John Day Watershed Restoration Projects

Annual Report
1999 - 2000

DOE/BP-00004282-1

March 2001

This Document should be cited as follows:

Robertson, Shaun, Linda Brown, ''John Day Watershed Restoration Projects'', Project No. 1998-01800, 23 electronic pages, (BPA Report DOE/BP-00004282-1)

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

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

The Confederated Tribes of the Warm Springs Reservation of Oregon

John Day Basin Office

FY 2000 Watershed Restoration Program

Annual Report

Prepared by:

Shaun W. Robertson
and
Linda Brown

Confederated Tribes of Warm Springs
John Day Basin Office

Prepared for:

U.S. Department of Energy
Bonneville Power Administration
Environment, Fish and Wildlife Division

Project Number: 98-018-00

Contract Number: 98BI-09782

12 March 2001

Table of Contents

TABLE OF CONTENTS II

TABLE OF FIGURES II

TABLE OF PHOTOS II

PROJECT DESCRIPTIONS I

PROJECT: ST. CLAIR DIVERSION 1
PROJECT: VIDONDO RETURN-FLOW COOLING 4
PROJECT: RUDISHAUSER PUMP STATION & PIPELINE CROSSING 6
PROJECT: MASCALL IRRIGATION REORGANIZATION 8
PROJECT: EDIGER RETURN FLOW COOLING 10
PROJECT: SOUTHSIDE DITCH DIVERSION 12
PROJECT: 2000 MONITORING EFFORT 14

Table of Figures

Figure 1. John Day Basin Map iv
Figure 2. Upper Mainstem John Day River Project Location Map v
Figure 3. South Fork John Day River Project Location Map vi
Figure 4. St Clair Diversion Site Map 3
Figure 5. Vindondo RFC Site Map 5
Figure 6. Mascall Project Site Map 9
Figure 7. Ediger RFC Site Map 11
Figure 8. Typical Layflat Stanchion Design 13

Table of Photos

Photo 1. Pre-project photo of the upper St. Clair Diversion ..... **Error! Bookmark not defined.**
Photo 2. St Clair Diversion following installation 2
Photo 3. Vindondo RFC Pre-Project 4
Photo 4. Vindondo RFC Post-Project 4
Photo 5. Vindondo RFC Post-Project 6
Photo 6. Rudishauser Pump Station Site Map 7
Photo 7. Rudishauser Pump Station 7
Photo 8. Mascal Irrigation Reorganization Pre-Project 8
Photo 9. Mascal Pump Station 9
Photo 10. Ediger RFC Pre-Construction 10
Photo 11. Ediger RFC Post-Project 11
Photo 12. Southside Diversion Location 12
Photo 13. Southside Project Wheelline 13
Photo 14. Permanent Transect Location – South Fork JDR 15

Abstract

The John Day is the second longest free-flowing river in the contiguous United States and the longest containing entirely unsupplemented runs of anadromous fish. Located in eastern Oregon, the basin drains over 8,000 square miles--Oregon's third largest drainage basin--and incorporates portions of eleven counties. Originating in the Strawberry Mountains near Prairie City, the John Day River flows 284 miles in a northwesterly direction, entering the Columbia River approximately four miles upstream of the John Day dam. With wild runs of spring Chinook salmon and summer steelhead, red band, westslope cutthroat, and redband trout, the John Day system is truly a basin with national significance.

Most all of the entire John Day basin was ceded to the Federal government in 1855 by the Confederated Tribes of the Warm Springs Reservation of Oregon (Tribes). In 1997, the Tribes established an office in the Basin to coordinate restoration projects, monitoring, planning and other watershed activities on private and public lands. Using funding from the Bonneville Power Administration, Bureau of Reclamation, and others, the John Day Basin Office (JDBO) subcontracts the majority of its construction implementation activities with the Grant Soil and Water Conservation District (GSWCD), also located in the town of John Day.

The GSWCD completes the landowner contact, preliminary planning, engineering design, permitting, construction contracting, and construction implementation phases of most projects. The JDBO completes the planning, grant solicitation/review, environmental compliance, administrative contracting, monitoring, and reporting portion of the program. Most phases of project planning, implementation, and monitoring are coordinated with the private landowners and basin agencies, such as the Oregon Department of Fish and Wildlife and Oregon Water Resources Department.

In 2000, the JDBO and GSWCD proposed continuation of a successful partnership between the two agencies and basin landowners to implement an additional six watershed conservation projects funded by the BPA. The types of projects include permanent diversions, pump stations, and return-flow cooling systems.

Project costs in 2000 totaled $533,196.00 with a total amount of $354,932.00 (67%) provided by the Bonneville Power Administration and the remainder coming from other sources such as the BOR, Oregon Watershed Enhancement Board, and individual landowners.

Figure 1. John Day Basin Map

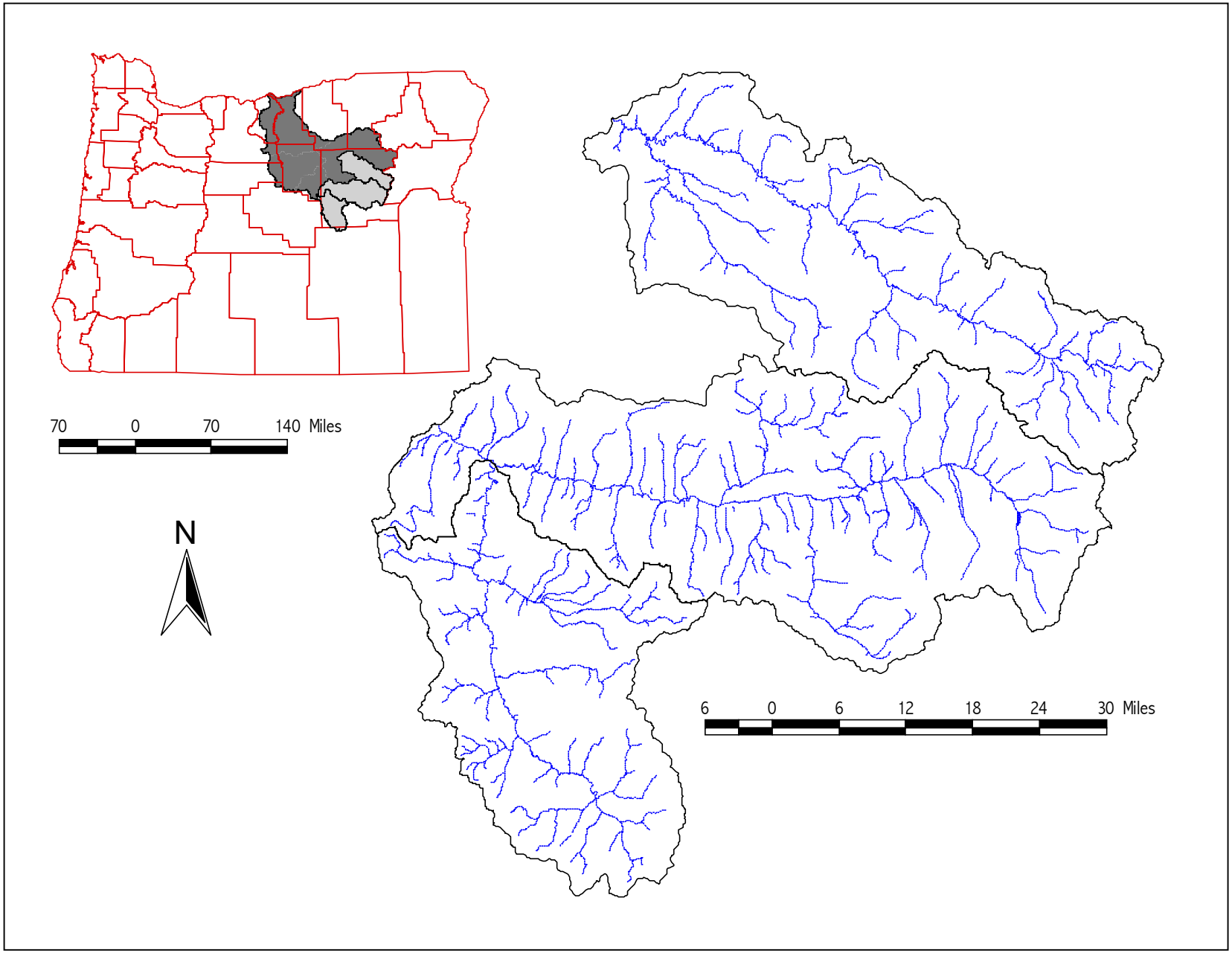


Figure 2. Upper Mainstem John Day River Project Location Map

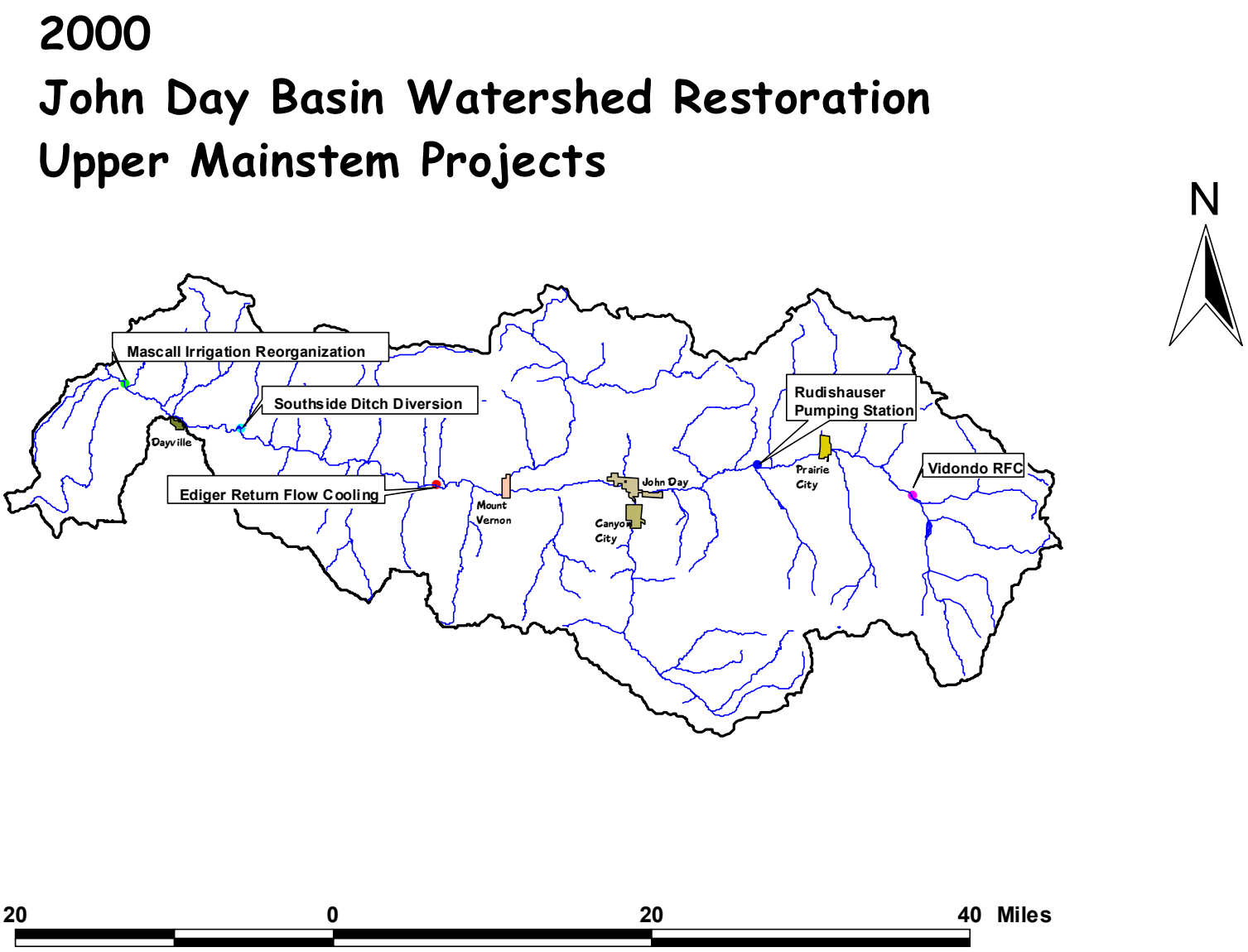
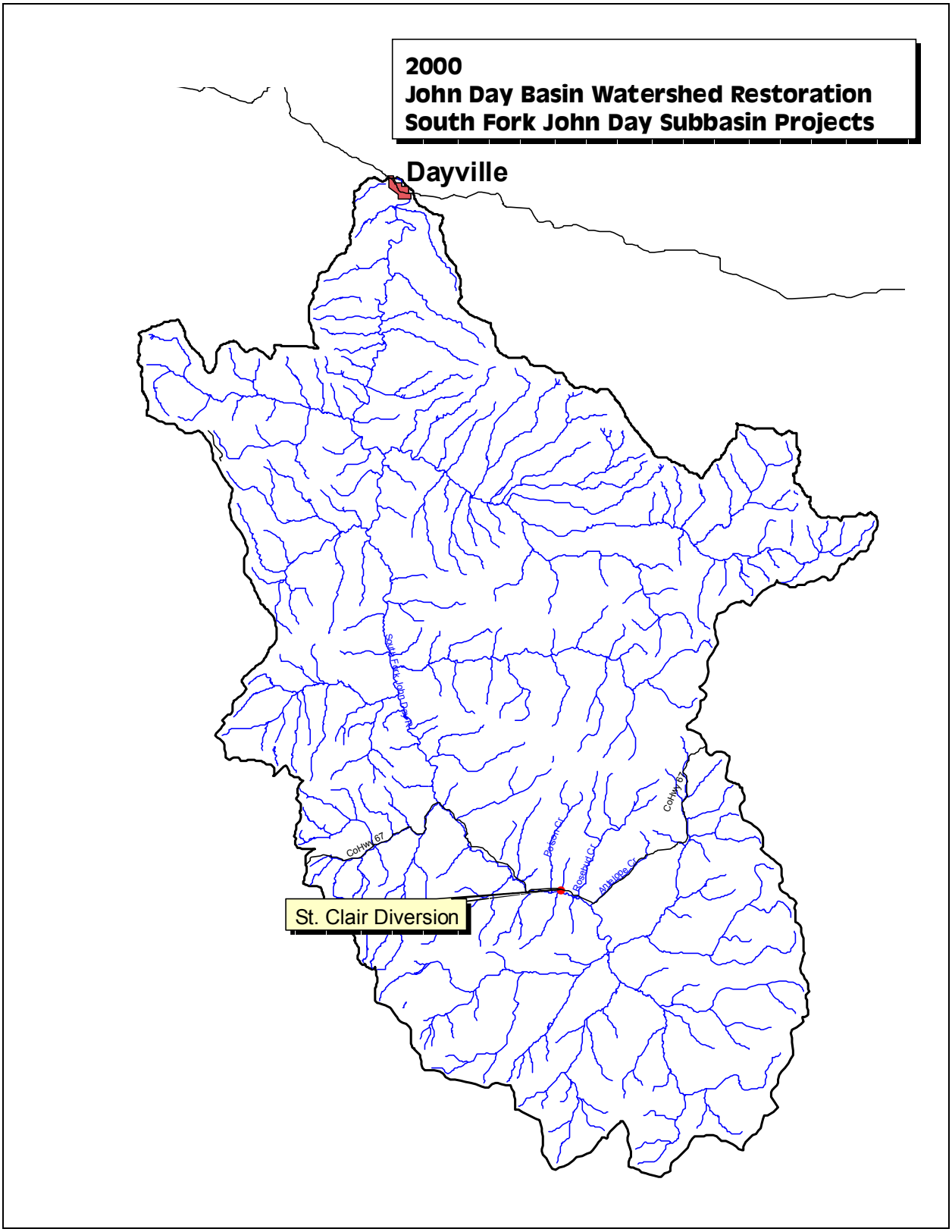


Figure 3. South Fork John Day River Project Location Map



Project Descriptions

PROJECT: ST. CLAIR DIVERSION

Project Background: Irrigation water on the St. Clair Ranch historically has been diverted by a gravel and rock dike, which directed water through an open canal. The gravel dike represented a style of temporary push-up diversion commonly used to divert water for irrigation purposes. Gravels were excavated from the riverbed using heavy equipment, and pushed into place. The dike was left in place rather than removed at the end of the irrigation season. However, off-season high flows frequently destroyed or washed away such diversions, necessitating their reconstruction the next year. In addition, as flows decreased during the irrigation season, materials were added to the diversion to raise the water level and maintain flow into the delivery system. This construction process could occur several times per year.

Such repeated construction and excavation activities pose serious threats to the integrity of riparian systems and fish passage. As river flows decline, the diversion may become a partial to total barrier to migrating fish. Repeated riverbed scouring may cause a gradual lowering of the riverbed. Use of heavy equipment along the banks and within the river prevent vegetative recovery and accelerate erosion. Though the St. Clair ranch is above Izee Falls, a natural barrier to migrating salmon, it is home to high densities of native redband trout.

The St. Clair diversion was replaced with a typical lay-flat diversion design, pioneered by the GSWCD in the John Day basin. This design incorporates stanchions and a diversion structure which allows fish passage at all flow levels and water diversion at the regulated rate. A headgate and measuring device was installed at the diversion and a fish screen was installed on the delivery ditch. The river bed was re-contoured with riprap and sheet steel piling to ensure flow over the fishway at all normally occurring river levels. Improvement construction activities were completed by adding riprap to the river banks to protect the new structure and halt bank erosion. Spoils were shaped along the banks. Grasses and hardwoods were planted to encourage riparian recovery. The entire project was incorporated into the John Day Monitoring Plan, which includes an assessment of fish passage over the structure. Permanent transects were established along the South Fork John Day River to monitor improvements in the river corridor within the St. Clair property.

Photo 1. St. Clair Pre-Construction

The improvement project benefited many uses by creating a permanent, efficient, and low-maintenance diversion system for the landowner, while improving fish habitat by opening passage at all river levels and eliminating streambed/bank and microhabitat disturbances. Water quality and riparian health were both enhanced by eliminating the recurrent impact to the streamside

corridor and chronic sediment inputs to the stream channel. The new diversion design facilitates diversion to legal rate and duty at all flow conditions.

Photo 2. St Clair Diversion following installation

Project Objective:

Install a permanent diversion on the St. Clair Ranch ditch. Demonstrate actions to improve water quality and fish habitat and eliminate fish passage barriers for anadromous and resident fish in the John Day River.

Project Description:

1. Input and analyze data collected under the 2000 monitoring plan for the project site.
2. Complete the engineering survey and design layout.
3. Construct a concrete turnout box and spillway a headgate for water regulation, and a water-measuring weir as appropriate.
4. Install layflat stanchions in spillway to allow for placement of flashboards that regulate impounded water level during the irrigation season.
5. Place riprap and sheet steel piling in the bed of the river on grade relative to point of diversion to ensure flow over the fishway under all normally occurring river levels.
6. Incorporate the existing water measuring device into the diversion system.
7. Stabilize the east and west banks of the stream as necessary with riprap to protect the installation and shape spoils on both banks.
8. Plant grasses and hardwoods on both banks to increase rates of recovery.

Project Monitoring:

Monitoring Objective: Evaluate improvement in water quality and rate of channel and riparian recovery.

Monitoring Completed:

1. Permanent photopoint locations have been installed and pre- and post-project photographs have been taken.
2. Various groups have installed thermal loggers during the irrigation season at the upper, mid-point, and lower boundaries of the St. Clair Ranch since 1997. The John Day Basin Office took over the monitoring in 2000. The loggers record water temperature every hour from June through October.
3. Flow was measured in 1999.
4. Channel cross-sections were surveyed in mid-August of 1999 and mid-July of 2000.
5. A mark-recapture effort was made on July 24, 2000.

Project Cost:

Local Cost Share	13,460.00	(58%)
BPA Contribution	9,600.00	(42%)
TOTAL	$ 23,060.00	

Start Date: 1 August 2000 Completion Date: 27 October 2000

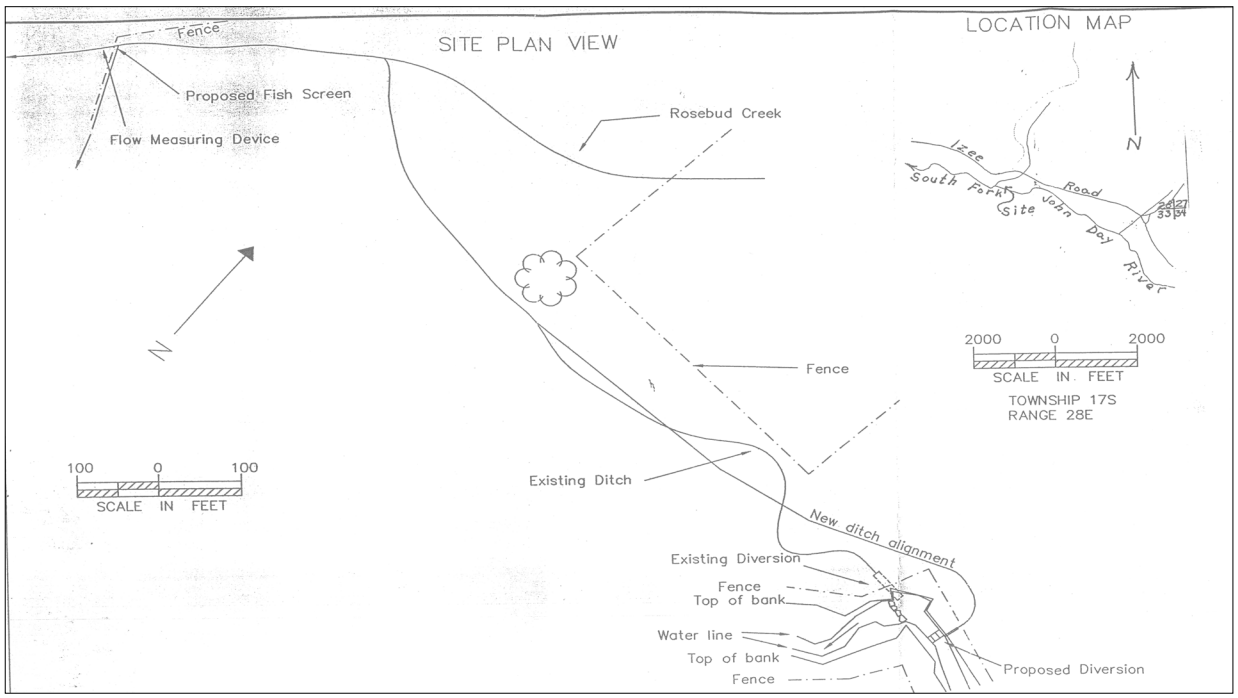


Figure 4. St Clair Diversion Site Map

PROJECT: VIDONDO RETURN-FLOW COOLING

Photo 3. Vindondo RFC Pre-Project

Project Background:

The Vidondo Ranch contains 200 acres of hay meadows that are irrigated with water taken from the John Day River. The used irrigation water was collected by approximately 4000 feet of ancient wooden pipes. Much of the pipe, installed over 50 years ago, has rotted and collapsed, causing ponding on parts of the fields. The collected water, being exposed to direct sunlight and ambient air, heats significantly, and may contribute poor quality water to the river when it returns.

To correct this situation, the open wooden pipes were replaced with perforated PVC pipe, which collect return flows and bring them to the river underground. This eliminates the pools of standing water, thermal loading and nutrient increases. At the point of return to the river, the cooler return-flows may provide thermal refugia for aquatic organisms and overall improvement in downstream habitat quality. Though these systems are not perceived to have a significant impact on instream flows, the impact on water quality can be considerable. Similar projects have decreased maximum return flow temperatures by as much as 57%. In many cases, the return flow maximums remain below that of the river. For the Vidondo project, contributing potential thermal refugia was particularly important because the ranch contains critical chinook salmon and steelhead spawning and rearing habitat and and summer rearing areas for bull and westslope cutthroat trout. These

Photo 4. Vindondo RFC Post-Project

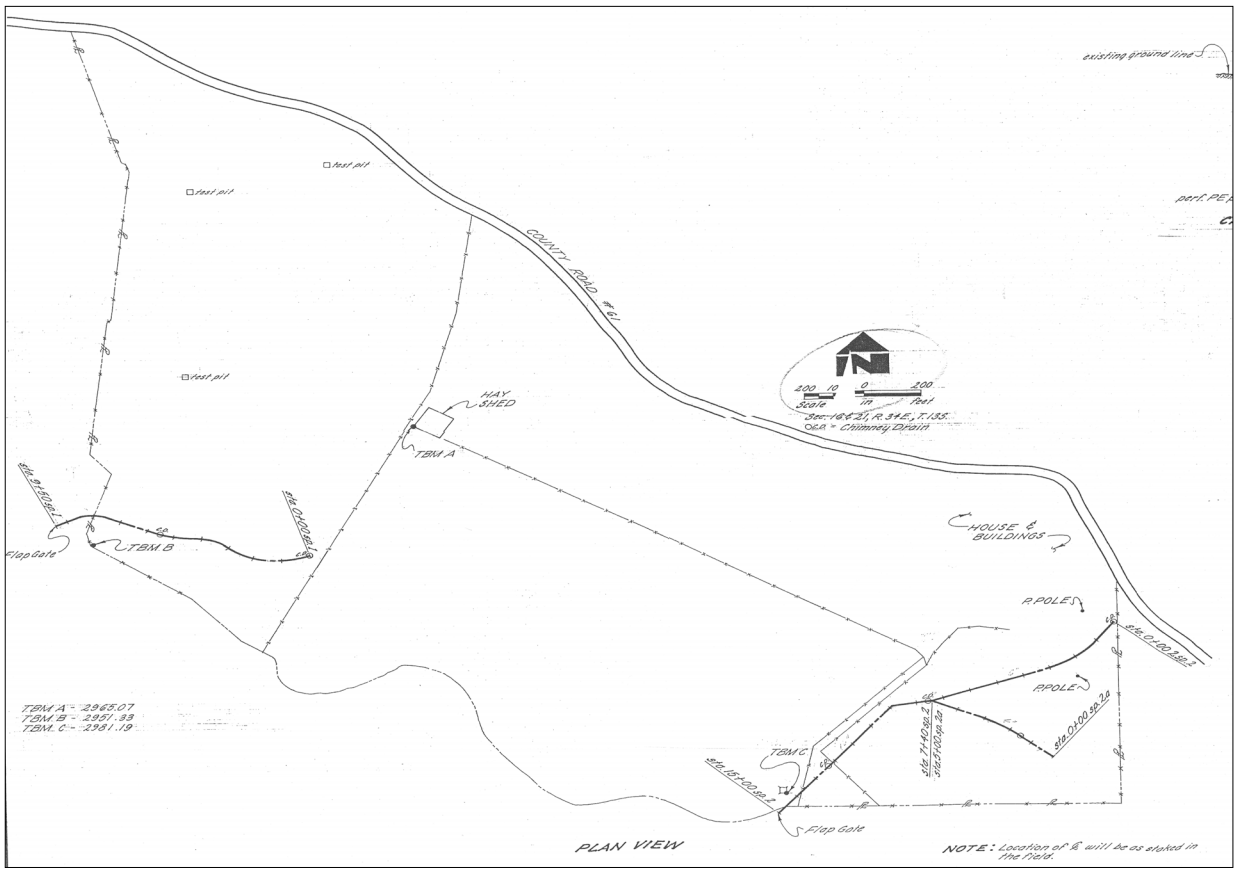
return-flow cooling systems also provide benefits to landowners by improving forage production in areas that were otherwise minimal and difficult to work in.

Project Objective: Coonstruct facilities to bring irrigation return flow to the river cooler than current condition.

Project Description:

1. Install pre-project photopoints and collect baseline information consistent with the proposed 2000 Interim Monitoring Plan.
2. Complete the engineering survey and design layout.
3. Install approximately 4000' of perforated pipe over a 200-acre project area to replace failing wooden drains.
4. Install four water level control structures on the tailwater lines to allow adjustment of the local water table as necessary.
5. Place riprap rock around the pipe discharge.
6. Shape all construction spoils and disturbed ground, as appropriate, to reduce erosion and to promote rapid riparian vegetative recovery.
7. Rebuild the existing riparian exclusion fence, where necessary, around construction areas.
8. Plant grasses and hardwoods, as appropriate, to reduce erosion and increase the rate of vegetation recovery.
9. Monitor consistent with the proposed 2000 Interim Monitoring Plan.

Figure 5. Vindondo RFC Site Map



Project Monitoring:

Monitoring Objective: Evaluate improvement in water quality and rate of channel and riparian recovery via standard monitoring protocol (GPS location, design drawings, site map, pre- and post- project photos and photopoints).

Monitoring Completed:

- In progress
- Pre- and post photos and location on GIS maps.
- Thermal loggers were installed immediately downstream of the project.

Photo 5. Vindondo RFC Post-Project

Project Cost:

Local Cost Share	10,690.00	(17%)
BPA Contribution	53,682.00	(83%)
TOTAL	$ 64,372.00	

Start Date: 1 December 2000 Completion Date: 9 March 2001

PROJECT: RUDISHAUSER PUMP STATION & PIPELINE CROSSING

Project Background: The Rudishauser diversion is located on the mainstem John Day, approximately 200 meters upstream from its confluence with Indian Creek. Water was diverted from the mainstem into an open conveyance system, which crossed Indian Creek through another push-up diversion. In addition, to irrigation water with Indian Creek streamflows, the cross-diversion in Indian Creek was typical of temporary push-up diversions, where materials are annually scavenged from the streambed to create an impoundment that directed water into a delivery system for irrigation purposes (*see* the description of the St. Clair diversion for more information on gravel push-up dams and their effects). The location of this particular diversion created a seasonal passage impediment to migrating spring chinook, summer steelhead, pacific lamprey, and resident trout. Refer to the St. Clair Diversion description above for an example of a temporary, push-up diversion.

To replace this structure, and provide for more consistent water supply for the landowner, the diversion in the John Day River and the Indian Creek crossing were removed. A pump station was installed on the John Day River and was connected to a system of buried pipe that crossed under Indian Creek and into the existing delivery system. A National Marine Fisheries Service – approved screen was installed on the pump suction line. Streambanks were shaped and planted with grasses and hardwoods following construction.

Project Objective:

Construct facilities to remove a fish passage impediment and improve tributary stream flows.

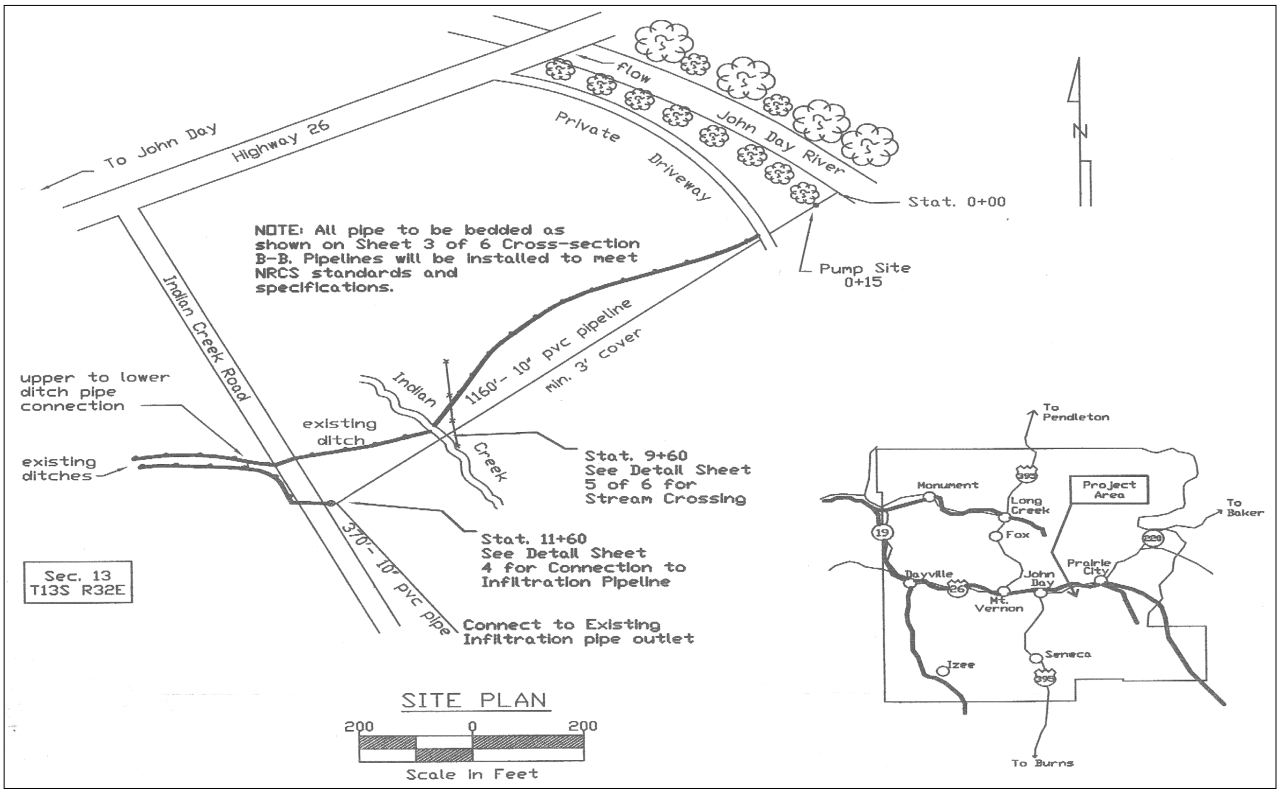
Project Description:

1. Install pre-project photopoints and collect baseline information consistent with the proposed 2000 Interim Monitoring Plan.
2. Complete the engineering survey and design layout.
3. Obtain water rights authorization from the OWRD.

Photo 7. Rudishauser Pump Station

4. Install buried pipeline from the pumping station, crossing under Indian Creek and emptying into the existing delivery system.
5. Install a screen and pump suction.
6. Shape all construction spoils and disturbed ground, as appropriate, to reduce erosion and to promote rapid riparian vegetative recovery.
7. Plant grasses and hardwoods, as appropriate, to reduce erosion and increase the rate of vegetation

Photo 6. Rudishauser Pump Station Site Map



recovery.
8. Monitor consistent with proposed 2000 Interim Monitoring Plan.

Project Monitoring:

Monitoring Objective: Determine overall water use in new irrigation system (via consultation with landowner and standard monitoring protocol).

Monitoring Completed:
Pre- and post photographs were taken; project locations were identified on the GIS database in the JDBO, and continuous recording thermal loggers were installed immediately downstream of the John Day diversion and Indian Creek crossing.

Project Cost:

Local Cost Share	38,517.00	(48%)
BPA Contribution	41,299.00	(52%)
TOTAL	$ 79,816.00	

Start Date: 1 July 2000 Completion Date: Phase I Completed 1 June 2001

PROJECT: MASCALL IRRIGATION REORGANIZATION

Project Background: Irrigation flows were previously diverted from Cottonwood Creek and the John Day River using two gravel push-up diversions. Temporary gravel berms were reconstructed annually, and as required during the season, as river flows declined. Depending on river flow conditions, these diversions could become partial to total barriers to migrating fish.

Diversion materials were excavated from the riverbed and the diversion was left in place following the end of the irrigation season. The process of diversion reconstruction, often several times per year, caused a gradual lowering of the river bed. This method of diversion required periodic use of heavy equipment in the river to perform construction and maintenance.

To replace this structure, and provide for more consistent water supply for the landowner's purposes, the diversions across both the John Day and Cottonwood Creek were removed. A pump station was installed on the John Day River, and was connected to a system of buried pipe that crossed Cottonwood Creek and into the existing delivery system. A National Marine Fisheries Service – approved screen was installed on the pump suction line. Streambanks were shaped and planted with grasses and hardwoods following construction.

Photo 8. Mascal Irrigation Reorganization Pre-Project

Project Objective:
Remove two barriers to anadromous fish passage; one in the John Day River and one in Cottonwood Creek. Improve water quality and fish habitat by eliminating a gravel push-up diversion. Improve irrigation efficiency.

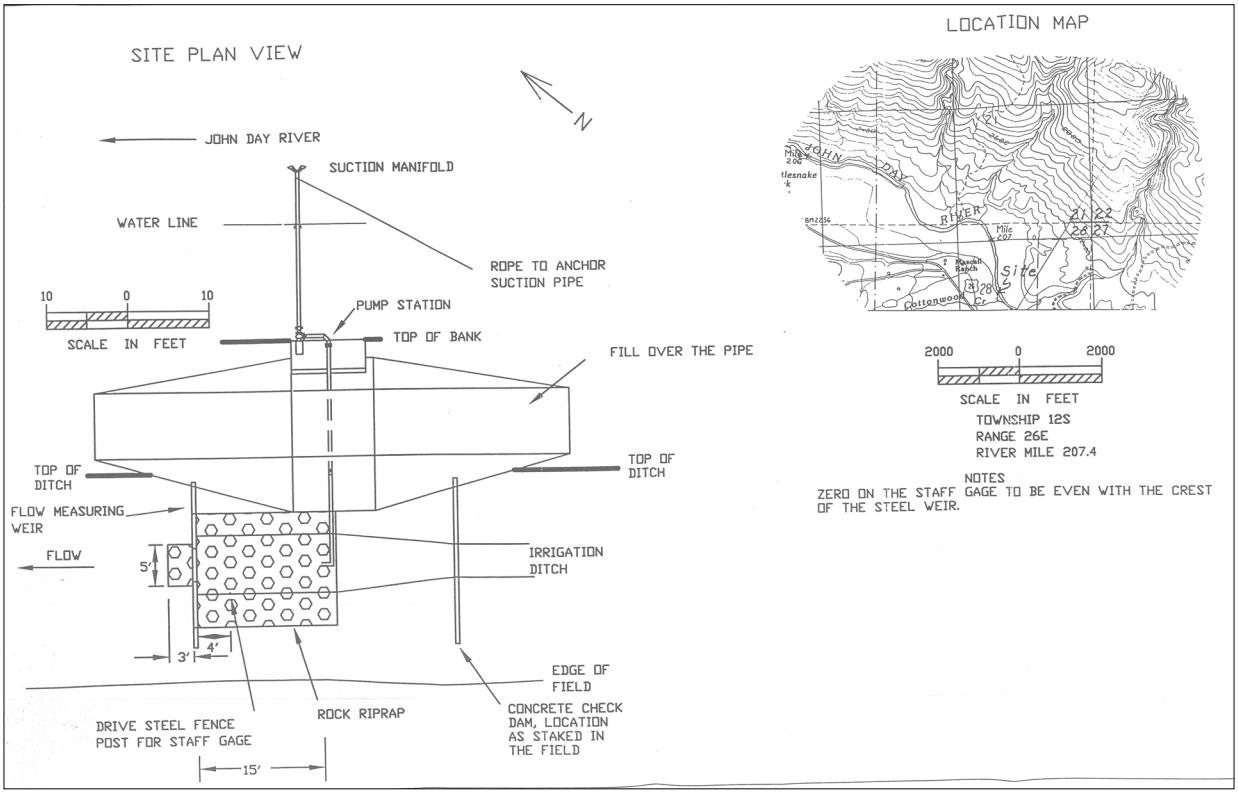


Figure 6. Mascall Project Site Map

Project Description:

1. Install pre-project photopoints and collect baseline information consistent with the proposed 2000 Interim Monitoring Plan.
2. Complete the engineering survey and design layout.
3. Obtain water rights authorization from the OWRD.
4. Install buried pipeline from the pumping station, crossing Cottonwood Creek and emptying into the existing delivery system.
5. Install a screen and pump suction.
6. Shape all construction spoils and disturbed ground, as appropriate, to reduce erosion and to promote rapid riparian vegetative recovery.
7. Plant grasses and hardwoods, as appropriate, to reduce erosion and increase the rate of vegetation recovery.
8. Monitor consistent with proposed 2000 Interim Monitoring Plan.

Photo 9. Mascal Pump Station

Project Monitoring:

Monitoring Objective: Determine overall water use in new irrigation system (via consultation with landowner and standard monitoring protocol).

Monitoring Completed:

- In progress
- Pre- and post photos and location on GIS maps.

Project Cost:

Local Cost Share	3,200.00	(05%)
BPA Contribution	52,498.00	(95%)
TOTAL	$ 55,698.00	

Start Date: 1 October 2000 Completion Date: 1 March 2002

PROJECT: EDIGER RETURN FLOW COOLING

Project Background:

Irrigation tailwater in this 94-acre project area previously migrated back to a wetland slough through a failing 50 year old wooden drain system (approximately 600 feet long). When the slough filled during the irrigation season, the overflow would flow over the ground surface for approximately 1600 feet before entering the John Day River. The collected water, being exposed to direct sunlight, ambient air, and nutrients and animal wastes on the field contributes degraded water to the river where it returns.

To correct this situation, the open wooden pipes were replaced with perforated PVC pipe, which collect return flows and convey them underground to the river. This eliminates the pools of standing water, thermal loads and nutrient increases. At the point of return to the river, the cooler return-flows may provide thermal refugia for aquatic organisms and overall improvement in downstream habitat quality. Though these systems are not perceived to have a significant impact on instream flows, the impact on water quality is considerable. Similar projects have decreased maximum return flow temperatures by as much as 57%. In many cases, the return flow maximums remain below that of the river. These return-flow cooling systems also provide benefits to landowners who experience improved forage production in areas that were otherwise minimal and difficult to work in.

Photo 10. Ediger RFC Pre-Construction

Project Objective:

To reduce summer river water temperatures for migrating adult salmonidsand juveniles rearing in the upper basin. To enhance an associated wetland by collecting irrigation tailwater into subsurface systems and using cooling ground temperatures as a heat sink to absorb heat from the water as it

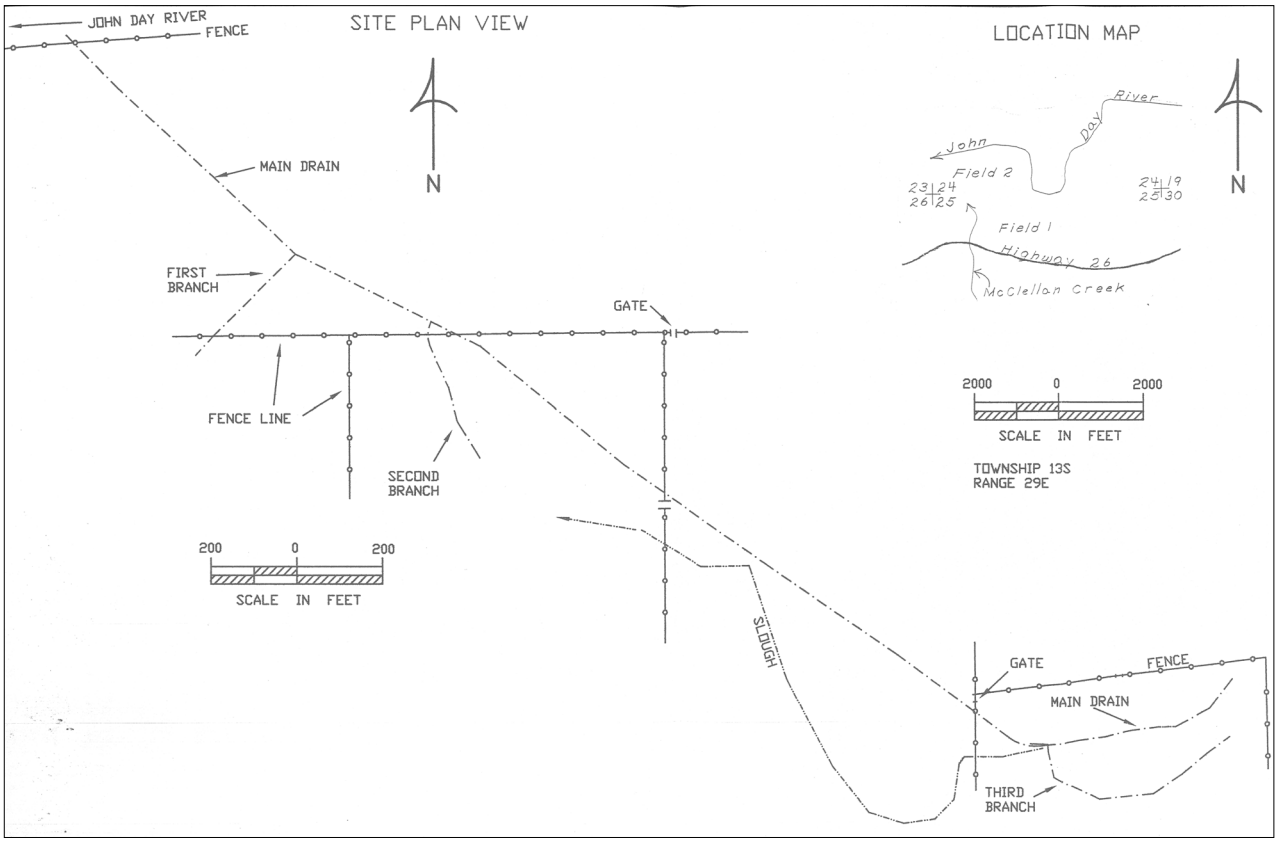
passes through the system.

Photo 11. Ediger RFC Post-Project

Project Description:

1. Install pre-project photopoints and collect baseline information consistent with the proposed 2000 Interim Monitoring Plan.
2. Complete the engineering survey and design layout.
3. Install approximately 2200' of perforated pipe over a 94-acre project area to replace failing wooden drains.
4. Install water level control structures at the slough end of the drain pipe allow adjustment of the water level in the slew.
5. Place riprap rock around the pipe discharge.

Figure 7. Ediger RFC Site Map



6. Shape all construction spoils and disturbed ground, as appropriate, to reduce erosion and to promote rapid riparian vegetative recovery.
7. Monitor consistent with proposed 2000 Interim Monitoring Plan.

Project Monitoring:

Monitoring Objective: Evaluate improvement in water quality and rate of channel and riparian recovery via standard monitoring protocol (GPS location, design drawings, site map, pre- and post- project photos and photopoints).

Monitoring Completed:

- In progress
- Pre- and post photos and location on GIS maps.

Project Cost:

Local Cost Share	4,000.00	(12%)
BPA Contribution	29,280.00	(88%)
TOTAL	$33,280.00	

Start Date: 1 October 2000 Completion Date: 1 September 2001

PROJECT: SOUTHSIDE DITCH DIVERSION

Irrigation water at the Southside Ditch historically has been diverted by a gravel and rock dike, which directed water through an open canal. The gravel dike represented a style of temporary push-up diversion commonly used to divert water for irrigation purposes. Gravels were excavated from the riverbed using heavy equipment, and pushed into place. The dike was left in place rather than removed at the end of the irrigation season. However, off-season high flows frequently destroyed or washed away such diversions, necessitating their reconstruction the next year. In addition, as flows decreased during the irrigation season, materials were added to the diversion to raise the water level and maintain flow into the delivery system. This construction process could occur several times per year.

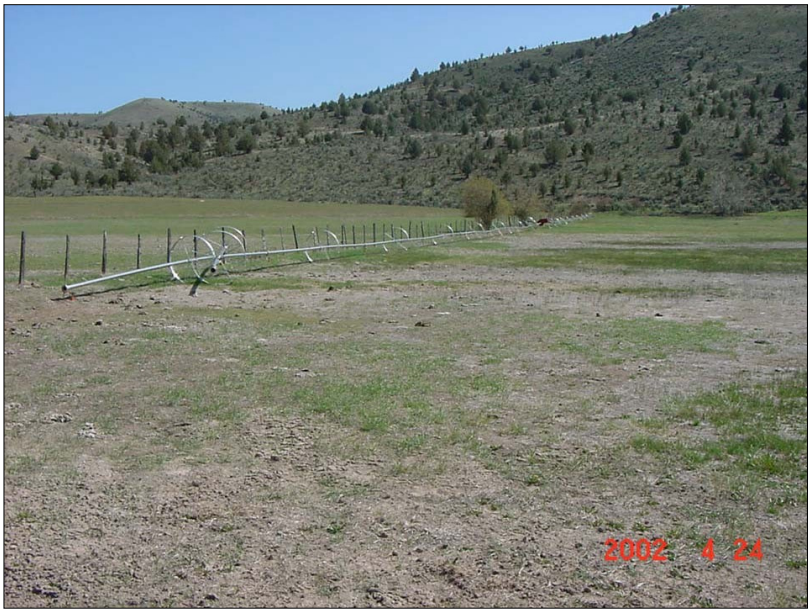
Such repeated construction and excavation activities pose serious threats to the integrity of riparian systems and fish passage. As river flows decline, the diversion may become a partial to total barrier to migrating fish. Repeated riverbed scouring may cause a gradual lowering of the riverbed. Use of heavy equipment along the banks and within the river prevent vegetative recovery and accelerate erosion.

The Mullin diversion was replaced with a typical lay-flat diversion design, pioneered by the GSWCD in the John Day basin.

This design incorporates stanchions and a diversion structure which allows fish passage at all flow levels and water

Photo 12. Southside Diversion Location

Photo 13. Southside Project Wheelline



diversion at the regulated rate. A headgate and measuring device was installed at the diversion and a fish screen was installed on the delivery ditch. The river bed was re-contoured with riprap and sheet steel piling to ensure flow over the fishway at all normally occurring river levels. Improvement construction activities were completed by adding riprap to the river banks to protect the new structure and halt bank erosion. Spoils were shaped along the banks.

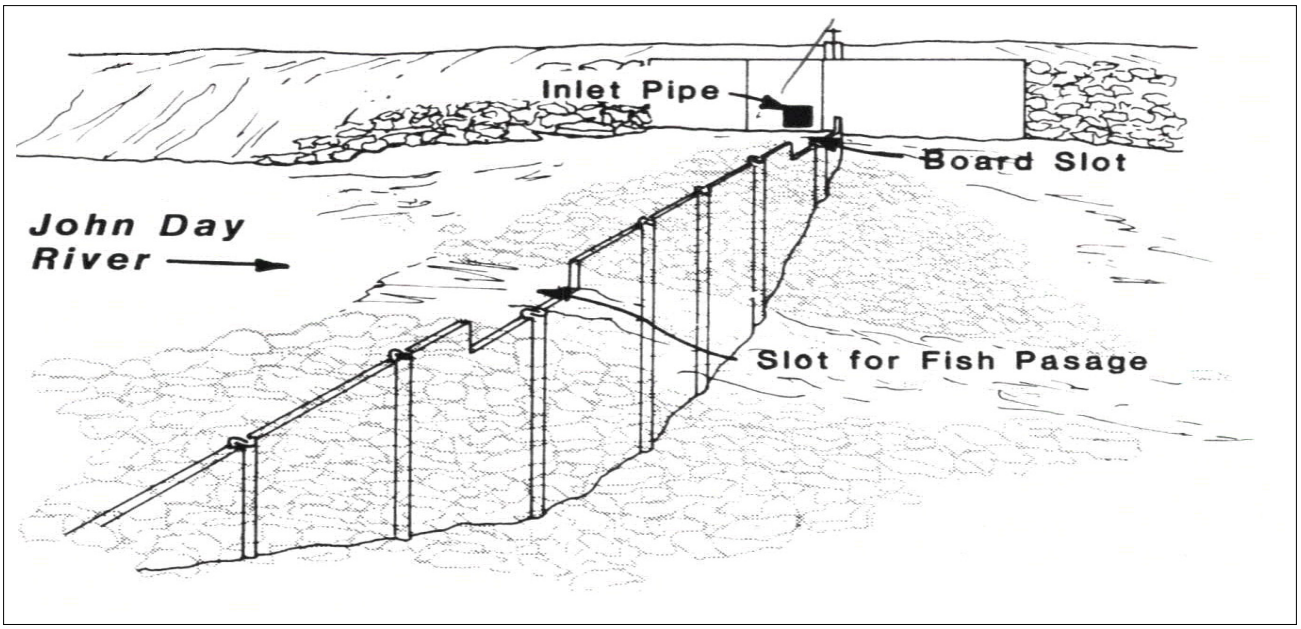
The improvement project benefited many uses by creating a permanent, efficient, and low-maintenance diversion system for the landowner, while improving fish habitat by opening passage at all river levels and eliminating streambed/bank and microhabitat disturbances. Water quality and riparian health were both enhanced by eliminating the recurrent impact to the streamside corridor and chronic sediment inputs to the stream channel. The new diversion design facilitates diversion to legal rate and duty at all flow conditions.

Project Objective: Install a permanent diversion on the Southside ditch. Demonstrate actions to improve water quality and fish habitat and eliminate fish passage barriers for anadromous and resident fish in the John Day River.

Project Description:

1. Input and analyze data collected under the 2000 monitoring plan for the project site.

Figure 8. Typical Layflat Stanchion Design



2. Complete the engineering survey and design layout.
3. Construct a concrete turnout box and spillway a headgate for water regulation, and a water-measuring weir as appropriate.
4. Install layflat stanchions in spillway to allow for placement of flashboards that regulate impounded water level during the irrigation season.
5. Place riprap and sheet steel piling in the bed of the river on grade relative to point of diversion to ensure flow over the fishway under all normally occurring river levels.
6. Incorporate the existing water measuring device into the diversion system.
7. Stabilize the east and west banks of the stream as necessary with riprap to protect the installation and shape spoils on both banks.
8. Plant grasses and hardwoods on both banks to increase rates of recovery.

Project Monitoring:

Monitoring Objective: Evaluate improvement in water quality and rate of channel and riparian recovery.

Monitoring Completed:
Permanent photopoint locations have been installed and pre- and post-project photographs have been taken.

Project Cost:

Local Cost Share	26,600.00	(39%)
BPA Contribution	38,106.00	(61%)
TOTAL	$ 67,706.00	

Start Date: 1 May 2000 Completion Date: 85% Complete as of 1 April, 2002

PROJECT: 2000 MONITORING EFFORT

Project Background: A consensus water quality monitoring plan is being prepared for the John Day basin. In the interim, an annual plan is prepared which includes evaluations of competed, proposed, and planned restoration projects. Evaluating completed projects is critical to assessing the biological benefits of the project as well as for effective planning of future activities.

The monitoring program evaluates projects at varying levels. While each project is evaluated and monitored to a certain extent, some projects or project types receive a greater level of monitoring dependent upon factors such as level of activity, expected biological response, resource issues proposed to be addressed by the project, and representative nature of project to other project types. For example, a return flow cooling project may be monitored for water temperatures, while a permanent diversion may be monitored for riparian vegetation and stream channel condition.

At a minimum, each proposed project has a permanent photo point installed, pre- and post-project photopoints taken, and a GPS location marked on the GIS project location map. In addition, a representative sample of projects are monitored as follows:
1. Permanent diversions (and pump station projects) may be monitored for channel structure, riparian vegetation, and fish passage.
2. Return flow cooling projects may be monitored for water temperatures and river thermal profile.
3. Other projects are monitored according to resource objectives and information needs.

Project Objective: Improve assessments of completed projects and evaluate to a sufficient level in order to assist with future planning efforts.

Project Description:

1. Amend or revise the 1999 annual monitoring plan to incorporate 2000 projects as necessary.
2. Implement the monitoring plan.
3. Prepare annual monitoring and individual project monitoring assessment reports.

Photo 14. Permanent Transect Location – South Fork JDR

Project Monitoring:

Monitoring Objective:
Varies by project.

Monitoring Completed:

1. Permanent photopoints were installed and pre- and post-project photographs were taken at the proposed project locations.

2. Permanent monitoring transects were established on the Oxbow Ranch.
   a. Photopoints were taken.
   b. Snorkleing techniques were used to estimate gross abundance and community composition.
   c. Production estimates were derived from electro-shocking effort results.

3. A mark-recapture study was conducted at the St. Clair project, to evaluate gross movement patterns and passage over diversion structures.

4. Cross-sections were surveyed at the St. Clair permanent transects.

5. Thirty-five thermal loggers were installed throughout the basin to evaluate stream temperatures, including 8 at specific project locations: four on the Holliday Ranch, and two at both the Crown and Mullin Ranches.

6. Permanent monitoring transects were established on the Forest Ranch.
   a. Photopoints were established.
   b. Cross sections were done on several reaches.

Project Cost:

Local Cost Share	6,618.00	(50%)
BPA Contribution	6,724.00	(50%)
TOTAL	$ 13,342.00	

Start Date: June 2000 Completion Date: December 2000