1-08. Oregon White Oak Community Regeneration (*High Priority*) (New)

Sponsor: Private landowners, timber companies, Hood River County (HRC), Oregon Department of Forestry (ODF), National Wild Turkey Federation (NWTF), Columbia Land Trust (CLT).

General Location: Generally watershed elevations below 1,500 feet / *6th Field Watersheds*: LEHR[1], LHR[2], LMHR[3], HR/ODC[5], LWHR[6], MEHR[10], NLC[11] / *Limiting Factors Addressed*: HDQ, HQC.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The extent of the Oregon white oak forest community type has declined in the watershed during the past 100 years due to such factors as fire suppression and active conversion to conifers. The chief threat to white oak and mixed white oak stands is occurring passively in unmanaged forests via overtopping by conifers such as grand fir and Douglas fir. As a result, available habitat for white oak dependant species including western gray squirrel, etc. has declined rapidly. This forest type is highlighted for protection and enhancement under Oregon Conservation Strategy (ODFW, 2006). Two important focus sites in the watershed include a) Middle Mountain and b) along the valley's eastern edge (including Whiskey Creek and Neal Creek).

Objectives: Increase the extent of Oregon white oak dominated stands by 80 acres during planning period and provide habitat for dependant wildlife species.

Proposed Actions and Schedule: Partners will help implement a minimum of two white oak regeneration demonstration projects during the planning period. Primary actions will include removal of conifer over-stories and thinning to maximize growth rates.

Total Project Cost (and Matching Partner Contributions): ≈$20,000 (undetermined contributions from ODFW, NWTF, timber companies, HRC and landowners).

TH-2-08. Habitat / Resource Land / Open Space Preservation Using the Voluntary Acquisition Approach (*High Priority*) (Previous W-4-02, W-5-02, H-7-05)

Sponsor: Columbia Land Trust (CLT), Western Rivers Conservancy (WRC), Hood River Soil and Water Conservation District (HRSWCD), Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO), Hood River Watershed Group (HRWG).

General Location: Basin-wide / *6th Field Watersheds*: All, particularly LEHR[1], LHR[2], LMHR[3], HR/ODC[5], LWHR[6], NLC[11] /: *Limiting Factors Addressed*: HDQ, HQC, HPA, CH, R, FP.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: As stated in the goals of this plan, the protection of high quality and productive aquatic habitats is a high priority of the HRWG. Fragmentation of large land parcels and accompanying habitats caused by conversion of open space, forest and farm lands to more intensive use represents an important challenge to maintaining a) functional aquatic, riparian, wetland and upland habitats (including migration corridors), b) the Hood River valley's traditionally farm and forest economic base and c) recently developed tourism industry which is closely tied to the open space nature of the valley. Development pressure is increasing on the valley's open space lands, including important fish and wildlife habitats, rare plant associations, clean waters, wildlife corridors and resource lands. These values will benefit from future voluntary protection. Middle Mountain, for instance, has been identified as an important east to west migration corridor for bear, deer, elk and other species.

Objectives: a) Reduce fragmentation of important resource lands (farms and forests) to protect the valley's traditional economy and ecosystems, b) Reduce fragmentation of relatively undisturbed habitats to maintain fish, wildlife, plant communities, water quality and water quantity.

Proposed Actions and Schedule: Using multiple GIS, LIDAR and other data sources, CLT, CTWSRO and other partners will continue working to develop an inventory and prioritization of critical aquatic, riparian, wetland and upland habitats that can be protected using an acquisition approach. Columbia Land Trust and partners will work to develop 4 private land conservation projects with willing landowners utilizing funding programs such as OWEB and NRCS (Wetland Reserve Program, etc.), and HRC (Riparian Tax Incentive Program). Projects will be accomplished via donation or purchase of perpetual conservation easements or fee simple ownerships. Acquisitions are intended to maintain traditional land uses, minimize conversion of land for development and preserve high quality aquatic and upland habitats. Current and future projects may include larger agricultural and open space ownerships in the Hood River and Parkdale areas.

Total Project Cost (and Matching Partner Contributions): ≈$2,000,000 (undetermined contributions from CLT, WRC, CTWSRO, HRSWCD and landowners).

TH-3-08. Interstate 84, Highway 281 and Highway 35 Wildlife Crossing Upgrades (*Medium Priority*) (Previous W-2-02)

Sponsor: Oregon Department of Transportation (ODOT).

General Location: Major highways transecting basin / *6th Field Watershed*: LEHR[1], LHR[2], HR/ODC[5], UEHR[8], MEHR[10] / *Limiting Factors Addressed*: W, HQC, HPA, CH.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Historically, terrestrial wildlife populations were able to freely migrate to the Columbia River shoreline and other habitats in the basin. Since construction of Interstate 84, Highway 35, the south shore railroad and other corridors, wildlife access to various habitats has been eliminated or impaired. Aspects of I-84 including median barriers and fencing may also trap animals in traffic lanes. The resulting presence of animals on highways leads to wildlife mortalities and traffic safety issues. ODOT recently completed a "wildlife hotspot inventory" which surveyed federal highways that harm wildlife and/or eliminate access to important habitats (MB&G, 2005). Segments of Hood River watershed highways included on this list include a) I-84 (mile markers 61.0 to 62.0), b) Highway 281 (mile marker 8.0-13.0 near Tucker Bridge and c) Highway 35 (mile markers 74.0-77.0 in the Cooper Spur area, mile markers 91.0-91.3 and mile markers 99.4-100.3).

Objectives: a) Improve wildlife access to and from important habitat along the Columbia River and tributaries for the enhancement of wildlife, b) Reduce wildlife mortality when animals attempt to cross the highway, c) Improve motorist safety by reducing the number of deer and other animals that become trapped on the highway.

Proposed Actions and Schedule: The HRWG will work with ODOT and other agencies such as the CRGNSA to further evaluate barriers and test mechanisms that could limit wildlife access to the highway, but also allow relatively free migration to habitat along the Columbia River and other parts of the basin. One solution might entail assessing the location and use of the most important migration routes, followed by installing additional highway underpasses or other means of improving migration corridors. The 2005 hot spot survey reports that deer do not seem to use the West Cliff Drive underpass, so evaluation of an upgrade or alternate underpass location may represent a good initial project.

Total Project Cost (and Matching Partner Contributions): ≈$3,000,000 (undetermined contributions from ODOT, ODFW and CRGNSA).

TH-4-08. Gravel Pit and Rock Quarry Maintenance and Final Reclamation (*Medium Priority*) (Previous WQ-18-02, WQ-18-05)

Sponsor: U.S. Forest Service (USFS), Hood River County (HRC), timber companies, Oregon Department of Transportation (ODOT), private landowners.

General Location: Basin-wide / *6th Field Watershed*: / All / *Limiting Factors Addressed*: HDQ, HQC.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The existence of at least 100 active, inactive and abandoned gravel pits, quarries and borrow areas in the watershed results in lost terrestrial wildlife habitat, deteriorated water quality, and accelerated runoff and erosion. Disturbed soils associated with such areas often support noxious weeds (e.g., knapweeds), which can be widely spread via transport and use of road aggregate and rock.

Objectives: a) Increase habitat for deer, upland birds, raptors and reptiles via final reclamation of mined lands, b) Reduce sediment generation and runoff rates from active, inactive and abandoned mines, c) Control the spread of noxious weeds from all mined lands via control techniques and establishment of beneficial plants, d) Protect public safety by reducing slope angles by benching and re-contouring where feasible.

Proposed Actions and Schedule: The USFS, HRC, ODOT and timber companies will help to identify the condition and status of surface mines within the watershed. These partners will then make efforts to inventory and manage natural resource problems on sites they control (i.e., weeds and runoff). Finally, abandoned mines will be considered for final restoration aimed at re-contouring to stable angles, re-topsoiling and establishment of plants and other features that will improve terrestrial wildlife habitat. The HRSWCD and HRWG will provide technical assistance on request. Specific projects planned during the next five years include the USFS / ODOT East Fork Hood River Quarry Project.

Total Project Cost (and Matching Partner Contributions): ≈$100,000 (undetermined contributions from USFS, HRC, ODOT, timber companies and others).

TH-5-08. Aspen Community Regeneration (*Medium Priority*) (New)

Sponsor: Private landowners, timber companies, Hood River County (HRC), U.S. Forest Service (USFS), Oregon Department of Forestry (ODF), Columbia Land Trust (CLT).

General Location: Basin-wide / *6th Field Watershed*: All / *Limiting Factors Addressed*: HDQ, HQC.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: The extent of the aspen forest community type has declined in the watershed during the past 100 years. This is mainly due to such factors as fire suppression, land drainage, declines in beaver populations and development. Another major threat to aspen is occurring passively in unmanaged forests, via overtopping by conifers such as grand fir and Douglas fir. As a result, available habitat for aspen dependant species has declined rapidly. (Similar declines may also be facing riparian black cottonwood stands, and may deserve similar attention).

Objectives: Increase the acreage of aspen dominated stands to provide habitat for dependant species by 40 acres during planning period.

Proposed Actions and Schedule: The HRWG will help implement the Salminen Aspen Stand Project in the Parkdale area, and two additional demonstration aspen regeneration projects during the planning period. Primary actions will include removal of conifer over-stories, replanting of aspen and other actions intended to increase the acreage of healthy stands in the basin. Partners will also investigate status and potential improvements to riparian black cottonwood stands.

Total Project Cost (and Matching Partner Contributions): ≈$20,000 (Salminen - $1,000 and undetermined contributions from HRC, USFS, CLT and timber companies).

Planning Element 6: Watershed Education & Technical Assistance

Goal: Promote natural resource stewardship in the watershed by working with individuals, educators, governments and other organizations to expand watershed education and technical assistance opportunities.

Background

A vast majority of Hood River valley residents strongly value the watershed's natural heritage, and truly want to be good land and water stewards. Oftentimes, landowners do not implement "good stewardship practices" simply because that have an incomplete understanding of natural processes, and the importance of these processes to fish, wildlife, neighbors and the valley's economy. It is important to realize, for instance, where our clean water supplies originate, and how these supplies may be harmed by certain activities. Furthermore, an understanding of the importance of clean and plentiful waters to all aspects of the valley's economy and lifestyle is critical. Once people understand these factors, elevated stewardship almost always results. Watershed education activities strive to convey this type of basic scientific and technical understanding, beginning in grade schools and continuing through adult life. Organizations that enact watershed education programs in the Hood River watershed include Hood River Valley High School, Hood River Community Education, Columbia Gorge Community College, Next Door Klahre School, Columbia Gorge Ecology Institute, USFWS Spring Creek National Fish Hatchery, U.S. Forest Service, Hood River Soil and Water Conservation District, Hood River Watershed Group and others.

The job of providing technical assistance to citizens of the watershed amounts to helping people help themselves. Oftentimes, the reason people don't enact stewardship projects on their property is because they don't know how. Fortunately, there are a wide range of assistance options available to watershed residents providing guidance on many types of projects ranging from simple to complex. Many participants in the Hood River Watershed Group willingly provide technical assistance to the public as a part of their regular activities, including the Columbia Gorge Fruit Growers, OSU Mid-Columbia Agricultural Research and Extension Center, irrigation districts, Natural Resources Conservation Service, Oregon Department of Forestry, Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service, Oregon Water Resources Department, Oregon Water Trust, Hood River Soil and Water Conservation District, Hood River Watershed Group and others. The services offered by these entities include development of management plans, designing BMPs, sponsoring classes and workshops, and most importantly, on-site assistance.

Residents who attend HRWG meetings regularly hear information regarding the status of Hood River salmon and steelhead populations, glacier and mountain conditions, valley infrastructure upgrades, on-going restoration work, water quality monitoring results, education programs and other issues. Through the Hood River Watershed Group, opportunities are provided for people who wish to volunteer time to help salvage fish

from irrigation canals, plant trees, remove noxious weeds, collect water quality samples, or staff an outreach booth at the county fair. There are also opportunities to become actively involved in on-going work related to watershed enhancement.

Strategy

The goal of this plan element is to elevate basin stewardship using the education and technical assistance approaches. Projects listed in this section are intended to implement specific HRWG actions, and also provide planning, grant writing and other support to existing and complementary projects already underway in the watershed. This particularly applies to K-12 and college education programs, where infrastructure and staffing are already established. In this case, the HRWG will provide support to integrate natural resource science into existing curriculums.

Several specific strategies will be applied by the HRWG to continue and expand public education and outreach, generate broader use of BMPs, and result in better protection and restoration of the watershed. These actions include a) extending assistance aimed at increasing water conservation in agricultural, commercial, industrial and residential settings, b) promoting awareness of the role that agriculture and forestry play in maintaining the open space character of the valley, c) providing assistance to orchardists, farmers, forestry operators, residents and governments related to water quality and habitat BMPs, d) supporting education and stewardship programs involving schools and stakeholders surrounding Indian Creek and other waterways and e) promoting basic research, demonstration projects and dissemination of BMPs intended to reduce the use of organophosphate pesticides on orchard crops throughout the valley.

Watershed Education & Technical Assistance Projects

Project No.	Project Name	Priority	Schedule
ED-1-08	Rural Living Handbook	High	2008
ED-2-08	HRWG Community Outreach and Education Actions	High	ongoing
ED-3-08	Integrated Pest Management Outreach	High	ongoing
ED-4-08	Residential Water Conservation Technical Assistance and Education	Medium	ongoing
ED-5-08	Agricultural Water Conservation Education	Medium	ongoing
ED-6-08	Water Rights and Allowable Uses Workshop	Medium	ongoing

Watershed Education & Technical Assistance Project Descriptions

ED-1-08. Rural Living Handbook (*High Priority*) (New)

Sponsor: Hood River Soil and Water Conservation District (HRSWCD).

General Location: All populated portions of the basin / *6th Field Watershed*: Primarily LEHR[1], LHR[2], HR/ODC[5], LWHR[6], NLC[11] / *Limiting Factors Addressed*: I, C, SL.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Like many places, Hood River County is growing rapidly. Most new residents (about 70%) live outside city boundaries. Most of these residents are also new to rural living, land management and associated conservation practices. The need for this project was identified as the HRSWCD and partners noticed an increasing number of new rural residents requesting assistance on topics such as manure management, pond-building and clearing of riparian vegetation.

Objectives: Elevate awareness and watershed stewardship of 3,000 Hood River County rural residents by encouraging land management practices that conserve natural resources.

Proposed Actions and Schedule: To better serve this growing sector of our community, the HRSWCD will design and publish a handbook on rural living in 2008. Six thousand copies of the handbook, six workshops and six informational articles will be distributed in Hood River County. The handbook will provide localized information on land use planning, gardening, living among orchards, livestock management, stream care, water rights, fire protection, wildlife issues and many other topics. In addition, it will provide contact information for agencies and organizations that can assist in deciphering regulations, policies, rights and planning decisions for those transitioning to rural living. The individual chapters (topics) covered in the handbook will be condensed into one-page fact sheets which will be available through the District office, website and press releases. The project is scheduled to be completed in 2009.

Total Project Cost (and Matching Partner Contributions): $25,723 (HRSWCD - $1,200, local partners - $10,018, OWEB - $14,505).

ED-2-08. HRWG Community Outreach and Education Actions (*High Priority*) (Previous E-3-02, E-4-02, E-3-05, E-4-05)

Sponsor: Hood River Watershed Group (HRWG), Hood River County School District Community Education (CommEd), Hood River Valley High School (HRVHS), other stakeholders.

General Location: All populated portions of the basin / *6th Field Watershed*: Primarily LEHR[1], LHR[2], HR/ODC[5], LWHR[6], NLC[11] / *Limiting Factors Addressed*: C, F, SL, R.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Promoting beneficial changes in watershed condition through changes in stewardship behavior is accomplished via providing technical assistance to landowners and managers, as well as educating adults and children on basic watershed uses and science.

Objectives: a) Improve understanding of basic watershed science topics via 9 "watershed stakeholder" presentations yearly during HRWG meetings, b) Improve level of watershed stewardship by providing five intensive one day "field series" education classes to 60 adult watershed residents each year, c) Improve watershed learning through the HRVHS Advanced Biology class and CGCC via involving three classes (60 students) per year in on-ground restoration projects on the new CGCC Indian Creek Campus, high school and other portions of that basin.

Proposed Actions and Schedule: One of the HRWG's five main functions is to expand public knowledge surrounding the activities of watershed stakeholders, the basin's natural features and processes, and principles of watershed stewardship. The three principle educational programs that the group uses include a) conducting monthly meetings where watershed topics are discussed and a local watershed stakeholder is invited to speak, b) organization of yearly "field series events" with CommEd and c) assistance to the HRVHS Advanced Biology class in developing watershed research projects for class adoption. This work requires funding of a full time coordinator and associated watershed council support. The HRWG also supports other allied local education programs such at the CGEI Secrets Program, which provides watershed education in school, after school and during summer programs.

Total Project Cost (and Target Partner Contributions): ≈$20,000 annually (undetermined contributions from HRWG, CommEd, CGCC, USFS, ODFW and others).

HRWG "Educational Field Series Tour" to Newton-Clark Glacier in fall of 2007, led by geologists from the U.S. Forest Service and Oregon State University. This annual tour directly engages watershed citizens in helping the USFS monitor on-going changes in Newton-Clark Glacier. *Photo by Jamie Gomez.*

ED-3-08. Integrated Pest Management Outreach (*High Priority*) (Previous E-2-02, E-2-05)

Sponsors: OSU Mid-Columbia Agricultural and Research Extension Center (MCAREC), Columbia Gorge Fruit Growers (CGFG), Hood River Soil and Water Conservation District (HRSWCD).

General Location: Irrigated agricultural land */ 6th Field Watershed*: LEHR[1]; LHR[2]; LMHR[3]; UMHR[4]; HR/ODC[5]; LWHR[6]; NLC[11] / *Limiting Factors Addressed*: C.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Water quality investigation conducted by DEQ and OSU between 1999 and 2003 showed elevations above state water quality criteria for organophosphate insecticides (azinphos methyl and chlorpyrifos) in several fish bearing stream reaches within the basin. These findings resulted in DEQ 303(d) listings of these waterways (See "Water Quality Status of Hood River Streams" table on page 8). Further research by DEQ has shown depressed brain acetylcholine esterase activity in fish from exposure to these chemicals used in orchards for pest management.

Objectives: a) Decrease levels of 303(d)-listed chemicals in area waterways to meet state standards, b) Demonstrate alternative pest management techniques that make organophosphate chemical usage unnecessary on certain crops.

Proposed Actions and Schedule: The Dee Flat Codling Moth Management Project will be completed by August 31, 2008. The demonstration project utilizes Integrated Pest Management (IPM) techniques to change how and when growers apply pesticides to drastically reduce the use of organophosphates (OPs) for codling moth control. The project also aims to promote pesticide application BMPs through the CGFG's Integrated Fruit Production program and the HRSWCD's outreach program for the Hood River Agricultural Water Quality Management Area Plan and Rules. Efforts will continue to promote CGFG's Backyard Tree Fruit program, which removes unmanaged fruit trees that act as hosts for commercial tree fruit pests such as codling moth.

Total Project Cost (and Matching Partner Contributions): $292,500 (Dee Flat project - $60,000 (from EPA via American Farmland Trust), IFP outreach – IFPnet – $135,000, MCAREC outreach - $50,000, HRSWCD outreach - $25,000, BYT outreach - $22,500).

ED-4-08. Residential Water Conservation Technical Assistance and Education (*Medium Priority*) (Previous E-1-02, E-1-05)

Sponsor: Hood River Watershed Group (HRWG), City of Hood River (CHR), Oregon State University Extension Service (OSU), Farmers Irrigation District (FID).

General Location: Populated portions of basin / *6th Field Watershed*: Primarily LEHR[1], LHR[2], HR/ODC[5], LWHR[6], NLC[11] / *Limiting Factors Addressed*: C, F.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Depleted stream flow is the most important factor limiting fish in the Hood basin. The two biggest consumers of water in the valley are agriculture (orchard) irrigation, and residential / commercial use. Given relatively fast populations growth, peak domestic water demand in the City of Hood River is expected to increase from 2.5 cfs to 11.5 cfs by 2040. Increased diversion for domestic supply will primarily impact the West Fork Hood River, beginning at RM 2.6 on the Lake Branch (below the CHR's spring water source). Increasing residential and commercial water use will also impact areas served by other water suppliers, and groundwater / base flows in rural residential areas.

Objectives: Increase stream flows in the Lake Branch, West Fork, lower Hood River and other streams impacted by residential and commercial water supply diversion to provide adequate flows for fish, recreation and other in-stream uses.

Proposed Actions and Schedule: The project objective will be achieved by providing community education and technical assistance aimed at residential, commercial, park, church and school water conservation. FID is actively developing the urban and suburban irrigation efficiency education section of its website, and the FID flow control and regulation project is ongoing. HRWG will work with FID and other partners to implement the "Low-Water Lawn" project within the watershed. The goal of this work is to create several very visible low-water demand turf plantings in the valley, and provide detailed technical assistance to others who wish to plant similar xeriscapes. FID will identify participants for low-water demand turf plantings, and encourage customers participating in the program by offering annual billing credits. FID will also participate in the EPA Water Sense program, which is dedicated to water efficiency outreach programs, encouraging water users to make sustainable water use choices. Finally, the HRWG will seek to develop convenient commercial availability of low-water grass and forbs seed through local retailers.

Total Project Cost (and Matching Partner Contributions): $19,000 (HRWG - $10,000, CHR - $2,000, FID - $5,000, OSU - $2,000).

ED-5-08. Agricultural Water Conservation Education (*Medium Priority*) (New)

Sponsors: Farmers Irrigation District (FID), Hood River Soil and Water Conservation District (HRSWCD), U.S. Natural Resources Conservation Service (NRCS), Oregon State University Extension Service (OSU).

General Location: Irrigated agricultural land / *6th Field Watershed*: LEHR[1], LHR[2], LMHR[3], UMHR[4], HR/ODC[5], LWHR[6]; NLC[11] *Limiting Factors Addressed*: C, F.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Flows in several Hood River 6th field watersheds are severely diminished by water withdrawals, most notably in the East Fork Hood River. Increased water use efficiency by orchards can help restore stream flows and provide better habitat in streams below diversions that are important to six ESA threatened fish runs and resident aquatic species. Preliminary data from ODFW suggests that higher summer flows will increase steelhead production in the Hood River.

Objectives: Increase stream flows to provide adequate water for aquatic life, recreation and in-stream values in the East Fork, Middle Fork, West Fork Hood rivers and other streams impacted by agricultural water diversions.

Proposed Actions and Schedule: HRSWCD and OSU will continue to conduct workshops and other outreach activities aimed at providing water conservation technical assistance to orchardists. FID will continue educating valley residents on the value and efficacy of using micro-sprinkler and drip irrigation via their program "Little Drips For Big Orchards." When FID completes the construction of its fully pressurized water delivery system in 2010, credit incentive programs will be offered to growers to convert all irrigation application systems to pressure compensating micro-sprinklers. FID currently offers orchardists and farmers in their district the free exchange of older style sprinkler heads with new water saving "micro-head" sprinklers.

Total Project Cost (and Matching Partner Contributions): $10,000 annually (FID - $5,000 ; Irrinet - $1,000, HRSWCD - $2,000; OSU - $2,000).

ED-6-08. Water Rights and Allowable Uses Workshop (*Medium Priority*)
(Previous SF-5-02, S-4-05)

Sponsor: Oregon Water Resources Department (OWRD), Farmers Irrigation District (FID).

General Location: All populated portions of the basin / *6th Field Watershed*: Primarily LEHR[1], LHR[2], HR/ODC[5], LWHR[6], NLC[11] / *Limiting Factors Addressed*: F, SL.

Key Water Quality, Water Quantity, Species, Habitat and Resource Management Issues: Illegal water use can decrease stream flows, impact currently authorized users, and negatively impact important in-stream values including fish production, aquatic biodiversity and river recreation. Impoundment of water may result in stream temperature increases. Better in-stream flows will help protect bull trout, steelhead, coho, Chinook, cutthroat and rainbow.

Objectives: a) Enhance aquatic life by protecting existing state in-stream water rights, b) Enhance agricultural and municipal sustainability by protecting existing out-of-stream water rights.

Proposed Actions and Schedule: OWRD and partners will plan, schedule and implement one basin-wide workshop targeting realtors, new landowners and others to increase public knowledge surrounding water rights laws. This workshop by be held in association with a regular irrigation district meeting, a Rural Living Handbook seminar, field series event, summer drought meeting, HRWG meeting or an FID water conservation assistance workshop.

Total Project Cost (and Matching Partner Contributions): $8,500 (OWRD - $5,000, MFID - $1,000, FID - $1,000, EFID - $1,000, HRWG - $500, Hood River News - $200).

References and Additional Information

Asbridge, G. 2002. *Hood River Basin Fish Passage Barrier Prioritization*. Mt. Hood National Forest, Hood River Ranger District. April 19, 2002. Parkdale, Oregon. 8 p.

Coccoli, Holly. 1999. *Hood River Watershed Assessment*. Hood River Watershed Group and Hood River Soil and Water Conservation District. December 1999. Hood River, Oregon. 124 p.

Coccoli, Holly. 2002. *Hood River Watershed Action Plan*. Hood River Watershed Group and Hood River Soil and Water Conservation District. June 19, 2002. Hood River, Oregon. 74 p.

Coccoli, Holly. 2004. *Hood River Subbasin Plan, Including Lower Oregon Columbia Gorge Tributaries*. Prepared for Northwest Power and Conservation Planning Council by the Hood River Soil and Water Conservation District. May 28, 2004. Hood River, Oregon. 226 p.

DEQ. 2001. *Western Hood Subbasin Total Maximum Daily Load* (TMDL). Oregon Department of Environmental Quality. December 2001. 148 p.

DEQ. 2004. *Water Quality Standards: Beneficial Uses, Policies and Criteria for Oregon*. OAR, Chapter 340. Division 041.

DEQ. 2006. Oregon's 2004/2006 Integrated Report. 2006. <www.deq.state.or.us/wq/assessment/rpt0406/search.asp>

FID. 1995. *Water Conservation and Management Plan* (version 8.0). Farmers Irrigation District. Hood River, Oregon. 6 p.

FID. 2006. *Farmers Irrigation District Sustainability Vision Document* – Winter 2006-2007 (version 12.2). Farmers Irrigation District. Hood River, Oregon. 6 p.

Fitch, Scott. 2001. *Hood River Watershed Bacteriological Survey*. Prepared by Hood River County Health Department. February 22, 2001. Hood River, Oregon. 10p.

HRSWCD. 2001. *Nutrient and Bacteria Monitoring Results for Selected Hood River Streams*. Hood River Soil and Water Conservation District. Hood River, OR. 7 p.

HRSWCD. 2002. *Baldwin/Tieman Creek Area Action Plan Final Report*. Prepared for Oregon Department of Environmental Quality 319 Program by the Hood River Soil and Water Conservation District. August 2002. Hood River, Oregon. 17 p.

HRSWCD. 2006. *Hood River Agricultural Water Quality Management Plan* (3rd revision). Prepared by Hood River Local Advisory Committee and Oregon Department of Agriculture in cooperation with Hood River Soil and Water Conservation District. December 12, 2006. Hood River, Oregon. 30 p.

Kleinsmith, Mike. 2008. Farmers Irrigation District Manager. *Personal communication*. February 29, 2008).

MB&G. 2005. *Wildlife Hot Spots along Highways in Northwestern Oregon*. Prepared for Oregon Department of Transportation by Mason, Bruce and Girard, Inc. July 2005. Portland, Oregon. 55 p.

Nelson, C. 2000. *Lower East Fork and Lower Middle Fork Hood River Riparian Assessment Report*. Prepared for Hood River Soil and Water Conservation District. May 2000. Hood River, OR. 40 p.

ODFW. 2006. *The Oregon Conservation Strategy*. Oregon Department of Fish and Wildlife. Salem, Oregon. 372 p with appendices.

OWEB. 1997. *The Oregon Plan for Salmon and Watersheds and the Healthy Streams Partnership*. State of Oregon. Salem, Oregon.

Pater, D.E., S.A. Bryce, T.D. Thorson, J. Kagan, C. Chappell, J. Mernik, S.H. Azevedo, and A.J. Woods. 1998. *Ecoregions of Western Washington and Oregon*. Map. USEPA and other cooperators. Corvallis, Oregon.

REO. 2002. *Interagency 5th and 6th field hydrologic units.* Developed by REO (Regional Ecosystem Office), USDA Forest Service, USDI Bureau of Land Management and USDA Natural Resources Conservation Service. December 23, 2002.

Salminen, Ed. 1999a. *Hood River Mainstem Watershed Riparian Assessment Report*. Prepared for Hood River Soil and Water Conservation District. May 1999. Hood River, OR. 33 p.

Salminen, Ed. 1999b. *Hood River Watershed Assessment: Wetland Assessment Report*. Prepared for Hood River Soil and Water Conservation District. May 1999. Hood River, OR. 26 p.

Shively, Dan. 2006. *Hood River Basin Aquatic Habitat Restoration Strategy*. Mt. Hood National Forest, Hood River Ranger District, November 2006. Mt. Hood-Parkdale, Oregon. 111 p.

USDA and USDI. 1994. *Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl*. USDA Forest Service and USDI Bureau of Land Management. April 13, 1994. Washington D.C., 73 p. with appendices.

USFS. 2003. *Roads Analysis: Mt. Hood National Forest*, USDA Forest Service, Mt. Hood National Forest, Sandy, Oregon. 52 p. with appendices and GIS coverages.

USFS. 1996a. *West Fork Hood River Watershed Analysis*. USDA Forest Service, Mt. Hood National Forest, Hood River Ranger District. Mt. Hood-Parkdale, Oregon.

USFS. 1996b. *East Fork Hood River and Middle Fork Hood River Watershed Analyses*. USDA Forest Service, Mt. Hood National Forest, Hood River Ranger District. Mt. Hood-Parkdale, Oregon.

Watershed Professional Network. 1999. *Oregon Watershed Assessment Manual*. Prepared for the Governor's Watershed Enhancement Board. June 1999. Salem, OR. 150 p.

Wetlands Consulting. 2003. *Hood River Local Wetlands Inventory and Wetlands Significant Determinations.* Prepared by Wetlands Consulting for City of Hood River Planning Department. July, 2003. Hood River, Oregon. 39 p.

List of Abbreviations

BPA	Bonneville Power Administration
BMP	best management practice
BOR	U.S. Bureau of Reclamation
BPA	Bonneville Power Administration
cfs	cubic feet per second
C	centigrade
CHR	City of Hood River
CGCC	Columbia Gorge Community College
CGEI	Columbia Gorge Ecology Institute
CGFG	Columbia Gorge Fruit Growers (previous Hood River Grower Shipper)
CLT	Columbia Land Trust
COE	U.S. Army Corp of Engineers
CommEd	Hood River County School District - Community Education
CRGNSA	Columbia River Gorge National Scenic Area
CTWSRO	Confederated Tribes of Warm Springs Reservation Oregon
dbh	diameter at breast height
DEQ	Oregon Department of Environmental Quality
DID	Dee Irrigation District
DSL	Oregon Department of State Lands
EFID	East Fork Irrigation District
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FCA	Farmers Conservation Alliance
FERC	Federal Energy Regulatory Commission
FWHA	U.S. Federal Highway Administration
FID	Farmers Irrigation District
GIS	Geographical Information System
HRC	Hood River County
HRVHS	Hood River Valley High School
HRSWCD	Hood River Soil and Water Conservation District
HRVPRD	Hood River Valley Parks and Recreation District
HRWG	Hood River Watershed Group
LIDAR	Light Detection and Ranging

LT	Longview Timberlands
LWD	large woody debris
MCAREC	Mid-Columbia Agricultural Research and Extension Center
MFID	Middle Fork Irrigation District
MHID	Mt. Hood Irrigation District
NOAA	National Oceanic and Atmospheric Administration – Fisheries Division
NWPCC	Northwest Power and Conservation Council
NRCS	U.S. Natural Resources Conservation Service
NWTF	National Wild Turkey Federation
ODA	Oregon Department of Agriculture
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OHV	off highway vehicle
ORV	off road vehicle
OPRD	Oregon Parks and Recreation Department
OSP	Oregon State Police
OSU	Oregon State University
OWEB	Oregon Watershed Enhancement Board
OWT	Oregon Water Trust
PSU	Portland State University
PLS	Powerdale Lands Stakeholders
RM	river mile
SRF	State Revolving Fund
TAC	Hood River Watershed Group – Technical Advisory Committee
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
TSS	total suspended solids
USDI	U.S. Department of the Interior
USDOT	U.S. Department of Transportation
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WRC	Western Rivers Conservancy
WRD	Oregon Water Resources Department

Appendices

Appendix 1. Map of Prioritized 6th Field Watersheds in Hood River Basin, and Location Codes.

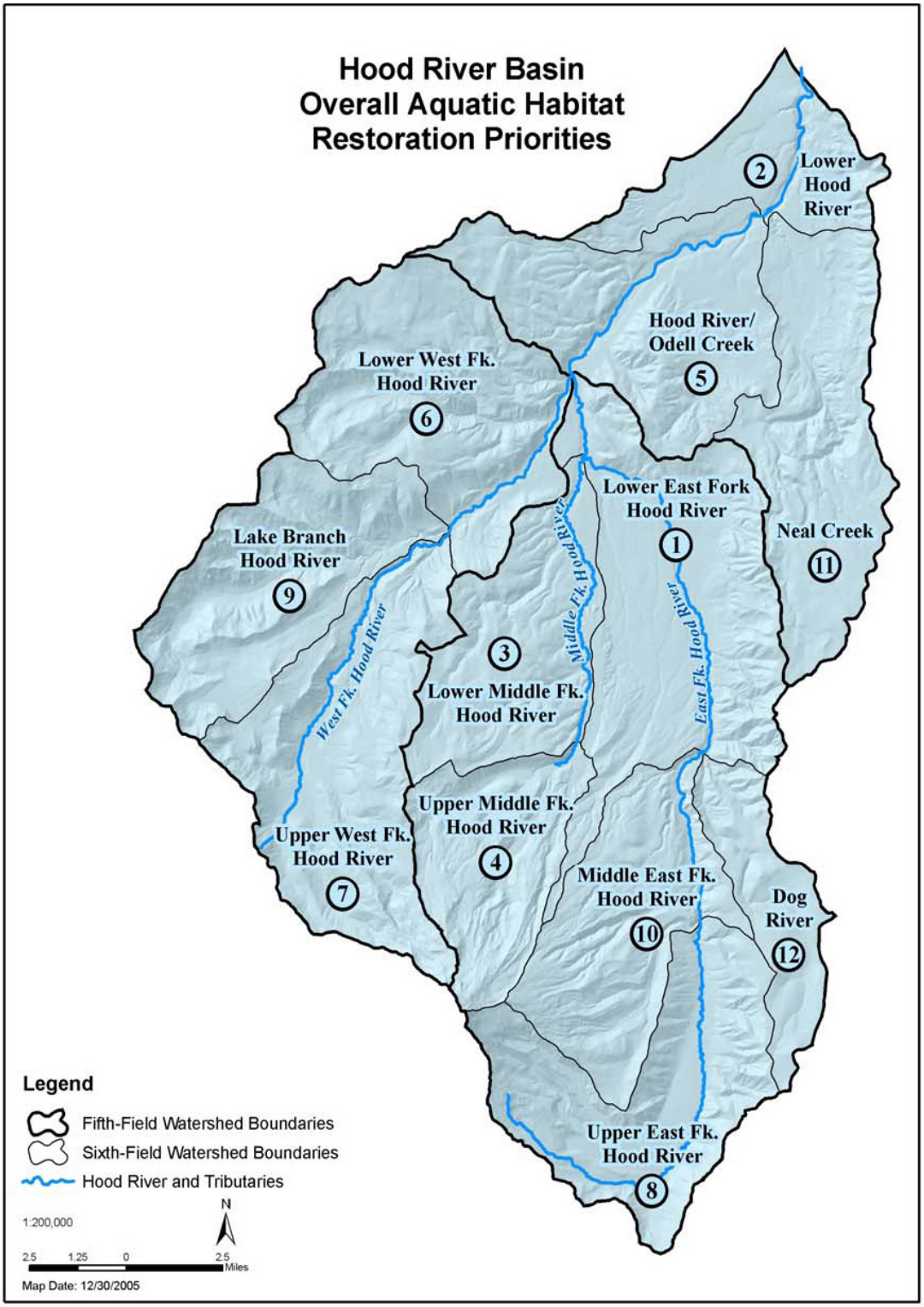
Appendix 2. List of Factors Limiting Aquatic and Terrestrial Productivity in Hood River Basin.

Appendix 3. List of Protected or Prioritized Species, and Selected Important Species in Hood River Basin.

Appendix 4. List of Known road Culvert Barriers in Hood River Basin.

Appendix 5. Descriptions of Projects Completed in 2002 – 2007

Appendix 1. Map of Prioritized 6th Field Watersheds in Hood River Basin and Location Codes. (USFS, 2006)



Appendix 1. (continued)

List of Hood River 6th Field Watershed Codes
Ordered from high to low restoration priority

LEHR[1]	Lower East Fork Hood River
LHR[2]	Lower Hood River
LMHR[3]	Lower Middle Fork Hood River
UMHR[4]	Upper Middle Fork Hood River
HR/ODC[5]	Hood River / Odell Creek
LWHR[6]	Lower West Fork Hood River
UWHR[7]	Upper West Fork Hood River
UEHR[8]	Upper East Fork Hood River
LBHR[9]	Lake Branch Hood River
MEHR[10]	Middle East Fork Hood River
NLC[11]	Neal Creek
DGR[12]	Dog River

Appendix 2. List of Factors Limiting Aquatic and Terrestrial Productivity in Hood River Basin.

Factors Limiting Aquatic Productivity (Coccoli, 2004 and USFS, 2006)

Code	Limiting Factor	Definition and Examples
C	Water chemistry	The effect of toxic substances or toxic conditions on the relative survival or performance of aquatic species. Substances include herbicides, pesticides and heavy metals.
CS	Stream channel stability	The effect of channel stability on the relative survival or performance of aquatic species; the extent of channel stability is with respect to its streambed, banks, and its channel shape and location.
F	Flow	The effect of the amount of stream flow and pattern /extent of flow fluctuations, within the stream reach on the relative survival or performance of the aquatic species. This includes the effects of flow reductions or channel dewatering from water withdrawals.
FP	Flood plain function	Floodplains have been converted to other uses. Development can restrict the natural ability of streams and riparian habitats to meander over time, limiting these habitats.
H/P	Harassment / Poaching	The effects of poaching and / or harassment on the relative survival or performance of aquatic species.
HD	Habitat diversity	The effect of the extent of habitat complexity (number of desired habitat types) within a stream reach on the relative survival or performance of aquatic species.
HQ	Key habitat quantity	The relative quantity of the primary habitat type(s) utilized by the aquatic species during a life stage; quantity is expressed as percent of wetted surface area of the stream channel.
I	Invasive species	Species not native to ecosystems to which they have been intentionally or accidentally introduced and whose introduction causes or is likely to cause economic or environmental harm.
O	Obstructions / Passage barriers	Physical structures impeding movement of aquatic species within their natural range of habitats. Structures include dams, water withdrawals, culverts and human caused waterfalls.
R	Riparian habitat condition	Riparian vegetation often is lost as habitat is converted to other uses. Riparian habitat provides significant benefits to aquatic systems.
SL	In-stream Sediment Load	The effect of the amount of fine sediment present in, or passing through, the stream reach on the relative survival or performance of aquatic species.
T	Stream temperature	The effect of water temperature within the stream reach on the survival or performance of aquatic species.

Table Note: Limiting factors are arranged alphabetically, and table order does not correspond to any relative prioritization of importance.

Appendix 2. (continued)

Factors Limiting Terrestrial Productivity (See note describing formulation below)

Code	Limiting Factor	Definition and Examples
CH	Chemicals	*Injurious effects to wildlife caused by the use of hazardous chemicals that cause direct poisoning or chronic weakening*. Includes bioaccumulation effects. Sources include orchard chemicals, chemical spills, ingestion of lead shot by waterfowl, etc.
DP	Disease and Parasites	*Loss caused by native and exotic diseases and parasites*. Example include loss of corvids and other passerine birds from West Nile virus, or waterfowl by botulism.
HDQ	Habitat Diversity, Quality and Food	*Stress factors related to active or passive conversion of important habitats to those of lesser quality*. Examples include diminished riparian / wetland complexity, changed hydrology from irrigation, loss of nest / den trees by forest conversion, lost forage quality, changing seral regimes due to fire suppression, decreased mast production in overtopped oaks, reed canary grass and other non-native plants.
HPA	Harassment, Poaching and Accidents	*Direct human-caused adverse impacts to wildlife*. Examples include loss of deer along Interstate 84, illegal shooting of eagles, electrocution of raptors on power lines, fence entanglement, etc.
HQC	Habitat Quantity and Connectivity	*Factors related to the decrease in extent of continuous habitat units*. Examples include loss of area due to urban development, roads, draining of wetlands, loss of roost sites, loss of cover due to intensive grazing, conversion to orchards, decreases in connectivity due to forest management activities, etc.
P	Predation	*Loss of important species due to predator / prey imbalances*. Impacts intensified when impacted species are at low populations. Examples include predation of natives by domestic dogs / cats.
W	Water	*Stress to wildlife caused by reduced access to water*. Examples include reduced stream flow by stream diversion, inaccessibility to Columbia River due to Interstate 84, decreasing spring flows, etc.
WR	Winter Range	*Loss of carrying capacity within wildlife populations due to decreases in thermal, hiding, breeding, rearing, nesting and escape cover*. Examples include diminishment of low elevation forest habitats due to human development.

Table Note: A compilation of limiting factors affecting terrestrial wildlife populations in the Hood basin was adopted by the HRWG technical advisory committee (TAC) in 2008 via examination of the 2004 Hood River Subbasin Plan, 2006 Oregon Conservation Strategy and professional judgment. The limiting factors classification system created does not precisely follow either plan, but includes consideration of the elements of those plans. Note that the Subbasin Plan utilizes a species-specific system that describes biological objectives and strategies, while the Conservation Strategy uses a system tiered from priority habitats. The system used here is more diagnostic based, and therefore a simplified *approximation* of the EDT process used for assessing aquatic limiting factors. The method lists and defines the factors that the TAC believes influence the relative survival or performance of the focus species listed as important in the Subbasin Plan and Oregon Conservation Strategy. Finally, note that limiting factors are arranged alphabetically, and table order does not correspond to any relative prioritization of importance

Appendix 3. List of Protected or Prioritized Species, and Selected Important Species in Hood River Basin.

List of Protected or Prioritized Species

Aquatic Species			
Run / Species	*Status:*	*Listing Date:*	*6th Field Watershed Presence:*
Bull trout	Threatened (Federal)	1998	LEHR[1], LHR[2], LMHR[3], UMHR[4], HR/ODC[5], LWHR[6],
Summer /steelhead	Threatened (Federal)	1998	LHR[2], HR/ODC[5], LWHR[6], UWHR[7], LBHR[9]
Winter / steelhead	Threatened (Federal)	1998	LEHR[1], LHR[2], LMHR[3], UMHR[4], HR/ODC[5], LWHR[6], UEHR[8], MEHR[10], NLC[11], DGR[12]
Spring / Chinook	Threatened (Federal)	1999	LEHR[1], LHR[2], LMHR[3], UMHR[4], HR/ODC[5], LWHR[6], UWHR[7], LBHR[9]
Fall / Chinook	Threatened (Federal)	1999	LHR[2], HR/ODC[5]
Coho	Threatened (Federal)		LEHR[1], LHR[2], LMHR[3], UMHR[4], HR/ODC[5], LWHR[6], NLC[11]
Terrestrial Species			
Species	*Status:*	*Listing Date:*	*6th Field Watershed Presence:*
Northern spotted owl	Threatened (Federal, critical habitat designated)	1990	LEHR[1], LMHR[3], UMHR[4], LWHR[6], UWHR[7], UEHR[8], LBHR[9], MEHR[10], NLC[11], DGR[12]

List of Select Important Species

Aquatic Species			
Run / Species	*Occurrence:*	*Comments:*	*6th Field Watershed Presence:*
Resident / coastal cutthroat trout	Common		LEHR[1], LHR[2], LMHR[3], UMHR[4], HR/ODC[5], LWHR[6], UEHR[8], MEHR[10], NLC[11], DGR[12]
Anadromous / coastal cutthroat trout	Rare	Anadromous form nearly extinct	LHR, additional distribution unknown
Rainbow trout	Common		LEHR[1], LHR[2], LMHR[3], UMHR[4], HR/ODC[5], LWHR[6], UWHR[7], UEHR[8], LBHR[9], MEHR[10], NLC[11], DGR[12]
Pacific lamprey	Unknown	Possibly extinct or never occurred in HR	LHR[2]?

Appendix 3. (continued)

Sculpin (multiple species)	Common		Present, distribution widespread
Mountain whitefish	Common		Present, distribution unknown
Bridge-lipped sucker	Common		Present, distribution unknown
Large-scale sucker	Common		Present, distribution unknown
Long nose dace	Common		Present, distribution unknown
Spotted dace	Common		Present, distribution unknown
Leopard dace	Unknown		Present, distribution unknown
Terrestrial Species			
Species	*Occurrence:*	*Comments:*	*6th Field Watershed Presence:*
Amphibians			
Cascade frog	Rare	above 2600 ft	Present, distribution unknown
Larch Mountain salamander	Common	Restricted distribution, candidate for listing	LHR[2], HR/ODC[5], LWHR[6],
Oregon slender salamander	Rare		Present, distribution unknown
Oregon spotted frog	Rare		Present, distribution unknown
Tailed Frog	Rare		Present, distribution unknown
Western toad	Rare		LEHR[1], LHR[2], LMHR[3], UMHR[4], HR/ODC[5], LWHR[6], UWHR[7], UEHR[8], LBHR[9], MEHR[10], NLC[11], DGR[12]
Reptiles			
Painted turtle	Uncommon		
Western pond turtle	Uncommon		
Mammals			
Fisher	Rare		Present, distribution unknown
Long-eared myotis	Unknown		Present, distribution unknown
Long-legged myotis	Unknown		Present, distribution unknown
Pine martin	Rare		Present, distribution unknown
Red tree vole	Rare		Present, distribution unknown
Silver-haired bat	Unknown		Present, distribution unknown
Western grey squirrel	Common		LEHR[1], LHR[2], LMHR[3], UMHR[4], HR/ODC[5], LWHR[6], UWHR[7], UEHR[8], LBHR[9], MEHR[10], NLC[11], DGR[12]
Wolverine	Unknown		Present, distribution unknown
Birds			
Bald eagle	Common		LEHR[1], LHR[2], LMHR[3], UMHR[4], HR/ODC[5], LWHR[6], UWHR[7], UEHR[8], LBHR[9], MEHR[10], NLC[11], DGR[12]

Appendix 3. (continued)

Black-backed woodpecker	Unknown		Present, distribution unknown
Flammulated owl	Unknown		Present, distribution unknown
Harlequin duck	Uncommon		Present, distribution unknown
Lewis' woodpecker	Common		LEHR[1], LHR[2], LMHR[3], UMHR[4], HR/ODC[5], LWHR[6], UWHR[7], UEHR[8], LBHR[9], MEHR[10], NLC[11], DGR[12]
Northern goshawk	Rare		Present, distribution unknown
Northern pigmy owl	Unknown		Present, distribution unknown
Peregrine falcon	Rare		Present, distribution unknown
Pileated woodpecker	Common		Present, distribution unknown
Purple martin	Common		Present, distribution unknown
Western bluebird	Uncommon		LEHR[1], LHR[2], LMHR[3], UMHR[4], HR/ODC[5], LWHR[6], UWHR[7], UEHR[8], LBHR[9], MEHR[10], NLC[11], DGR[12]
Yellow billed cuckoo	Likely extinct		

Appendix 4. List of Known Road Culvert Barriers in Hood River Basin.

List of Culvert Problems on County, USFS and State Roads

Hood River Mainstem *Source: ODFW and ODOT, 2005, and Hood River County Public Works*						
County or State No. & Name	**Subbasin/Stream**	**Stream Mile**	**Species**	**Habitat Quality**	**Priority**	**Comments**
101/Brookside	Indian Cr/ Unnamed Cr	1.4	Cutthroat	Poor	Low	Velocity barrier. Juvenile step barrier.
129/Markham	Indian Creek	2.4	Cutthroat	Poor	Low	Velocity barrier.
201/Eastside	Whiskey Creek	2.1	Cutthroat	Fair	Low	
HWY 35	Whiskey Creek	2	Cutthroat	Fair	Low	Step/velocity barrier. Only on 2002 ODOT culvert list.
202/Whiskey Cr. Rd.	Whiskey Creek	0.2	Cutthroat	Fair	Low	Velocity barrier. Juvenile step barrier.
306/Ehrck Hill	Neal Cr/ Lenz Cr	0.9	Coho, Cutthroat	Fair	Med	Velocity inhibits/prohibits fish passage.
209/Fir Mtn.	Neal Cr/ Unnamed Cr	0.3	(Steelhead)	Fair	Med	Step/velocity barrier.
209/Fir Mtn.	Neal Cr /Unnamed Cr	2.5	St, Cutthroat	Fair	Med	Velocity inhibits passage. Juvenile step barrier.
315/Neal Cr.	WF Neal Cr/Unnamed Cr	0.7	Cutthroat	Poor	Low	High velocity water.
320/Central Vale	Odell Creek	0.2	Cutthroat	Fair	Low	Velocity limits passage. Step barrier for juvenile fish.
322/AGA	Odell Creek	1.8	Cutthroat	Fair	Med	New culvert. Velocity inhibits/prohibits fish passage.
305/Lippman	Odell Cr/ Unnamed Cr	2.3	Cutthroat	Fair	Low	Velocity barrier. Landowner says small culvert leads to flooding. On HRC PW plan of work.
320/Central Vale	Odell Creek	2.3	Cutthroat	Fair	Low	2 culverts. Velocity barrier. Juvenile step barrier.
West Fork Hood River						
501/Lost Lake	Deer Creek	2.0	Cutthroat	Fair	Low	Velocity/step barrier.
Middle Fork Hood River						
417/Red Hill	Rogers Creek	0.2	Cutthroat	Good	Low	Lower 10' of pipe is corroded through in many places.

Appendix 4. (continued)

East Fork Hood River
Source: ODFW and ODOT, 2005

Road # and Name	Subbasin/ Stream	Stream Mile	Species	Habitat Quality	Priority	Comment
421/Culbertson	Trout Cr	0.5	Cutthroat	Good	Low	Velocity barrier. 20" step out of culvert over dam.
401/Trout Creek	Trout Cr	5.4	Cutthroat	Good	Low	Juvenile step barrier. Adults are limited by velocity.
418/Baseline	Trout Cr	1.6	Cutthroat	Good	Low	Velocity barrier.
423/Laurance Lk.	Trout Cr	3.2	Cutthroat	Good	Low	Velocity barrier.
421/Culbertson	Evans Cr	0.6	St, coho	Good	Med	Retaining wall creates pool, siphons creek through 1' opening, then onto concrete slab. Passage barrier.
424/Hutson	Evans Cr	1.6	St, coho	Fair	Med	Juvenile step barrier. Velocity barrier.
429/Evans Cr.	Evans Cr	3	St, coho	Fair	Low	Velocity barrier.
421/Culbertson	Evans Cr/ Griswell	1	St, coho	Good	Med	Velocity and step prohibit juveniles, inhibit adults.
426/London	Evans Cr/Griswell	1.5	St, coho	Good	Med	Step/velocity barrier.
422/Laurance Lake	W. Fk. Evans Cr	14	St, coho	Fair	Low	Velocity barrier.
428/Cooper Spur	Doe Cr	3.3	Cutthroat	Good	Med	Step/velocity barrier.
HWY 35	Tilly Jane Ck.	3.4	Cutthroat	Fair	Low	Step/velocity barrier
428/Cooper Spur	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/Bassler	East Fk. Hood R.	0.2	St, coho, ct	Fair	Med	Step/velocity barrier.
415/Allen	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. Only on 2002 ODOT culvert list.
411/Woodworth	Baldwin Cr/	0.6	Cutthroat	Fair	Low	Velocity barrier. Juvenile step barrier.
428/Cooper Spur	Baldwin Creek/Unnamed Cr	0.3	Cutthroat	Fair	Low	Juvenile step/velocity barrier. 5' concrete slide inhibits passage as well. 2 culverts.
412/Miller	Baldwin Cr	0.6	St, coho	Fair	Med	Velocity barrier.
405/Alexander	Wisehart Cr	0.3	St, coho, cutthroat	Fair	Med	Double culvert. Water cascades down rock for 2' before reaching pool. Velocity inhibits passage.

Appendix 4. (continued)

Continued, Culvert Problems on County and State Roads - East Fork Hood River						
County Rd # or State Hwy	**Subbasin/ Stream**	**Stream Mile**	**Species**	**Habitat Quality**	**Priority**	**Comments**
406/Quinn	Wisehart C	0.5	St, coho,	Fair	Med	Velocity barrier.
411/Woodworth	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. Only on 2002 ODOT culvert list.
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	Polallie Ck	7.0	Cutthroat	Good	Chg to H*	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	Chg to H*	Step/velocity barrier
HWY 35	Hellroaring Ck	1.6	Cutthroat	Good	Chg to H*	Step/velocity barrier
Hwy 35	Cat Creek	4.8	St, coho, ct	Fair	High	Juvenile step barrier/velocity barrier. New on 2005 list.

**The ODOT list from 2005 had changed the Polallie Creek culvert from medium priority on the 2002 list to high and both Engineers and Hellroaring Creek culverts from low to high. Reasons unknown.*

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 Creek	1.2	T1N, R10E, Section 22 NW	Private concrete culvert cattle crossing no longer used
Graham Creek	0.1	T1N, R10E, Section 21	County culvert under Leasure Rd – velocity barrier?
Crystal Springs Cr	0.2	T1S, R10E, Section 20	County culvert on unused logging road

Appendix 4. (continued)

Hood River Ranger District Fish Passage Remediation Culvert Inventory
(Gary Asbridge, USFS)

Fish species codes: Bull trout (BT), Cutthroat trout (CT), Summer steelhead trout (StS), Rainbow trout (RBT), Eastern brook trout (EB)					
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	CT	0.60
1310649752	West Fork Neal Creek- Trib B	1700000	5.1	CT	0.30
1310649752	West Fork Neal Creek- Trib A	1700110	0.1	CT	0.60
1316223120	West Fork Neal Creek- Trib A	1710000	0.1	CT	0.10
1332740383	West Fork Neal Creek	1700000	6.1	CT	2.25
1344282604	West Fork Neal Creek	1700000	4.8	CT	1.30
1345370971	West Fork Neal Creek	1700630	0.1	CT	0.10
1379158832	Neal Creek	1710000	3.7	CT	0.10
1479662005	North Fork Mill Creek	1711630	2.0	CT	2.25
1522840637	North Fork Mill Creek	1720193	0.2	CT	0.75
1492593682	North Fork Mill Creek	1700660	1.5	CT	0.75
1529146283	North Fork Mill Creek	1700663	0.1	CT	0.50
1538284633	Tumble Creek 1	4400000	2.0	CT	0.50
1539002351	Pocket Creek	3540000	2.4	CT	0.50
1554752394	Engineers Creek	3500640	0.1	CT	0.40
1554752394	Meadows Creek	3500681	0.1	CT	0.80
1559680505	Meadows Creek	3545000	0.8	CT	0.50
1559680505	Meadows Creek	3545000	0.2	CT	0.25
1559680505	Meadows Creek	3500680	0.1	CT	0.20
1589839118	Culvert Creek	3500740	0.5	CT	0.40
1589839118	Culvert Creek	4400000	0.2	CT	0.25
1641197769	Doe Creek Trib	3510000	2.2	EB	0.10
1650454260	Doe Creek	3510000	8.0	EB	0.05
1730550703	Elk Creek	1810000	6.4	RBT	0.50
1743718407	McGee Trib	1810000	2.3	RBT	0.10
1752555978	McGee Creek	1810000	3.5	RBT	0.40
1752555978	Redhill Creek	1800000	5.8	StS, RBT	0.75
1766313424	Tumbledown Creek	1800000	3.9	RBT	0.05
1801999581	Marco Creek	1800000	2.9	RBT	0.60
1851378382	Marco Creek	1600000	17.4	RBT	0.25
1875250687	Laurel Creek	1300620	0.9	RBT	0.50
1873064714	Laurel Creek	1350000	0.2	RBT	0.50
2002815769	Laurel Creek	1300000	13.5	RBT	0.05

Appendix 4. (continued)

2026832505	Divers Creek	1310000	4.5	RBT	0.50
2047177526	No Name Creek	1300000	5.5	RBT, EB	0.30
2051301929	Mosquito Creek	1300000	1.5	RBT	0.25
2051437953	Lake Branch- Trib A	1300000	1.2	RBT	0.25
2056176893	Indian Creek	1300000	5.3	RBT, EB	0.30
2071069279	Indian Creek	1311000	2.0	RBT	0.05
2071069279	Long Branch	2810000	4.0	RBT	1.50
2089794953	No. Fork Green Point Cr Trib	2820000	10.3	RBT, EB	0.05
2095141574	North Fork Green Point Creek	2820000	10.5	RBT, EB	0.05
2112484629	Gate Creek Trib	2820000	9.8	RBT, EB	0.05
2114965732	Green Point Creek Trib	2810000	9.4	RBT, EB	0.05
2126190175	Green Point Creek	2810000	7.8	RBT, EB	0.60
2114965732	Green Point Creek	2810000	4.9	RBT, EB	0.20
2128614877	Green Point Creek	2810000	9.7	RBT, EB	0.10
2137263587	Dead Point Creek Trib	2820000	1.4	RBT	0.50
				Total Habitat Miles	25.55

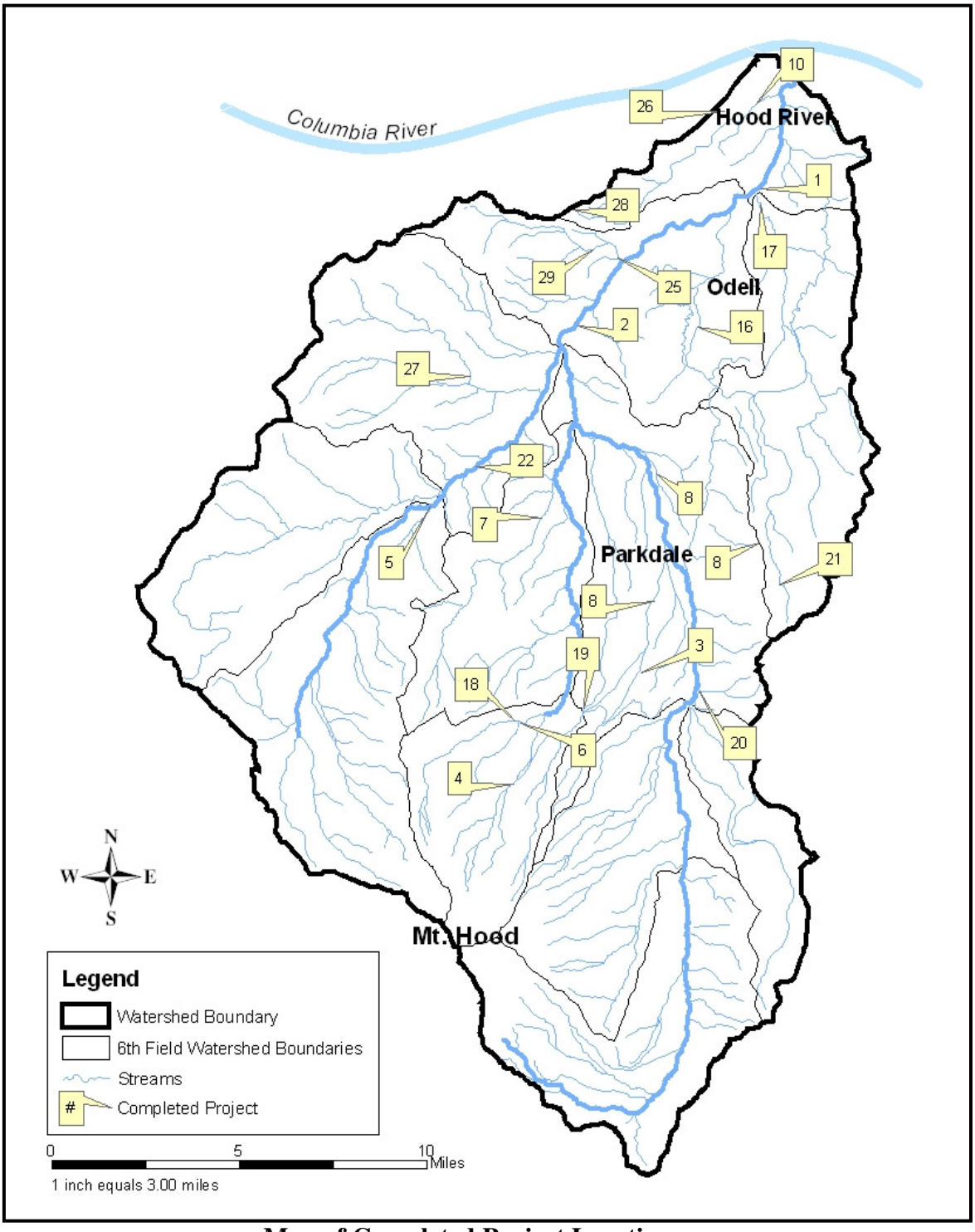
Appendix 5. Projects Completed in 2002 – 2007

Below are a list, map and full project description of significant watershed enhancement actions completed between 2002 and 2007. Note that the original project number (in parentheses behind project name) is derived from either the original 2002 Action Plan, or the 2005 "ranking update." This date is indicated by the last two digits of the project number (i.e., either "02" or "05").

2002 – 2007 Completed Projects

	Project Name	Priority
1.	Powerdale Dam Fish Screen Replacement (FP-1-02), Increase Minimum Flows Below Powerdale Dam (S-1-02)	High
2.	Farmers Canal Fish Screen Replacement (FP-2-02)	High
3.	Glacier Ditch/Evans Creek Fish Passage (FP-4-02), Sediment Basin Overflow (WQ-17-02)	Medium
4.	Coe Branch Diversion Improvements (FP-7-02)	High
5.	Dee Irrigation District Diversion Fish Passage Investigation (FP-8-05)	Medium
6.	Clear Branch Dam Fish Trap Study (FP-11-02)	Medium
7.	Aldridge Ditch Diversion Fish Screen (FP-13-02)	Medium
8.	Fish Passage Improvements on Private Land (including Evans Creek bridge, Tieman Creek Fish Weirs and Tieman Creek Bridge) (FP-14-02)	Medium
9.	Barrier Prioritization and Remediation Survey (FP-16-02)	Medium
10.	Indian Creek Fish Passage and Enhancement (FP-18-02)	Low
11.	Landowner Cost Assistance for Agricultural Water Quality Improvements (WQ-1-02)	High
12.	Extend Streamside Vegetation Protection to All Land Uses (WQ-2-02), Update Comprehensive Land Use Plan for Statewide Planning Goal 5 (H-3-02)	High
13.	Continue Pesticide Monitoring Studies (WQ-3-02)	High
14.	Lower East Fork Tributaries Water Quality Improvement (WQ-4-02)	High

15.	Road Maintenance (County Public Works - WQ-5-02), (USFS – WQ-6-02), (HRC Forestry – WQ-7-02), (Longview – WQ-8-02)	High
16.	Odell Creek Water Quality Improvements (WQ-10-02)	High
17.	Lower Neal Creek Riparian Area Improvements (WQ-11-02)	High
18.	Laurance Lake Temperature Study (WQ-13-02)	Medium
19.	Volmer Ditch Replacement (S-7-02)	Medium
20.	Highway 35 Corridor Maintenance Alternatives Feasibility Study (H-1-02)	High
21.	Upper WF Neal Creek Riparian and Stream Improvements (H-6-02)	Medium
22.	WF Hood River (Powerline Reach) Large Wood Placement (H-10-02)	Medium
23.	Continue and Expand Wateshed Awareness and Outreach (including Streamcare Brochure, Dirks-Edmonds and matching OWEB grants and Drought Tolerant Lawn Brochure) (E-4-02)	High
24.	Voice for the Hood River Watershed (E-5-02)	High
Projects Completed 2002-07 that were not listed in 2002 Watershed Action Plan		
25.	Ditch Creek/Emmons pipeline projects	*Not Ranked*
26.	Avalon/Belmont/Orchard Rd. pipeline projects	*Not Ranked*
27.	North Greenpoint Creek Diversion Upgrade	*Not Ranked*
28.	Highline Piping	*Not Ranked*
29.	Ditch Creek Bridge Removal	*Not Ranked*



Map of Completed Project Locations
(Number corresponds to project number in table above)

Completed Projects Descriptions

1. Powerdale Dam Fish Screen Replacement (FP-1-02), Increase Minimum Flows Below Powerdale Dam (S-1-02) ☑

Lead Entity: PacifiCorp

Date Completed: Settlement Agreement signed June 2003; FERC Order issued Nov. 2003

Cost: Done in-house by PacifiCorp and partners

Description /Key Outcomes: PacifiCorp and the partners listed below met over a period of several years to negotiate the agreement that resulted in the November 2003 Federal Energy Regulatory Commission (FERC) Order. According to the settlement and order terms, PacifiCorp agreed to surrender its license to operate Powerdale Dam. PacifiCorp was allowed to continue operating the Powerdale Hydroelectric Project until April 15, 2010; decommissioning will commence after that date and be completed by Feb. 29, 2012. During the interim period from 2003 until 2010, measures have been put in place to protect fisheries in the Hood River. They include increasing the minimum stream flows below Powerdale Dam, cessation of power generation from April 15 to June 30 each year with a corresponding reduction of diversion flow to 25 cfs, and related activities designed to minimize the impacts of the dam and diversion to aquatic species. The fish screen will not be replaced, but ongoing maintenance of the screen is required by the agreement.

On November 7, 2006, a debris torrent came down the Hood River, undercutting part of the flow line, which then fell into the Hood River. This caused sections of the wooden flume to collapse inward. PacifiCorp then obtained regulatory permission to remove the damaged sections of pipeline. At this time, PacifiCorp has ceased water diversion and power generation and there are no plans to repair the flow line and resume operations. As a consequence, no water is being diverted at this site so the fish screens are not being used.

Partners: ODFW, DEQ, CTWSRO, HRWG, American Rivers, NOAA Fisheries, US Fish and Wildlife Service

2. Farmers Canal Fish Screen Replacement (FP-2-02) ☑

Lead Entity: Farmers Irrigation District (FID)

Date Completed: November 2002 for fish screen; 2005 for pipe line over Hood River

Cost: $1.4 million for screen; $2.5 million for pipe line to replace flume

Description /Key Outcomes: At the main stem Hood River FID diversion (RM 11.0), a rotary drum screen was replaced with an innovative, passive infiltration, high velocity horizontal fish screen designed and patented by FID. A wooden flume at the upper end of the canal was also replaced with pipe. A new fish return bypass system was created using an existing ephemeral channel enhanced to emulate a natural habitat instead of a standard pipe. Other project features are a more natural intake configuration and improved sediment management. In 2005, the area was rocked by an earthquake and the existing flume that carried water over the Hood River was damaged. FID replaced the flume with 2,000 feet of twin 48" PVC pipe. The new fish screen and bypass prevent fish mortality and introduction of fish into the irrigation district's conveyance system.

Partners: OWEB, BPA/CTWSRO, USFS (Title II), National Fish and Wildlife Foundation, ODFW, DEQ, HRSWCD, HRWG, DEQ SRF

3. Glacier Ditch/Evans Creek Fish Passage (FP-4-02), Sediment Basin Overflow (WQ-17-02) ☑

Lead Entity: Middle Fork Irrigation District (MFID)

Date Completed: December 2004

Cost: $912,000

Description/Key Outcomes: Three new pipeline sections totaling 3.0 miles and associated concrete vaults, valves and appurtenances were constructed, including the piping of the West Evans Ditch line. Two diversion dams on Evans Creek were eliminated and fish passage was restored to 2.5 miles of creek, benefiting steelhead, coho salmon and cutthroat trout in Evans Creek. Spawning and rearing conditions were improved in the lower 5.5 miles by the elimination of silt from glacial water sources that previously flowed into non-glacial Evans Creek.

Partners: USFS (Title II), OWEB, BPA/CTWSRO, WRD, HRWG

4. Coe Branch Diversion Improvements (FP-7-02) ☑

Lead Entity: Middle Fork Irrigation District (MFID)

Date Completed: Spring 2007

Cost: $60,000

Description/Key Outcomes: As part of a continuing effort to reduce the potential for fish mortality, an old Alaska steep passage fish ladder was replaced with the latest design ODFW fish passage ladder. As part of the project, a new screen was installed on the intake, new conduit and electrical lines were run from the base of Laurance Lake dam to the Coe diversion and a new upgraded Primary Logic Controller (PLC) was installed. The PLC allows MFID to operate the control gates electronically and will enhance the operation on a new diversion and permanent fish screen once installed. In addition to improving fish passage and reducing fish mortality, the PLC will reduce pulsing issues with sediment and water.

Partners: ODFW, USFS

5. Dee Irrigation District Diversion Fish Passage Investigation (FP-8-05)

Lead Entity: Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO) ☑

Date Completed: 2004

Cost: Done in-house by HRWG, with assistance of partners

Description/Key Outcomes: A feasibility study was done to investigate the options and alternatives to the current Dee Irrigation District diversion, which some fish biologists believe may impede upstream fish migration to the upper West Fork Hood River at times. The study concluded that:

- The water rights approval process for an exchange or conserved water program or some combination of these would be lengthy, involved, and highly uncertain.
- The estimated cost for the project is over $3.5 million.
- There is not a consensus on whether the project would result in a net benefit to fish.
- Greater benefits could be achieved by addressing water management efficiency, stream flow restoration and fish passage needs within Dee Irrigation District.

Partners: DID, MFID, HRWG, FID

6. Clear Branch Dam Fish Trap Study (FP-11-02) ☑

Lead Entity: Middle Fork Irrigation District (MFID)

Date Completed: March 2005

Cost: $3,000

Description/Key Outcomes: The purpose of this investigation was to review and summarize available Clear Branch trap information to determine if it was functioning properly, and if not, develop a corrective action plan. The study provides recommendations to further assess potential trap problems in order to narrow the focus on a workable solution.

Partners: USFS

7. Aldridge Ditch Diversion Fish Screen (FP-13-02) ☑

Lead Entity: Aldridge Ditch Company

Date Completed: Summer 2006

Cost: $70,000

Description/Key Outcomes: A new bypass channel was constructed and the FID innovative, horizontal fish screen was installed in 2006. CTWSRO contributed $60,000, FCA contributed $7,000 and the Aldridge Ditch users contributed $3,000 to the project. Primary benefits include reduced fish mortality and improved fish passage.

Partners: CTWSRO, ODFW, FID, FCA

8. Fish Passage Improvements on Private Land (FP-14-02) ☑

Evans Creek Bridge:

Lead Entity: Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO) and Oregon Department of Fish and Wildlife (ODFW)

Date Completed: 2003

Cost: $52,850

Description/Key Outcomes: A 36" metal culvert on Evans Creek (RM 1.3) that impeded both juvenile and adult fish passage was replaced with a 30-foot span bridge in August 2003. Species benefited include winter steelhead, resident trout and coho salmon. The culvert was the furthest downstream passage barrier on Evans Creek, a major tributary to the East Fork Hood River. The bridge also allows for natural transport processes, including flood flows, sediment and woody debris passage.

Partners: OWEB, ODF, Hanel Development, HRWG, HRSWCD, landowner

Tieman Creek Fish Weirs:

Lead Entity: Hood River Watershed Group (HRWG) and Oregon Department of Fish and Wildlife (ODFW)

Date Completed: 2003

Cost: $6,760

Description/Key Outcomes: Three rock weirs were placed at 6-10 foot intervals below a private irrigation diversion barrier (RM 1), creating step pools to allow both upstream and downstream passage of juvenile and adult fish. The project opened up 2.0 miles of fish habitat.

Partners: CTWSRO, OWEB, Inter-Fluve Inc., Hanel Development, HRSWCD, landowner

Tieman Creek Bridge:

Lead Entity: Hood River County Forestry Department

Date Completed: 2003

Cost: $41,700

Description/Key Outcomes: An undersized culvert was replaced with a bridge as part of an area sediment control project. Juvenile and adult cutthroat trout passage was restored between well-utilized habitats. Flood transport capacity was increased under county forest road.

Partners: HRWG, OWEB, ODFW

9. Barrier Prioritization and Remediation Survey (FP-16-02) ☑

Lead Entity: Oregon Department of Fish and Wildlife (ODFW) and U.S. Forest Service (USFS)

Date Completed: 2000

Cost: Done in-house by ODFW, USFS and partners

Description/Key Outcomes: Using in-house resources, the Forest Service, in consultation with ODFW, prioritized fish passage barriers based on the "old" 6th field HUC subwatersheds. This was done after completion of earlier road and culvert surveys by ODOT/ODFW (1998), HRC Forestry Dept. (2000), and USFS culvert survey of the Mt. Hood NF (2001). This survey can help target resources to fix priority passage barriers.

Partners: HRC Forestry Department, ODOT

10. Indian Creek Fish Passage and Enhancement (FP-18-02) ☑

Lead Entity: Hood River Watershed Group (HRWG)

Date Completed: Fall 2007

Cost: $47,350

Description/Key Outcomes: The removal of concrete piers, steel walkways and other infrastructure from the old Diamond Fruit dam at RM 1.0 on Indian Creek was the impetus of the Indian Creek Dam and Trash Airlift project. In addition, old car bodies, white goods and other rubbish were removed via helicopter, for a total of 11 tons of garbage removed from the creek and riparian area. Other work accomplished in the project area included Scotch broom removal and placement of a woody debris structure in Indian Creek. This structure was created to improve fish habitat using logs removed during the construction of the Columbia Gorge Community College building nearby. Outcomes of the project included improved water quality and fish habitat.

Partners: CGCC, Providence Hood River Memorial Hospital, FID, BPA Aircraft Services, HRVPRD, Port of Hood River, Hood River Garbage, CHR, ODFW, and NWSA

11. Landowner Cost Assistance for Agricultural Water Quality Improvements(WQ-1-02) ☑

Lead Entity: Natural Resources Conservation Service (NRCS), Hood River Soil and Water Conservation District (HRSWCD)

Date Completed: 2002-2007

Cost: $2.8 million - $1.47 million in USDA funds were allocated to local agricultural landowners through the Environmental Quality Incentives Program (EQIP). These funds were matched with landowner contributions ranging from 25-50% of the cost. Over $119,000 in OWEB funds were spent through the Small Grant program, matched by $61,700 in local contributions.

Description/Key Outcomes: USDA cost-share funds were used primarily for irrigation system improvements, pesticide best management practices and irrigation water management. OWEB funds assisted 14 agricultural landowners with water quality improvement projects. Outcomes included irrigation upgrades on 200 acres, protection of three small springs and erection of a manure composting facility. Benefits include water conservation and improved water quality.

Partners: OWEB, landowners

12. Extend Streamside Vegetation Protection to All Land Uses (WQ-2-02), Update Comprehensive Land Use Plan for Statewide Planning Goal 5 (H-3-02) ☑

Lead Entity: Hood River County Planning Department

Date Completed: 2004

Cost: This project was done in-house by Hood River County, with participation by partners.

Description/Key Outcomes: Ordinance 42, Stream Protection Overlay Zone, was adopted by Hood River County in February 2004 to address Goal 5. The ordinance protects all fish-bearing streams by establishing a 50 foot buffer (protection overlay zone) along streams with an average annual stream flow of less than 1,000 cubic feet per second (cfs) and 75 foot buffer along streams with an average annual stream flow of 1,000 cfs. Forest practices regulated by the Oregon Forest Practices Act and agricultural activities regulated by the Oregon Department of Agriculture (SB1010- Hood River Agricultural Management Area Plan and Rules) are exempt from this ordinance. Adoption of the Stream Protection Overlay Zone and Goal 5 benefits water quality by minimizing removal of riparian vegetation and development in riparian corridors.

Partners: HRWG, DEQ, ODFW, FID, DLCD, USFS

13. Continue Pesticide Monitoring Studies (WQ-3-02) ☑

Lead Entity: Oregon State University (OSU) and Oregon Department of Environmental Quality (DEQ)

Date Completed: 2004

Cost: $217,200 - $128,500 OWEB and $88,700 in-kind

Description/Key Outcomes: An OWEB-funded study, utilizing toxicologists from both DEQ and OSU, was completed in 2004. It showed ongoing exceedances of pesticide standards for the organophosphates azinphos-methyl and chlorpyriphos in Neal, Lenz and Indian creeks. Pesticide monitoring is being done at present (2008) by DEQ, with financial support ($30,000 annually) from BPA through CTWSRO. Results of these studies have been used to target educational efforts about best management practices for pesticide selection and application.

Partners: HRSWCD, HRWG, MCAREC, PSU, HRGSA, CTWSRO, OWEB

14. Lower East Fork Tributaries Water Quality Improvement (WQ-4-02) ☑

Lead Entity: Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO), Hood River Soil and Water Conservation District (HRSWCD)

Date Completed: 2002-2007

Cost: $32,550 - Emil Creek fences ($8550 & $8200), Wisehart - $2,030, Griswell - $13,770

Description/Key Outcomes: Two fencing projects were completed in 2004 on Emil Creek, a tributary to the East Fork Hood River. One, at RM 0.0-0.3, was built by CTWSRO (1,500 feet/both sides); the other was built by the landowner at RM 0.6 (800 feet/both sides plus gates and off-site water trough) utilizing OWEB small grant funds. Another fence was installed on Wisehart Creek (380 feet/both sides of creek) in 2002 as well as riparian plantings just upstream on Wisehart. A fourth fencing project protected 1.2 acres of riparian area along 800 feet of Griswell Creek, as well as upgrading a farm crossing on the creek. Outcomes included reduced erosion, sedimentation and manure transport into waterways. Fenced riparian areas are developing bank-stabilizing vegetation and restored stream function.

Partners: OWEB, NWSA, landowners

15. Road Maintenance (County Public Works - WQ-5-02), (USFS – WQ-6-02), (HRC Forestry – WQ-7-02), (Longview – WQ-8-02) ☑

Lead Entity: Hood River County Public Works and Forestry Department, U.S. Forest Service (USFS), Longview Timberlands (LT)

Date Completed: 2002-2007

Cost: $2.925 million - HRC Forestry Department reported that $815,000 spent by sale purchasers from 2002-07 plus HRC Forestry Department spends approximately $20,000 ($120,000 total) annually repairing road failures and fixing fish passage problems. LT hires their own contractors to handle road work rather than tying it to timber sales. They spend approximately $80,000 per year on maintenance ($490,000 total). LT also spent approximately $250,000 each year ($1,500,000) on capital improvements and expense construction such as new roads and bridges. During this time frame LT built two bridges on Green Point Creek, one at Neal Creek, a replacement bridge on Tony Creek and two other bridges were rebuilt elsewhere in the county.

Description/Key Outcomes: On HRC forest land, timber sale purchasers from 02-07 were required to improve roads by rocking, installing drainage structures, mulching and gate installation as part of the timber sales. LT's contractors graded and rocked roads as well as built new roads and bridges. This road maintenance and construction helps to reduce erosion and sedimentation into waterways.

Partners: Timber sale purchasers

16. Odell Creek Water Quality Improvements (WQ-10-02) ☑

Lead Entity: Hood River Soil and Water Conservation District (HRSWCD)

Date Completed: 2002 - 2007

Cost: $116,610 - $14,220 for Halo Stables, $17,130 for Visser fence, $17,060 for Middle Mountain Equestrian Center manure storage building, $68,200 for Odell horsekeeping demonstration project, donated time and materials for Visser plantings and dam removal

Description/Key Outcomes: Four projects addressed livestock impacts on water quality in Odell Creek. Utilizing OWEB and matching funds, gutters/downspouts, paddock footings and a manure storage building were installed in two projects at Halo Stables/Middle Mountain Equestrian Center. At RM 0.5 on Odell Creek, a 1,770 foot stretch of the creek was fenced on both sides, a small dam was removed and riparian plants installed. At the arena on Wy'East Road a demonstration site, manure storage facility, gutters, drain lines, paddock footings and an educational kiosk were installed.

Partners: Landowners, OWEB, HRWG, OSU, ODFW

17. Lower Neal Creek Riparian Area Improvements (WQ-11-02) ☑

Lead Entity: Hood River Soil and Water Conservation District (HRSWCD)

Date Completed: 2002-07

Cost: $45,560 - $13,260 for Fenner, $31,700 for Osborn, $600 for Kahler plantings and $2,000 in-kind assistance from HRWG

Description/Key Outcomes: Three OWEB Small Grant projects addressed water quality in Neal Creek. A manure storage building was constructed on the Fenner property, a bridge was installed over Neal Creek to replace a ford, and one landowner planted riparian shrubs and trees on Lenz Creek. In addition, an orchardist planted redosier dogwood on 1,500 feet of a perennial road ditch that drains into Neal Creek. Outcomes are reduced potential pollutants (manure, sediment, spray drift) in Neal Creek and improved water quality.

Partners: Landowners, ODF, NRCS, OWEB, HRWG

18. Laurance Lake Temperature Study (WQ-13-02) ☑

Lead Entity: Middle Fork Irrigation District (MFID) and U.S. Forest Service (USFS)

Date Completed: June 2005

Cost: $68,000

Description/Key Outcomes: This project continued and expanded the scope of earlier temperature monitoring efforts on Laurance Lake. In this project, MFID collected water temperature, flow, bathymetric, water quality and meteorological data at various sites in and around Laurance Lake. A computer model was then used to analyze the heat dynamics of Laurance Lake and inlet/outlet streams. The model was used to evaluate reservoir management strategies and options to reduce the observed heat discharge to Clear Branch Creek, critical habitat for threatened bull trout. A working group of stakeholders was established and met throughout the project to provide guidance. This working group continues to work with MFID to evaluate different dam management options to better meet TMDL requirements.

Partners: OWEB, DEQ, ODFW, USFS, HRWG, CTWSRO, MFID

19. Volmer Ditch Replacement (S-7-02) ☑

Lead Entity: Middle Fork Irrigation District (MFID)

Date Completed: Spring 2007

Cost: $180,000 ($99,000 USFS Title II, MFID $81,000)

Description/Key Outcomes: This project entailed replacing 7,500 feet of open ditch with 12" diameter PVC pipe line in order to conserve water and eliminate the contribution of silty, glacial water to non-glacial Trout Creek.

Partners: USFS

20. Highway 35 Corridor Maintenance Alternatives Feasibility Study (H-1-02)

Lead Entity: Oregon Department of Transportation (ODOT)

Date Completed: 2003

Cost: $150,000

Description/Key Outcomes: ODOT commissioned this study to determine where the "hot spots" for road failure are located and to develop alternatives to mitigate damage. In recent years, Hwy 35 has been impacted by debris torrents released by receding glaciers on Mt. Hood. ODOT has applied for federal emergency highway funds to address several of these "hot spots," notably Newton and Clark creeks in the Hood River drainage.

Partners: USFS, HRWG, Federal Highway Administration

21. Upper WF Neal Creek Riparian and Stream Improvements (H-6-02)

Lead Entity: Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO)

Date Completed: September 2005

Cost: $25,000

Description/Key Outcomes: The Long Prairie fence was built to exclude cattle from the West Fork Neal Creek (RM 9), tributary to Neal Creek, and will protect 0.5 miles of stream with an average buffer of seventy feet. The total fence length was 4,015 feet and was constructed according to USFS specifications. This "wildlife friendly" fence was constructed of three strands of barbed-wire and a bottom strand of barbless wire. Included were seven pull structures built with 5"-6" round posts and three wire gates.

Partners: USFS, NWSA

22. West Fork Hood River (Power Line Reach) Large Wood Placement (H-10-02)

Lead Entity: Confederated Tribes of the Warm Springs Reservation Oregon (CTWSRO)

Date Completed: August 2007

Cost: $184,000

Description/Key Outcomes: This project entailed placement of over 300 logs and 80 boulders in a 0.5 mile stretch of the West Fork Hood River, creating 21 structures. Five of these spanned the entire width of the river. The goal was to increase spawning and rearing habitat in a prime spawning area for spring Chinook and summer steelhead.

Partners: BPA, USFS, NWSA, HRWG

23. Continue and Expand Watershed Awareness and Outreach (E-4-02) ☑

Stream Care Brochure

Lead Entity: Hood River Watershed Group (HRWG)

Date Completed: 2002, reprinted in Dec. 2005 and June 2006

Cost: $900

Description/Key Outcomes: A stream care brochure was created by the HRWG to educate landowners about why and how to protect streams. The brochure has been distributed to new landowners at city and county planning office and local realtor offices. It has also been distributed at the SWCD office and at the SWCD/HRWG display at the Hood River County Fair.

Partners: Hood River County Planning Department, HRSWCD

Dirks-Edmunds and matching OWEB grants

Lead Entity: Hood River Watershed Group (HRWG)

Date Completed: June 2005

Cost: $2,000

Description/Key Outcomes: Thanks to an unexpected bequest from the estate of professor Jane Dirks-Edmunds that was matched by OWEB, the HRWG gave two $1,000 education grants in spring of 2005. One went to the HRVHS Advanced Biology class which has offered a semester-long course on stream ecology for many years. Students learn to map the stream, measure flow, identify macro-invertebrates, do water quality analysis, identify tree species and report their findings to fellow students and community members. The $1,000 was used to purchase additional Hach water quality test kits.

The other $1,000 was given to the Columbia Gorge Ecology Institute for their Secrets program. SECRETS is a six-week forest ecology curriculum that is offered to 5th graders in area schools. The program has been in place for a number of years.

Partners: Estate of Jane Dirks-Edmunds, OWEB, HRVHS, CGEI

Drought Tolerant Lawn Brochure

Lead Entity: Hood River Watershed Group (HRWG)

Date Completed: 2007

Cost: Done in-house by the HRWG

Description/Key Outcomes: A brochure describing drought tolerant dwarf tall fescue grass and tips for establishing a lawn was developed by the HRWG. In addition to the brochure, a demonstration Water Warden sod lawn was installed at the Hood River County Library. Bailey Seed donated 50 pounds of dwarf tall fescue seed to use by landowners for demonstration lawns. To date, two lawns have been seeded. The brochure has been distributed to participants at a June 17, 2007 conservation landscaping class and at the SWCD/HRWG display at the Hood River County Fair.

Partners: HRSWCD

24. Voice for the Hood River Watershed (E-5-02) ☑

Lead Entity: U.S. Forest Service (USFS)

Date Completed: September 2004

Cost: $40,300

Description/Key Outcomes: Seven signs were installed at four locations of restoration projects in the watershed. Locations included Pinnacle Creek, Clear Branch Dam, Tamanawas Falls trailhead and Green Point Creek. The signs (including some in both English and Spanish) explain the restoration work, history of the watersheds and the fish and wildlife inhabitants of each watershed. The goals were to increase public awareness of, and support for, watershed restoration work, aquatic ecology and watershed function.

Partners: HRWG, HRSWCD, ODFW, MFID, OWEB

Projects completed 2002-07 that were not listed in 2002 WAP:

25. Ditch Creek/ Emmons pipeline projects ☑

Lead Entity: Farmers Irrigation District (FID)

Date Completed: 2006

Cost: $1.2 million

Description/Key Outcomes: Sections of the FID canal along Reed Rd. were piped with twin 48" PVC pipe. Approximately 600 feet were piped where the canal crossed Ditch Creek and 3800 feet were piped at the Emmons reach. Primary benefits were improved water quality and water conservation.

Partners: DEQ SRF, ODFW, DSL, HRC

26. Avalon/Belmont/Orchard Rd. Pipeline Projects ☑

Lead Entity: Farmers Irrigation District (FID)

Date Completed: 2005-2006

Cost: $3.75 million

Description/Key Outcomes: These three units of the FID conveyance system were piped; 30,000 feet of pipe was installed. An estimated 5 cfs of water is returned to the Hood River at RM 4.0 during peak irrigation season as a result of these pipeline projects. The primary benefits were improved water quality and water conservation.

Partners: DEQ, SRF, Business Energy Tax Credit (BETC), Energy Trust of Oregon (ETO)

27. North Green Point Creek Diversion Upgrade ☑

Lead Entity: Farmers Irrigation District (FID)

Date Completed: Fall 2006

Cost: $67,000 (WHIP-$16,000, PFW $13,000, ODFW R&E $38,000)

Description/Key Outcomes: The innovative horizontal FID fish screen was installed on this diversion and a new bypass channel constructed as part of this project. Benefits include improved fish passage.

Partners: NRCS, USFWS, ODFW, FCA

28. Highline Piping ☑

Lead Entity: Farmers Irrigation District (FID)

Date Completed: Spring 2005

Cost: $355,000

Description/Key Outcomes: A 6,180 foot pipeline was completed between Kawachi's orchard on Binns Hill Rd. to Phelps Creek above York Hill Rd. using HDPE (high density polyethylene pipe). The primary benefits were improved water quality and water conservation.

Partners: Landowners

29. Ditch Creek Bridge Removal ☑

Lead Entity: Farmers Irrigation District (FID)

Date Completed: Summer 2006

Cost: Done in-house by FID, HRWG, and HRC staff

Description/Key Outcomes: A dilapidated bridge had collapsed into Ditch Creek at RM 1.0, impairing fish passage and potentially degrading water quality. The bridge was removed, one stream bank re-graded, road barricaded and two water bars installed on the road. The disturbed area was reseeded, bridge timbers burned, and remaining debris removed from the site. Outcomes included improved fish passage, reduced stream bank erosion and reduced pollution/sedimentation into Ditch Creek.

Partners: HRWG, HRC Forestry Department