This report was funded by the Bonneville Power Administration (BPA), U.S. Department of Energy, as part of BPA's program to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries. The views in this report are the author's and do not necessarily represent the views of BPA.
Hood River Fish Habitat Project
Confederated Tribes of the Warm Springs Reservation of Oregon
(CTWSRO)

ANNUAL REPORT

Submitted by
Alexis Vaivoda and Joe McCanna

Project No. 1998-021-00
Contract No. 00005645

December 2004
ABSTRACT

This report summarizes the project implementation and monitoring of all contract activities in the Hood River basin that occurred over the October 1, 2003, to September 30, 2004, period (FY 04). The following description of activities is organized according to objective and task as provided in the FY 04 statement of work for project 1998-021-00. Some of the objectives in the corresponding statement of work for this contract were not completed within FY 04. A description of the progress during FY 04 and reasoning for deviation from the original tasks and timeline are provided.

Alexis Vaivoda and Joe McCanna
TABLE OF CONTENTS

ABSTRACT.................................................................................................................................i
TABLE OF CONTENTS.................................................................................................................ii

OBJECTIVE 1. Provide coordination of all activities, administrative oversight and assist in project implementation and monitoring activities.................................................................1

OBJECTIVE 2. Coordinate, implement, and revise, as needed, the Hood River Fish Habitat Protection, Restoration, and Monitoring Plan.................................................................1

OBJECTIVE 3. Monitor and evaluate the changes in fish presence and available habitat in relation to the design, construction, and implementation of the Central Lateral Canal upgrade and invert siphon.................................................................1

OBJECTIVE 4. Monitor and evaluate changes in fish presence and available habitat in relation to the modification of two culverts on Baldwin Creek.................................................................5

OBJECTIVE 5. Evaluate the alternatives for changes to the Dee Irrigation District’s diversion on the West Fork Hood River for improved fish passage.................................................................8

OBJECTIVE 6. Construct and maintain riparian fence to stabilize and improve the riparian zone along the East Fork Hood River tributaries.................................................................9

REFERENCES...........................................................................................................................13
APPENDIX A..............................................................................................................................follows page 14

LIST OF TABLES

Table 1. East Fork Irrigation District November 2003 fish salvage species distribution..................4
Table 2. Fish salvage results for the Lower Baldwin Creek Culvert Project by date and species, 2004.................................7

LIST OF FIGURES

Figure 1. This photo shows the most upstream end of East Fork Irrigation District’s Central Lateral Canal Project. The structure shown here is used to remove debris from the water before the canal enters the pipeline. This is the point where the Main Canal splits to Duke’s Valley and the Central Lateral.................................................................3

Figure 2. An example of the ditch and the installation of the 72” HDPE pipe........................................3

Figure 3. The downstream end of the first phase, this is where the second phase of the project will begin in December 2004.................................................................4

Figure 4. The number of salmonids recovered from the Neal Creek Lateral below the Neal Creek diversion for 1999 – 2003.................................................................5

Figure 5. Pre and post project longitudinal profiles of the Lower Baldwin Creek Culvert Project, 2004.................................................................6

Figure 6. Pre and Post Project photos of downstream outlet of the Lower Baldwin Creek Culvert Project, 2004.................................................................7

Figure 7. Culvert removal and footing placement for the Lower Baldwin Creek Culvert Project, 2004.................................................................8

Figure 8. Arch placement and arch covering for the Lower Baldwin Creek Culvert Project, 2004........8

Figure 9. Emil Creek fencing project 2004, depicting the width of the exclosed area, approximately 50 m.................................................................11

Figure 10. Emil Creek fencing project 2004, fenced livestock crossing................................................11

Figure 11. Neal Creek fencing project photo points 1996-2004. The 1996 flood created a new channel for Neal Creek, causing alignment through this pasture. The fencing project was designed to exclose livestock from the new channel. Notice the exposed bank in the 1996 photo.................................................................12
OBJECTIVE 1. Provide coordination of all activities, administrative oversight and assist in project implementation and monitoring activities.

Administrative oversight and coordination of the habitat statement of work, budget, subcontracts, personnel, implementation, and monitoring was provided. Mick Jennings provided most of this oversight and coordination as the Hood River Production Program Project Manager.

OBJECTIVE 2. Coordinate, implement, and revise, as needed, the Hood River Fish Habitat Protection, Restoration, and Monitoring Plan.

The Hood River Fish Habitat Protection, Restoration, and Monitoring Plan was completed in 2000 (Coccoli et al., 2000). This document was utilized for many purposes including: drafting the Watershed Action Plan (Coccoli, 2002), ranking projects for funding, and prioritizing projects to target in the future. This document has been reviewed by many, including stakeholders, agencies, and interested parties. Holly Coccoli, the Hood River Watershed Group Coordinator and author of the Hood River Fish Habitat Protection, Restoration, and Monitoring Plan has updated and revised the plan. Changes were incorporated into the Hood River Subbasin Plan (HR Plan). The final HR Plan was completed in August 2004. Coccoli was the primary author of the plan, and it is available on the web at: www.nwpcc.org/fw/subbasinplanning/hood/plan/ES_Intro.pdf. The HR Plan defines fish and wildlife current conditions, goals, objectives, and strategies, in the Hood River subbasin (Coccoli, 2004). The EDT model used to outline physical conditions addressed both current conditions and several possible future scenarios. The HR Plan will be used in the future to revise the Watershed Action Plan and support requests for fish and wildlife monitoring and habitat restoration projects.

OBJECTIVE 3. Monitor and evaluate the changes in fish presence and available habitat in relation to the design, construction, and implementation of the Central Lateral Canal upgrade and invert siphon.

The East Fork Irrigation District (EFID) diverts 45 cfs from Neal Creek, a tributary to the mainstem Hood River, into an irrigation ditch to serve orchardists in the lower east valley. The low head diversion dam is not a barrier to adults; however, a 32-inch diameter by 100-inch long rotary fish screen located in the ditch 100 meters downstream is inadequate to handle the volume of water in the ditch. At full operation, irrigation water tops the screen allowing fish access into the irrigation canal system. Salvage operations have found steelhead/rainbow trout and cutthroat trout throughout the Neal Creek ditch and lateral canals. Approach velocities were estimated at 2 ft/s; approximately five times the NOAA Fisheries standard (0.4 ft/s). Also, the mesh size of the rotary screen (1/8 inch) does not meet NOAA Fisheries criteria of 3/32 inch.

This project is designed to eliminate glacial sediment in Neal Creek and passage problems at the Neal Creek diversion (RM 5.0), as well as water loss in relation to the irrigation ditch. This
The Neal Creek Invert Siphon / Central Lateral Canal Upgrade Project will have multiple benefits including: eliminating interbasin transfer of glacial water to a clear water stream, eliminating a fish passage barrier, solving a problem of fish entrainment in the Neal Creek lateral, and reducing water loss due to evaporation and seepage. The entire project is scheduled to occur over four years (2003-2007), and is estimated to cost $10 million. This project has multiple funding sources in addition to BPA; secured dollars so far include the following sources: OWEB, Pacific Coastal Salmon Recovery Fund, USFS Title II Funds, a DEQ loan, and the EFID patrons. BPA funding is expected to comprise no more than 20% of the total funds for the project.

A conceptual design and scope of work proposal for this project including cost estimates were prepared by SJO Consulting Engineers for the EFID and were approved by the EFID Board of Directors. Preliminary designs were completed in 2002. The work has been divided into three phases (upper, middle and lower) due to the large size of the project. The upper phase was initiated in 2003, and was completed in February 2004. The upper phase consists of a water divider and debris grate set in a concrete foundation at the beginning of the project (Figure 1), 900’ of concrete pipe, and approximately 5,000’ of 72” HDPE (Weholite) pipe. The $492,000 that BPA contributed in FY 2004 to this project was spent on the HDPE pipe and its installation (Figure 2). The upper phase begins at the Central Lateral and Duke’s Valley Lateral split adjacent to highway 35 and continues approximately 1.0 mile down to the Booth Hill Rd. crossing (Figure 3).

During 2003 and 2004, there were several meetings with the EFID to discuss the status of the Neal Creek Invert Siphon / Central Lateral Canal Upgrade Project. SJO Engineering updated the group on the proposed pipe route, estimated costs, and completion of the engineering designs. NEPA requirements for the first phase were completed before the project was initiated in 2003. The NEPA document for the entire project was completed in September 2004. The last part of the NEPA requirements included the cultural resource surveys for the second and third phases. This enabled completion of the NEPA checklist. Following the completion of the checklist, the BPA environmental specialist completed the Supplemental Analysis.

The monitoring and evaluation for this project includes water quality, macroinvertebrate assemblages, photo monitoring, and fish presence/absence in the irrigation canal. Water quality monitoring includes, temperature, dissolved oxygen, and conductivity. The water quality and macroinvertebrate pre-project monitoring for this project will be collected over two irrigation seasons; March through November in 2005 and 2006. The Central Lateral Project will be completed during the winter of 2006-2007. The water quality and macroinvertebrate post-project monitoring will occur March through November 2007 and 2008. Due to the large scale of this project the benefits from the project will not be attained until the entire project is completed. Salvage operations occur annually in November in the East Fork Irrigation District (Table 1). These activities have occurred since 1999 (Figure 4). Excluding 2001, the number of salmonids recovered in the Neal Creek Lateral has been fairly consistent ranging from 572-859. In 2001, the salvage operations occurred during a cold snap. This caused the remaining water in the canal to freeze making it difficult to recover fish. Upon project completion, it is expected that the number of fish recovered from the Neal Creek Lateral will be minimized; eventually eliminating the need to do salvage operations below the EFID Sand Trap and Coanda Fish Screen.
The second phase is expected to begin in December 2004, so salvage operations will occur in November 2004 after the irrigation ditch is drawn down. The results of the 2004 salvage will be included in the FY 2005 Annual Report (Project No. 1998-021-00). Continued fish salvage in the irrigation canal will be coordinated with EFID to monitor fish presence and eliminate entrainment of residual fish that live and over winter in the Eastside Irrigation Canal.
Figure 3. The downstream end of the first phase, this is where the second phase of the project will begin in December 2004.

Table 1. East Fork Irrigation District November 2003 fish salvage species distribution.

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>steelhead/rainbow trout</th>
<th>cutthroat trout</th>
<th>sculpin</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neal Creek Lateral</td>
<td>10/3/03</td>
<td>843</td>
<td>16</td>
<td>130</td>
<td>989</td>
</tr>
<tr>
<td>Central Lateral</td>
<td>10/3/03</td>
<td>122</td>
<td>0</td>
<td>29</td>
<td>151</td>
</tr>
<tr>
<td>Headgate to Sandtrap</td>
<td>10/6/03</td>
<td>544</td>
<td>0</td>
<td>53</td>
<td>597</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>1,509</strong></td>
<td><strong>16</strong></td>
<td><strong>212</strong></td>
<td><strong>1,737</strong></td>
</tr>
</tbody>
</table>
Figure 4. The number of salmonids recovered from the Neal Creek Lateral below the Neal Creek diversion for 1999 – 2003.

OBJECTIVE 4. Monitor and evaluate changes in fish presence and available habitat in relation to the modification of two culverts on Baldwin Creek.

A culvert replacement project was completed on Baldwin Creek, tributary to the East Fork Hood River (RM 2.1). Native populations of Hood River steelhead trout have been listed as a Threatened Species under the Endangered Species Act. Baldwin Creek has been designated as Essential Fish Habitat for steelhead by the Department of State Lands and also supports coho salmon and cutthroat trout (Coccoli, 1999). Presence of cutthroat and rainbow trout has been confirmed by Confederated Tribes of Warm Springs (CTWS) surveys. Fish passage barriers and water quality have been identified as problems on Baldwin Creek (Coccoli, 2002). Two culverts on private property owned by a single landowner, located on Baldwin Creek at river mile 1.0 and 1.1, were analyzed by Inter-Fluve during the spring of 2002 and were found to impede fish passage. Preparation for this project began in FY 03 with the intent of replacing these two culverts with bottomless arches. A subsequent budget shortage prompted the delay of the project until FY 04. A change in the road composition over the upper culvert and a decision by the landowner during the intervening year eliminated the upper of the two culverts from the project.

The replaced culvert was a 20-foot long 72-inch circular culvert with three-inch corrugations and acted as a barrier to juvenile upstream migration at all flows and as a barrier to adult fish migration during most flows. Passage problems developed from the culvert being undersized (maximum capacity of 178 cfs), having a one-foot drop at the outlet with a one-foot jump pool, and a 2.3% slope. Oregon Department of Fish and Wildlife (ODFW) criteria allow a maximum six-inch entrance jump for trout and steelhead juveniles, a minimum two-foot jump pool, and a culvert slope of no greater than 0.5%. NOAA Fisheries guidelines state that any culvert
replacement structure shall be designed to withstand the 100-year peak flood flow without structural damage to the crossing and shall exceed the bankfull channel width. A 100-year event at this site was calculated by the Oregon Department of Forestry to be 658 cfs. CTWS stream surveys show an average bankfull width in the areas above and below the culvert site to be eleven-feet with an average slope of 1.5%. With these criteria and landowner preferences considered, a stream simulation strategy utilizing a 4’8” high x 15’ wide x 20’ long bottomless arch capable of handling 411 cfs was chosen for the design. This crossing will simulate a natural stream bottom, will provide fish passage at all flows, and will be adequate to handle most flows. An armored overflow depression in the road fill at a location away from the crossing and at an elevation lower than the top of the bottomless arch, was included in the design to accommodate flood waters greater than 411 cfs.

Permits from the Army Corps of Engineers and Oregon Division of State Lands were issued in March of 2003. BPA consulted with NOAA Fisheries under Section 7 of the ESA. This project was approved under NOAA Fisheries 2003 Biological Opinion on Habitat Improvement Programs (HIP BO). Informal correspondence with NOAA Fisheries concerning applicability of project with HIP BO terms and conditions confirmed project approval on April 19, 2004. The terms and conditions of the HIP BO required salvage of fish from within the construction area. Incidental take of threatened steelhead was allowed under the HIP BO as determined by BPA. BPA determined that no cultural resources would be affected. The NEPA Compliance Checklist and the HIP BO Consistency Form were completed and authorization for this project was granted in May of 2004. Longitudinal profiles (Figure 5) and photos of the culvert were taken prior to and after construction (Figure 6).

Figure 5  Pre and post project longitudinal profiles of the Lower Baldwin Creek Culvert Project, 2004.
Figure 6  Pre and Post Project photos of downstream outlet of the Lower Baldwin Creek Culvert Project, 2004.

Culvert removal and arch construction began on August 30, 2004 and was completed on September 2, 2004. The instream work period for Baldwin Creek extends from July 15th to August 30th. An instream work extension was issued by the Oregon Department of Fish and Wildlife for instream work occurring on September 1st. Blocknets were placed upstream and downstream of the work site and fish were salvaged from the work area prior to any instream work (Table 2). Fish were salvaged with the use of a backpack electroshocker and in accordance with NOAA Fisheries Guidelines. No mortalities occurred as a result of fish salvaging.

<table>
<thead>
<tr>
<th>Date</th>
<th>Cutthroat (O. clarkii clarkii)</th>
<th>Rainbow (O. mykiss)</th>
<th>Cope’s Giant Salamander</th>
<th>Crayfish</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 31, 2004</td>
<td>11</td>
<td>8</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>September 1, 2004</td>
<td>4</td>
<td>7</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 2. Fish salvage results for the Lower Baldwin Creek Culvert Project by date and species, 2004.

After overburden removal and excavation for the footings, precast concrete footings were placed on the south side and the culvert was removed (Figure 7). After additional excavation, the footings were placed on the north side. A few large boulders were placed in the channel, the prefabricated arch was placed and attached to the footings, and the arch was covered with overburden (Figure 8). Wingwalls composed of riprap were placed on the banks upstream and downstream of the crossing to deter erosion and undercutting of the bottomless arch. Native grass seed was spread over the disturbed areas and was covered with hay. Additional photos and longitudinal profiles will be taken over time to monitor changes in riparian development and channel geomorphology.
OBJECTIVE 5. Evaluate the alternatives for changes to the Dee Irrigation District’s diversion on the West Fork Hood River for improved fish passage.

The Dee Irrigation District (DID) diverts approximately 12 cfs from the West Fork Hood River at river mile 6.0 from July through September each year to provide irrigation water to orchards and farms in the mid-valley region. Currently, the diversion is thought to possibly 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. The objective of this feasibility study was to investigate the options and alternatives to provide unimpeded upstream adult migration for spring chinook salmon, summer steelhead, and resident trout into the upper West Fork Hood River at all flows by making changes to the DID diversion.
This feasibility study assesses the practicality and impacts of options of alternative intake systems to replace the existing diversion while achieving the fish passage goals described above. This report was written by Holly Coccoli and Dave Compton, and was the result of a collaborative effort between Middle Fork Irrigation District (MFID), DID, Farmers Irrigation District, ODFW, HRSWCD, and CTWS. The entire report is included as Appendix A. The following conclusions were made regarding the options of eliminating the DID diversion:

- An intertie serving DID from MFID sources would require formal approval by district and patrons.
- 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 minimum cost for engineering and construction alone of the intertie supply conveyance and upgrades in MFID for the project is $2.3 million. The estimated minimum cost for converting DID to a pressure pipe system that would connect to the MFID is $352,704 for an in-house construction approach. This could rise to over $1 million if a standard engineering and contract bidding process was required, which is expected if federal or state funds were used.
- A consensus on whether a net benefit to fish would be generated by the project is not a forgone conclusion at this time, and several agencies are skeptical that a net benefit would exist.
- Significant financial and human resources. There is a question of who would act as the lead entity and project manager, and where the human resources and additional staffing for grant writing and project management would come from to handle this project.
- It appears to provide far more certainty, and may generate greater benefits on a cost and effort basis – to address water management efficiency, streamflow restoration, and fish passage needs within each district while maintaining the status quo in terms of independent water sources, but cooperating between districts where needs and opportunities are clear.

These conclusions are based upon the feasibility of water transfer or exchange under Oregon Water Law, the benefits and impacts to fish populations, water supply requirements in DID, water availability from the Middle Fork Hood River, and the estimated cost of delivery. Following these conclusions, discussions regarding water efficiency and fish passage have been spurred and will be ongoing projects within each responsible district and involved agencies. The conclusions of this study indicate that evaluating the effects of the DID diversion on fish passage, and addressing on-farm water management efficiency are the next step in restoring habitat and streamflows in the West Fork Hood River.

**OBJECTIVE 6. Construct and maintain riparian fence to stabilize and improve the riparian zone along the East Fork Hood River tributaries.**

Land use in the East Fork Hood River subbasin consists of orchard, forest, pasture, and growing single-family residential development. Many creeks are designated as Essential Habitat for steelhead trout listed as a threatened under the ESA. East Fork Hood River tributaries are also known to support coho salmon, rainbow trout, and cutthroat trout. Habitat problems include passage hindrances, high summer temperatures, elevated nutrients, bacterial contamination, low
dissolved oxygen, sedimentation, and streambank erosion. Non-point pollution sources include livestock access to streams, feed pens adjacent to streams, wetland drainage, riparian vegetation removal, highway maintenance activities and road runoff. Water uses include irrigation, livestock watering, and support of indigenous fish and wildlife. It is likely that the salmonid temperature standard (17.8° C, 7-Day Moving Average) is exceeded in some of the East Fork Hood River tributaries.

A riparian fence project was completed on Emil Creek (RM 0.0-0.3), tributary to the East Fork Hood River, on August 17, 2004 after two weeks of construction. Emil Creek is listed as Essential Salmon Habitat by the Division of State Lands and may support coho and ESA listed winter steelhead (Coccoli, 1999). Applied Archaeological Research conducted a cultural resources survey in June of 2004. No cultural resources were found as a result of this survey and the determination that “no historic properties will be affected” was granted by BPA on July 14, 2004. A Categorical Exclusion was granted by BPA on July 23, 2004 for any further NEPA requirements.

The Emil Creek fence was built to exclude horses from Emil Creek and will protect 457 meters of stream with an average buffer of 21 meters (Figure 9). The total fence length was 692 meters and was constructed of four-strand barbless-wire with 5”-6” round posts as the pull structures. A fenced livestock crossing (Figure 10) and five gates were installed to allow portioning of the land. Postholes were dug with a tractor auger (12 inches in diameter) and by hand with a posthole digger and metal t-posts were driven with a post pounder every ten feet along the fenceline. Round posts were substituted for every fourth t-post for added strength. An Americorps team was subcontracted for the project to help with construction. The riparian vegetation was still intact and was composed of a hardwood conifer mix. Photopoints were taken of the fencing site before the fencing project began and after the project was completed.

The short-term benefit of this riparian fence exclosure is to remove sources of erosion and reduce disturbance levels within the riparian corridor. This fence will also act to protect the riparian areas that were still intact. The long-term benefit is to restore and protect a portion of the riparian corridor to a more natural and higher functioning state. The ultimate goal is to increase salmonid habitat and increase egg and juvenile survival. Photopoints will be used to document changes and monitor the project.
Fencing projects have been on-going with cooperation from the Hood River Watershed Group, Hood River Soil and Water Conservation District, Oregon Department of Fish and Wildlife, and CTWS since 1996. Continuing monitoring of these projects shows great success. For example, one of the earliest projects was completed in 1996 on Neal Creek. This project came about because the flood of 1996 changed the location of the Neal Creek channel, resulting in areas of heavy erosion through pastureland. This project targeted water quality enhancement through
livestock exclusion. Neal Creek aquatic habitat parameters were taken from ODFW Aquatic Inventories reports. The channel setback for the fence is 3.0-4.5 m. The Hood River Watershed Group planted a mix of alders, seedling pine, and grasses after project completion. CTWS and the landowner have monitored this project over the last eight years (Figure 11).

Figure 11. Neal Creek fencing project photo points 1996-2004. The 1996 flood created a new channel for Neal Creek, causing alignment through this pasture. The fencing project was designed to exclose livestock from the new channel. Notice the exposed bank in the 1996 photo.
REFERENCES

APPENDIX A

The Feasibility of an Alternative Water Supply for Dee Irrigation District From the Middle Fork Hood River

Middle Fork Irrigation District
September 2004

Prepared for the
Confederated Tribes of the Warm Springs Reservation
Hood River Fisheries Program
Table of Contents

1. Background and Purpose ........................................................................................................ A-2
2. Existing Water Diversion in the Middle Fork and Dee Irrigation Districts......................... A-3
3. Feasibility of Water Transfer or Exchange under Oregon Water Law ......................... A-5
4. Benefits and Impacts to Fish Populations ........................................................................... A-8
5. Water Supply Needs in Dee ID and Water Availability from the Middle Fork Hood River ................................................................. A-9
6. Estimated Cost of Delivery Infrastructure and Dee System Improvements ..................... A-10
7. Opportunities for Increased Efficiency and Water Savings in the Dee ID and MFID ...... A-11
8. Additional Considerations from an Irrigation District Perspective ................................. A-11
9. Summary and Conclusions ................................................................................................. A-12
1. Background and Purpose

Middle Fork Irrigation District (MFID) has prepared this study to examine the feasibility of providing the Dee Irrigation District (DID) with irrigation water. This idea has been discussed for many years among irrigation districts and area fish biologists as having the potential to enhance water management efficiency and fisheries restoration in the Hood River watershed. The discussion has occurred in the context of cooperative fish recovery and natural resource conservation efforts since the early 1990s on the part of Hood River irrigation districts, state, local, and federal government, Bonneville Power Administration, and the Confederated Tribes of the Warm Springs Reservation.

The DID operates a water diversion on the West Fork Hood River that is believed to impede the migration of anadromous fish. The DID water conveyance and distribution system consists of open ditches that are leaky and inefficient, requiring growers to use a rotation system that allows irrigation only ¾ of the actual time required (Farmers Irrigation District, March 1998). An alternative water supply from the Middle Fork Hood River via an intertie pipeline, if feasible, could allow DID to abandon the diversion dam, eliminate a fish migration barrier, and restore stream flow to the West Fork to benefit fish. In addition, ditches within DID could be converted to a pressurized pipe system to improve water use efficiency and water supply, and eliminate grower pumping costs. On-farm irrigation upgrades could further promote the efficient use of water while fully meeting irrigation needs. A concept paper on this subject was prepared by the Farmers Irrigation District and MFID in March 1998 entitled A Cooperative Conservation Proposal. An initial review by the Oregon Water Resources Department indicated that approval for a water rights transfer between the two districts was unlikely due to the potential for injury to water rights in the Middle Fork. However, subsequent discussions with the Department have been somewhat more optimistic, and have kept the idea “alive”. This feasibility study was prepared for the CTWS to assist future water resource and fisheries plans in the Hood River watershed by providing more definitive information about the proposal from the standpoint of pipeline and facilities costs, water supply, water rights, and other considerations.

2. Existing Water Diversion in the Middle Fork and Dee Irrigation Districts

Middle Fork Irrigation District

The Middle Fork Irrigation District (MFID) is located in the Upper Hood River Valley. MFID operates an on-demand pressurized irrigation water distribution system serving 6,365 acres of primarily fruit orchards and other field crops. Three hydroelectric power generation stations are operated year round. The District relies on both natural stream flow and storage in Laurance Lake for the irrigation water supply. High quality clear water from Pinnacle and Clear Branch creeks is impounded in Laurance Lake behind Clear Branch Dam. MFID directly diverts from the glacially influenced Coe Branch and Eliot Branch into their distribution system, along with several other smaller diversions on the valley floor. Managing these sources together provides some flexibility in meeting water demands within the district given variable water quality (glacial sediment) and water supply situations.
Except for Eliot Ditch (1.0 mile), Volmer Ditch (1.8 mile) and part of Glacier Ditch (3.6 miles) the distribution system is a closed pipeline facility. Over 60 miles of 4” to 48” diameter mostly buried pipeline delivers pressurized water to more than 420 farm turnouts. Water discharged from Powerhouse No. 3 is used for down-slope irrigation or returned directly to Rogers Creek. Except for required overflow water at fish and trash screens, there are no additional return flows in the District. In recent years, peak water use from all MFID sources combined is about 62 cfs. In order to fulfill the calculated peak period (July) irrigation requirement for all 6,365 acres of pears at a full delivery rate (5.6 gpm), the required MFID system capacity is about 158 acre-feet/day or 79.66 cfs. The table below shows typical irrigation diversion amounts for a range of water supply conditions.

### TYPICAL MONTHLY IRRIGATION DIVERSION AMOUNTS 1/

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>April</td>
<td>9.2</td>
<td>10.2</td>
<td>13.5</td>
</tr>
<tr>
<td></td>
<td>May</td>
<td>18.0</td>
<td>10.4</td>
<td>17.7</td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>52.9</td>
<td>54.8</td>
<td>33.0</td>
</tr>
<tr>
<td></td>
<td>July</td>
<td>60.5</td>
<td>61.7</td>
<td>55.1</td>
</tr>
<tr>
<td></td>
<td>August</td>
<td>59.7</td>
<td>59.6</td>
<td>56.3</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>22.6</td>
<td>32.2</td>
<td>33.2</td>
</tr>
<tr>
<td></td>
<td>October</td>
<td>22.8</td>
<td>6.4</td>
<td>8.8</td>
</tr>
</tbody>
</table>

1/ From MFID annual Water Use Reports to Oregon Water Resources Department.

### Dee Irrigation District

The Dee Irrigation District serves 30 irrigators on 889 acres of mostly orchard in the area known as the Dee Flat. The DID is situated downhill and west of the Middle Fork Irrigation District. In recent years, the peak irrigation water demand in the DID has been approximately 12 cfs as indicated by flow measurements in the Dee Irrigation Canal. MFID measured flows in the lower Dee Canal between July 29 and September 14, 2004 as shown in the chart below. Canal flows ranged from a low of 5.43 cfs on September 10 to a high of 11.51 cfs on August 25.

The Oregon Water Resources Department operated a stream gage in the Dee Irrigation Canal between 1925 and 1989. Data from this record is shown below for the 10-year period between 1980 and 1989.
3. Feasibility of a Water Transfer or Exchange under Oregon Water Law

A meeting was held on August 10, 2004 with Robert L. Wood, District 3 Watermaster for the Oregon Water Resources Department (OWRD) to discuss whether a water rights transfer or exchange between the Middle Fork Irrigation District (MFID) and the Dee Irrigation District (DID) is possible, and under what conditions. Subsequently, Wood conducted further research about the legal mechanisms that might be available to facilitate a water supply for DID using MFID water sources. Although he stressed that a detailed proposal would be necessary to make a definitive evaluation, the following information was compiled for the purpose of this feasibility study.
A standard water rights transfer, such as a Point of Diversion or Place of Use transfer, is not a workable approach in this situation because transfers are not applicable to different water bodies in different tributary subbasins. In 1998, OWRD staff indicated that they could not support a proposal to allow a transfer in point of diversion from the West Fork to the Middle Fork of the Hood River (letter from Larry Toll, dated June 15, 1998 to Jerry Bryan and Bill Stanley). The reasons stated included 1) the possible injury to water rights in the Middle Fork basin, where newer priority date users in MFID could be regulated off in favor of older DID users; 2) the proposal would cause further shortages of water given that water availability already showed a net shortfall of water in the Middle Fork; and 3) such a transfer would require a major policy change. OWRD staff later suggested that their Conserved Water or Water Rights Exchange programs, in theory, might facilitate an alternative water supply to DID from MFID sources. However, approval under either of these programs appears to be uncertain at best given program requirements, including strict water rights mitigation.

The Conserved Water Program

The Conserved Water Program (ORS 537.455-500; OAR 690-018) allows a water user who conserves water to use a portion of the conserved water on additional lands, lease or sell the water, or dedicate the water to instream use. In exchange for granting the user the right to “spread” a portion of the conserved water to new uses, the law allocates a portion to the state for instream use. After mitigating the effects on any other water rights, the Water Resources Commission allocates 25% of the conserved water to the state for an instream water right, and 75% to the applicant, unless the applicant proposes a higher allocation to the state, or more than 25% of the project costs come from federal or state non-reimbursable sources. The original water right is reissued to reflect the quantity of water being used with the improved technology, and the priority date stays the same. Another water right certificate is issued for the conserved portion with either the same priority date, or a priority date of one minute after the original water right (http://www.wrd.state.or.us/programs/stewardship/conserved.shtml). DID could possibly dedicate or lease its existing water rights back instream to the West Fork, or change these to a supplemental source for emergencies. Any land parcels that are currently without irrigation water rights within MFID may be first in line for conserved water before any DID lands could be served.

The Conserved Water Program might serve to allow lands now supplied by DID to be supplied from water savings generated within MFID. MFID could potentially report conserved water savings generated in the last 5 years through piping, on-farm efficiency or other projects. For example, to supply DID with 10 cubic feet per second (cfs) using the Conserved Water Program, MFID would be required to generate and/or document water savings of 15 cfs within their system (10 cfs for DID, and 5 cfs to be dedicated back instream) without affecting any downstream water rights. This example assumes that one-half of the conservation project cost was funded by state or federal grants. A common problem in OWRD’s experience in trying to implement this program is that return flow and water rights injury issues often limit the amount of water determined to be conserved and available for new uses. For example, if a water right in the Middle Fork will have less water available to it because of the conserved water project, then
that would likely be viewed as an “injury” to that right. (Tony Justus, Oregon Water Resources Department, pers. comm., 9/13/04).

**Water Rights Exchange**

The second potential legal mechanism is a Water Rights Exchange (ORS 540.533-543; OAR 690.380-2660). Any person holding a water right subject to transfer (such as a certificated water right, or a perfected permit), or any person applying for or holding a permit for use of water for an instream purpose may apply for permission to use stored, surface or ground water from another source in exchange for supplying replacement water in an equal amount to satisfy prior appropriations from the other source (http://lic.oregon.gov). If approved, a new water right for exchange purposes would be issued from the Middle Fork for use within DID as part of an exchange that would leave an equal amount of water as instream flow in the West Fork Hood River—essentially a trade. In order to be approved, it must first be determined that 1) a new water right can be issued from the Middle Fork given that the instream water right is not met; and 2) in order to advance in the process – that state, federal and tribal fish resource agencies support the exchange and consider it a net benefit to fish or the environment. If instream water rights in the Middle Fork Hood River (Certificate No. 75230) are found to be impaired, the resource agencies would need to agree that the water rights exchange would produce an overall benefit to the Hood River fish populations. Support by state, federal and tribal fish resource agencies is critical in determining whether OWRD would approve an exchange. Consultation with fish agencies is required by OAR Chapter 690, Division 33 to aid the Department in determining how a proposed water use affects the public interest with regard to sensitive, threatened, or endangered fish species.

Two state instream water rights established for the purpose of anadromous and resident fish habitat are relevant to this study. These include the Middle Fork Hood River from Eliot Branch at River Mile 9.1 to the mouth (Certificate No. 75230) and the West Fork Hood River from Lake Branch at River Mile 5.6 to the mouth (Certificate No. 75619). Both certificates have priority dates of 1991. According to an OWRD Water Availability model report from November 1997, the instream water right in the Middle Fork Hood River is not met from April through August, and the instream water right in the West Fork is not met from June through November. Stream flows needed to meet instream water rights range from 33 cfs to 89 cfs in the Middle Fork, and from 8 cfs to 75 cfs in the West Fork during these months. Monthly flow statistics in the West Fork Hood River and the instream water right amounts are shown in Figure 1. Stream gage data is not available for the Middle Fork Hood River. The monthly instream water rights for the Middle Fork Hood River in Certificate No. 75230 are: January – March, 150 cfs; April, 221 cfs; May, 246 cfs; June, 233 cfs; July, 150 cfs; August, 140 cfs; September, 100 cfs; October, 116 cfs; November, 145 cfs; and December, 150 cfs.
Figure 1. Monthly discharge statistics from the West Fork Hood River at Dee USGS Station No. 14118500 for period of record 1954–1991, in comparison to the flow rates on West Fork Hood River instream water right in Certificate No. 75619

The following detailed information would be needed for the OWRD to evaluate a water rights exchange:

1. Streamflow data or OWRD’s Water Availability Model report for the Middle Fork and West Fork Hood River (such as given above)

2. System capacity for the Middle Fork ID

3. Actual water use rate in each district.

4. Paper water rights rate in each district.

5. Maps of the area showing the districts, diversion points, and water rights.

6. Under a water rights exchange, how much water would be taken from the Middle Fork Hood River, how much will be left in the West Fork, where would the water be diverted from, would there be any change to return flows to the Middle Fork? Would other water rights in MFID be injured? Would any other water rights in the Middle Fork subwatershed be injured?

7. Are all other water rights except the instream right in the Middle Fork satisfied?
8. What would happen to the Dee ID rights from the West Fork if an exchange where approved? Is it possible to convert the Dee ID rights to supplemental or would they have to be cancelled?

9. Do the fish resource agencies support the proposed exchange?

4. Benefits and Impacts to Fish Populations

Bull trout and steelhead in the Hood River Subbasin were listed as threatened species under the Endangered Species Act in 1998. The West Fork Hood River supports summer run steelhead and spring chinook. Spring chinook have been reintroduced to the West Fork from Deschutes River stock, as the native Hood River spring chinook were extirpated by the 1970s. Bull trout inhabit the Middle Fork Hood River and several of its tributaries. A draft Bull Trout Recovery Plan was prepared by the US Fish and Wildlife Service in 2003 that outlines measures to assist recovery of the bull trout population in the Hood River Subbasin. Several streams in the Middle Fork Hood River, including Clear Branch, support winter run steelhead. Each of these fish species is the focus of recovery actions and cooperative habitat improvement efforts in the Hood River Subbasin. Responsible agencies include the US Forest Service, the US Fish and Wildlife Service, the Confederated Tribes of the Warm Springs Reservation, Oregon Department of Fish and Wildlife, and NOAA Fisheries.

Improving fish migration at water diversions and restoring streamflows are among the highest priority actions identified in federal, state, tribal, and local plans for fish recovery. The approach in the Hood River watershed is to use cooperative partnerships to design projects, obtain permits, and secure design and construction grant funds to pay or offset project costs. The streamflow restoration strategy is largely voluntary and depends on water savings generated by ditch to pipe conversion or other efficiency measures. Watershed plans identify the need for fish passage and flow restoration at sites in both the West Fork and Middle Fork Hood River, as well as the East Fork Hood River.

There is a concern that the DID diversion dam located near River Mile 6.0 on the West Fork of the Hood River is a partial barrier to migrating adult anadromous fish including spring chinook salmon and summer steelhead, and that maintenance of the dam results in periodic disturbance and degradation of fish habitat. If the DID water supply was replaced, then the diversion could be abandoned and the stream channel restored. Although the DID canal has an adequate fish screen, the diversion uses a push up dam or weir with large boulders to direct water into an intake. The boulder weir is routinely adjusted with heavy equipment, causing period streambed disturbance and siltation. Replacement of the diversion dam with a more fish-friendly design appears to be costly (Mick Jennings, Confederated Tribes Warm Springs Reservation, pers. comm.) given the geology and other site limitations. Ideas for remediation of the have ranged from moving the diversion upstream 150 feet to gain elevation so that the boulder weir would not be needed, hanging pipe on bedrock wall, and boring through bedrock, however, no engineering studies or construction cost estimate has been completed at this time. Funding for such a project would be sought through the Pacific Coastal Salmon Recovery Fund, and/or other public sources.
If a 10 cfs exchange or transfer from MFID to DID was implemented, summer and fall streamflows in the West Fork could be increased by 2.5 to 8.4% at the USGS Gage, and by considerably higher amounts in the 0.7 mile reach from the DID diversion and the mouth of Lake Branch. The principal species and life stages in the West Fork Hood River likely to benefit from the flow increase would include adult holding, migration, and juvenile rearing for spring chinook and summer steelhead, and spawning for spring chinook. Alternately, if a water rights exchange results in a decreased streamflows in the Middle Fork Hood River, bull trout and/or steelhead life stages could be negatively affected by some increment. The US Fish and Wildlife Draft Bull Trout Recovery Plan implementation schedule identifies improving stream flows at diversions by securing instream flows and/or water rights as a high priority task to restore habitat connectivity and opportunities for migration for bull trout. The US Forest Service has expressed an interest in having the MFID conduct instream flow studies to satisfy federal Endangered Species Act consultation requirements for MFID facilities on the National Forest lands. For the last several years during June and July, MFID has augmented streamflow releases below Clear Branch Dam on a voluntary basis to maintain steelhead redds.

In summary, it is likely that the following questions will need answers before support for a water rights exchange among the various fish agencies is confirmed.

1. What are the relative instream flow restoration needs and benefits in the West Fork compared to any potential losses or detrimental effects of expanded diversion from the Middle Fork?
2. What future instream flow restoration needs are anticipated in lower Clear Branch for steelhead and bull trout life stages, and in Coe and Eliot Branches below the diversions? How will serving DID affect MFID’s ability to meet any future instream flow restoration needs within the Middle Fork?
3. Is documentation needed to assess the severity and frequency of fish passage impediment at the DID diversion?
4. If a problem is documented, what is the cost and technical feasibility of physical modifications to the Dee ID diversion to eliminate the fish passage problem in the West Fork? Could the point of diversion be moved to improve the fish passage situation?

5. Water Supply Needs in Dee ID and Water Availability from the Middle Fork Hood River

MFID estimated the water supply need at Dee at 9 c.f.s for the purpose of this feasibility study. The 9 cfs estimate of water supply need is based on a conservative assumption that piping and efficiency upgrades within the DID distribution system could reduce current peak demand (~12 cfs) by ~25%. The tailrace area of Powerhouse No. 3 is the most appropriate location to construct an intertie pipeline between the two districts. Currently, the tailrace discharges at MFID Powerhouse No. 3 are not adequate to supply DID with 9 c.f.s (see graph below). In order to supply DID with 9 cfs, MFID would need to upgrade existing facilities to handle additional flow. It is anticipated that the additional water to serve the DID would come primarily from the Coe Branch diversion, should the required water rights approval be obtained. MFID would need
to upgrade to their penstock line along Clear Creek Road to Culbertson Road to handle the increased flow to Powerhouse No. 3 for diverted water going to DID. In addition, a settling pond or sandtrap facility would need to be constructed at Coe Branch to handle glacial silt loads. Currently, Coe has only minimal sand settling facilities, which limits when and how much water can safely be diverted without damage to power turbines and irrigation.

Within the last 5 years, the MFID has saved approximately 7 cfs of endflow at 5 locations through piping and operational changes, and has plans to save an additional 4 cfs at four other locations. It is assumed, therefore, that 9 cfs of water would be physically available to serve Dee under typical runoff conditions and in the absence of increased instream flow targets in Middle Fork tributaries for fish. A severe drought, or a prolonged outage at Eliot, Coe, or Clear Branch water sources due to a catastrophic landslide or other event, would restrict the amount of water delivery to irrigators in MFID and in DID if an intertie was constructed. All irrigators would be subject to the Drought Contingency Plan, Curtailment and Allocation Procedures of the MFID draft Water Management and Conservation Plan (H&R Engineering, January 2004).

6. Estimated Cost of Delivery Infrastructure and Dee System Improvements

An initial review of the costs for pipeline construction to facilitate water delivery from the Middle Fork ID to Dee Irrigation District estimated the cost between $2.3 and $2.6 million, as follows:

- A preliminary cost for engineering, design and construction services for developing approximately 15,000 lineal feet of 18 inch water line from Powerhouse No. 3 to Dee Flat would be between $1,371,000 and $1,659,000 (letter from Gray and Osborne, Inc).

- Upgrade to the MFID penstock line along Clear Creek Rd. to Culbertson Rd to handle the increased flow to Powerhouse #3 for diverted water going to Dee Irrigation District. The projected cost for this upgrade is estimated at approximately $900,000.
An estimated cost for Dee Irrigation’s internal infrastructure, including pressure reducing vaults with a minimum of 2 valves and approximately 24,000 feet of various size PVC class 200 gasket pipe and placement is $352,704. This cost estimate is based on an in-house design and construction approach. If the project was pursued through a formal engineering and construction bidding process, the cost would easily be three times higher.

No additional cost estimate has been developed for required upgrades to the Coe Branch diversion needed to supply the additional water for the DID. This design and footprint/site plan would be subject to environmental review by the U.S. Forest Service, U.S. Fish & Wildlife Service and NOAA Fisheries.

The DID total budget is under $45,000 per year. Because it has under 1000 acres and only 30 irrigator accounts, it has limited means to collect added revenues or handle loan payments to pay for large capital projects.

7. Opportunities for Increased Efficiency and Water Savings in the Dee ID and MFID

Opportunities within Dee Irrigation District

Conversion from open ditches to pressurized pipeline could save water and $7500 in grower pumping costs annually (Steve Hunt, DID). The Dee canal and distribution system is low gradient and known to be excessively leaky. The quantity of total losses (evaporation, seepage, etc) and the fate of seepage losses from the Dee Canal and ditch system is not documented.

It is possible that some of the leakage losses in the Canal or ditch system returns to the West Fork or other streams as streamflow, however, this remains undocumented at the present time. This should be further investigated in order to assess the benefits to streamflow from piping.

Opportunities within Middle Fork Irrigation District

Opportunities to increase water conveyance and delivery efficiency may be somewhat more limited in the MFID. Except for Eliot Ditch (1.0 mile), Volmer Ditch (1.8 mile) and Glacier Ditch (3.6 miles) the distribution system is a closed pipeline facility. The district has identified opportunities to eliminate another 5 cfs in end losses at four locations. Water delivery pressures in parts of the district system are higher than desired, in some cases 60 to 100 psi instead of the desired 40 psi. MFID has conducted up to 120 random audits per year of water use by irrigators for the last several years.
8. Additional Considerations from an Irrigation District Perspective

Approval by each of the irrigation district boards and patrons would need to be obtained if this proposal were to be pursued further. Besides major uncertainties about water rights, a number of other issues and concerns from an irrigation district perspective are likely to arise. These include water quality, workload priority, water management flexibility, costs compared to benefits for each district, and perhaps other concerns. Concerns about the quality of water supplied by MFID may be an issue for DID patrons. Their existing West Fork water supply has a lower glacial silt load than MFID sources. A commitment to provide DID with water may limit the water management flexibility to deal with fish needs, drought, or emergency situations within MFID. The cost of the project is significant, and so would be the workload required for implementation. The benefits received by each district in exchange for the effort and cost investment would have to be substantial and obvious.

9. Summary and Conclusions

1. An intertie serving DID from MFID sources would require formal approval by district and patrons.

2. The water rights approval process for an exchange or conserved water program or some combination of these would be lengthy, involved, and highly uncertain.

3. The estimated minimum cost for engineering and construction alone of the intertie supply conveyance and upgrades in MFID for the project is $2.3 million. The estimated minimum cost for converting DID to a pressure pipe system that would connect to the MFID is $352,704 for an in-house construction approach. This could rise to over $1 million if a standard engineering and contract bidding process was required, which is expected if federal or state funds were used.

4. A consensus on whether a net benefit to fish would be generated by the project is not a forgone conclusion at this time, and several agencies are skeptical that a net benefit would exist.

5. Significant financial and human resources. There is a question of who would act as the lead entity and project manager, and where the human resources additional staffing for grant writing and project management would come from to handle this project.

6. It appears to provide far more certainty, and may generate greater benefits on a cost and effort basis – to address water management efficiency, streamflow restoration, and fish passage needs within each district while maintaining the status quo in terms of independent water sources, but cooperating between districts where needs and opportunities are clear.