NORTH FORK JOHN DAY RIVER BASIN ANADROMOUS FISH HABITAT ENHANCEMENT PROJECT

Annual Report for April 2010 – January 2011

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ABSTRACT

The Confederated Tribes of the Umatilla Indian Reservation North Fork John Day Anadromous Fish Enhancement Project continued to develop and implement habitat improvements during 2010 using guidance from the John Day Subbasin Plan, Mid-Columbia Steelhead Recovery plan, and other plans or management documents which prioritized restoration efforts. Cooperative efforts between private landowners and public entities such as the North Fork John Day Watershed Council, Umatilla National Forest, Wallowa-Whitman National Forest, and Grant Soil and Water Conservation District prioritized, designed, and implemented specific habitat restoration efforts. During 2010 the project worked with cooperators to replace one passage barrier, construct four riparian fences, eradicate noxious weeds and conduct presence/absence surveys, plant native vegetation, and completed three surveys for future passage barrier removal designs. Coordination for future efforts included conversations with the NFJDWC, Umatilla and Wallowa Whitman National Forest, and local landowners.

ACKNOWLEDGMENTS

The Confederated Tribes of the Umatilla Indian Reservation wish to thank the Bonneville Power Administration for funding the project and its personnel Jason Karnezis, Jenna Peterson, and others for their assistance. We would also like to give thanks to the North Fork John Day Watershed Council for providing a forum for tribal input and promoting the Confederated Tribes of the Umatilla Indian Reservation's habitat recovery efforts; the Umatilla National Forest and its employees (Fishery Biologists Kathy Ramsey, Kristie Groves, and Allison Johnson, Hydrologists Caty Clifton, Joy Archuleta, and Ed Farren, Range Managers Tom Thompson and Brad Lathrop) and the Wallowa Whitman National Forest and its employees (Hydrologist Suzanne Fouty, Range Manager Teena Ballard) for assistance with cooperative restoration efforts and providing information, the Natural Resources Conservation Service's Chet Hadley and Lorraine Vogt, and Oregon Department of Fish and Wildlife's Jeff Neal. A special thanks to Delbert Jones in assisting with monitoring efforts and implementing and maintaining improvements, to, Julie Burke Celeste Reeves, and Michelle Thompson for administrative support, and Gary James and Jim Webster for support and guidance. We would like to acknowledge cooperating landowners, Steve Berry, Gene and Julia Engblom, Richard and Dorothy Allstott, Brian Prater, Bill Neal, Sheri Helms, Robin, Mary Lou, Andy and Bill Fletcher, and Forrest Rhinehart who supported our efforts by cooperating in habitat enhancements on their property.

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INTRODUCTION

The Confederated Tribes of the Umatilla Indian Reservation's North Fork John Day River Habitat project (the Project) has undertaken the task of protecting and enhancing habitat in the North Fork John Day (NFJD) basin to improve natural production of indigenous species in support of the Confederated Tribes of the Umatilla Indian Reservation's (CTUIR) First Foods. Our efforts are expected to increase juvenile and adult freshwater survival resulting in greater numbers of Endangered Species Act listed Mid-Columbia River Summer Steelhead trout (*Oncorhynchus mykiss*) and Bull trout (*Salvelinus confluentus*) in addition to Spring Chinook salmon (*Oncorhynchus tshawytscha*) and redband trout (*Oncorhynchus mykiss gairdnerii)*. Progress toward this goal can be difficult to ascertain due to existing habitat conditions across the basin, depressed aquatic populations relative to historic conditions, and habitat use at specific locations relative to population dynamics across the basin NFJD and Columbia River basins. In place of a baseline representing historic conditions or the particular state of a depressed population the relative productivity of less disturbed areas can be useful. Significant portions of the NFJD Mid-Columbia Steelhead trout (Carmichael, R.W., 2006), spring Chinook salmon, and Bull trout populations reside in the NFJD Wilderness area and other protected areas that are relatively unaltered or minimally altered; thus, habitat conditions throughout these populations could provide a suitable surrogate for identifying changes in life history strategies in other parts of the basin. Restoring degraded habitats and monitoring subsequent changes in habitat use and species should provide an estimate of our effect upon these species.

Restoration efforts benefiting these species and habitats primarily occur outside undisturbed or minimally disturbed areas, that is, lands managed by private or public entities. As such, cooperative partners are necessary to develop and implement effective restoration efforts within in-stream, riparian, and floodplain habitats. These efforts not only benefit threatened and non-threatened wildlife but protect or restore larger scale natural processes with sufficiently large processes and prioritize efforts according to needs, available funding and technical feasibility. Collaborative efforts reduce the burden upon a single entity and improve restoration efforts by providing additional scrutiny, cost share opportunities, and educational opportunities about the value of singular and cooperative habitat restoration efforts. Deficits in habitat are identified through review of priority area strategies outlined in the Columbia BM RC&DA (2005), Carmichael, R.W., 2006, forest and basin plans, and other documents created to direct program implementation or recovery efforts. From these designations, specific restoration efforts are developed during discussions with landowners.

To date, the Project has constructed approximately 34.7.4 Km of riparian fencing, 29 off-stream water developments, and reactivated two wells; enhanced approximately 20 Km stream, 850 acres of riparian and floodplain habitat, and 850 acres of upland habitat on private and public properties. Appendix I & II show sites where maintenance or restoration efforts were completed during 2008 on private and public lands. Private landowners who have entered into a Riparian Conservation Agreements with CTUIR include Forrest Rhinehart (Upper Camas Creek), Robin, Mary Lou, William, and Andy Fletcher (Lower Camas Creek), Gene and Julia Engblom (Owens Creek), Richard and Dorothy Allstott (Snipe Creek), Steve Berry (Deer Creek), and Billy Neal and Sheri Helms (NF John Day). Cooperative partners with whom CTUIR hasn't entered into a Riparian Conservation Agreement have included the North Fork John Day Watershed Council (NFJDWC), the Umatilla National Forest (UNF), Wallowa Whitman National Forest, Grant Soil and Water Conservation District, National Resource Conservation Service (NRCS), and the Farm Services Agency (FSA) among others. Conversations with these and other groups or agencies are proving useful for identifying additional restoration opportunities and dispersing information regarding the benefits of cooperative restoration efforts to develop trust with small rural communities within the NFJD Basin. For example, the NFJDWC has proven invaluable for reaching out to the 1200 people residing within the basin that would otherwise be reluctant to cooperate with a tribal or government entity.

Bonneville Power Administration (BPA) initially approved the Project in 2000 with on-the-ground actions following in 2001 to provide partial mitigation for the loss of native salmon and steelhead resulting from the construction of dams on the Columbia River. Additional habitat restoration funds are secured through entities such as the FSA, NRCS, Oregon Watershed Enhancement Board (OWEB), Oregon Department of Fish and Wildlife (ODFW), U.S. Bureau of Reclamation (BOR), the U.S. Army Corps of Engineer (Corps) and other private or public. In an effort to reduce costs associated with overhead the UNF's North Fork John Day Ranger District provides office and storage space while vehicles and equipment are shared with:

(1) BPA Project #198710001 – CTUIR's Umatilla River Basin Anadromous Fish Habitat Enhancement Project
(2) BPA Project #199604601 – CTUIR's Walla Walla Basin Habitat Enhancement Project
(3) BPA Project #199608300 – CTUIR's Grande Ronde Basin Habitat Enhancement Project
(4) BPA Project #200820100 – CTUIR's Protect and Restore the Tucannon Watershed

This annual report covers efforts conducted from 1 February 2010 through 31 January 2011.

SITE DESCRIPTION

The NFJD River (Figure 1.) is the largest tributary to the John Day River flowing westerly for 180 kilometers to join the mainstem John Day River near Kimberly, Oregon. The NFJD River's basin covers 47,885 square kilometers consisting of 37% private, 62% federal, and 1% state lands. The NFJD has been designated as a Wild and Scenic River from Camas Creek upstream to the head waters including one portion classified as "Wild," two as "Scenic," and two as "Recreational." These segments are primarily managed by the UNF and WNF. State Scenic Waterways designated by the State of Oregon, stretch from Monument, OR upstream to the NFJD Wilderness boundary and from the confluence with the North Fork John Day River upstream to the Crawford Creek Bridge on the Middle Fork John Day River. The Middle Fork John Day River (MFJD) (Figure I) flowing into the NFJD is generally considered and primarily managed as a separate system by ODFW, the Confederated Tribes of the Warm Springs Reservation of Oregon, and The Nature Conservancy.

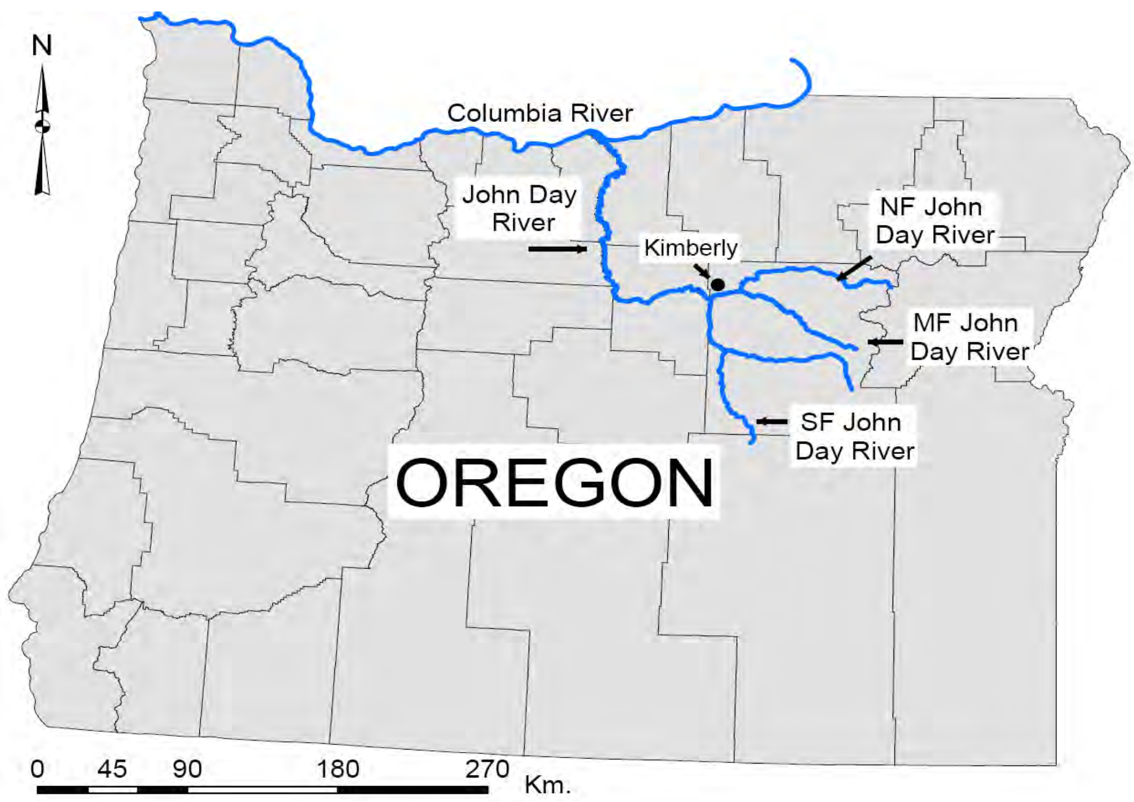


Figure I. Regional map showing the John Day Basin.

The NFJD contains fifteen 5th Field HUC's (Figure II) of which four, the Upper and Lower Camas Creek, Desolation Creek, and Granite Creek units are considered 'priority' areas for the purpose of concentrating the Project's restoration efforts. The CTUIR currently maintains six Riparian Conservation Agreements with landowners on the NFJD, Deer, Camas, Owens, and Snipe Creeks (Figure III, Appendix I).

Diverse land forms and geology range from 558 meters at the mouth to 2530 meters in elevation in the headwaters and consist of Columbia River Basalts, oceanic crust, volcanic materials, historic river and lake deposits, and recent river and landslide deposits. The North Fork John Day basin has a continental climate influenced by maritime weather patterns in the higher elevation areas which are characterized by low winter and high summer temperatures, low to moderate average annual precipitation and dry summers. Climate ranges from sub-humid in the upper elevations to semi-arid in the lower elevations with 0.33 to 0.5 meters annually contributing 60% of the flow in the lower John Day River, primarily through November and March. Mean annual temperatures are 3° C in the upper sub-basin and 14° C in the lower sub-basin and range from <-18^{o} C in the winter to over 38° C during the summer. The average frost-free period is 50 days in the upper sub-basin and 200 days in the lower sub-basin. The Blue Mountains in the basin's higher elevations produce a range of microclimates unlike the lower basins typical warmer and more stable patterns.

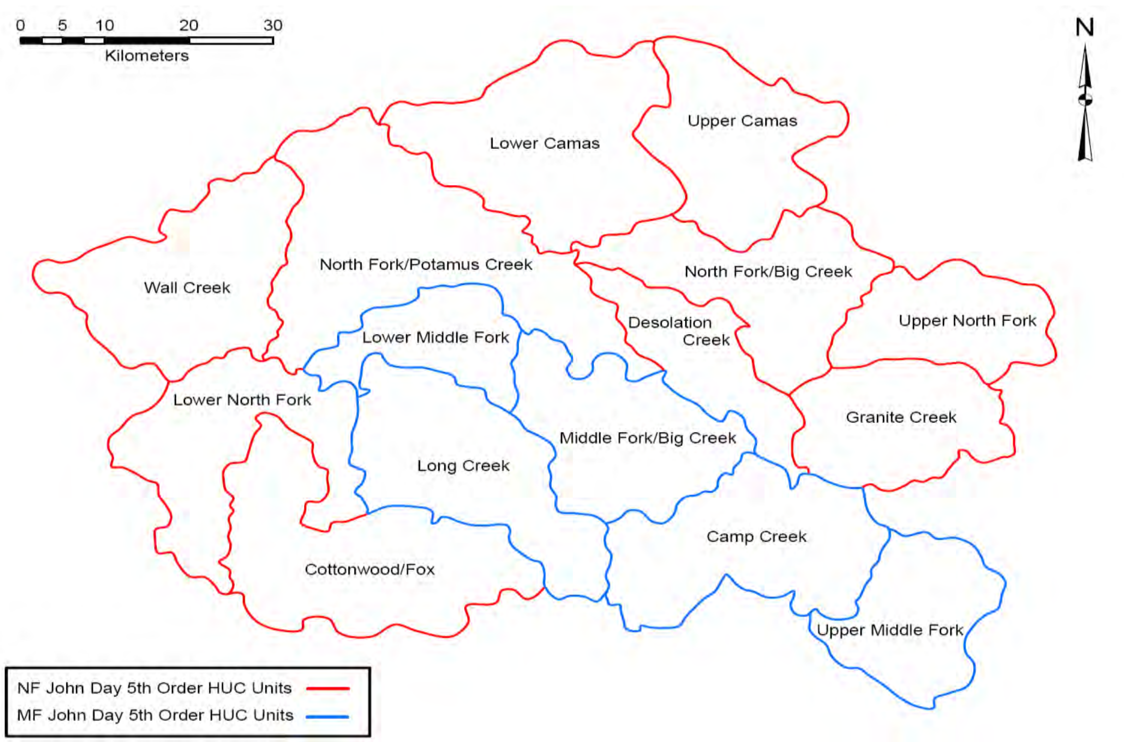


Figure II. NFJD 5th field HUC's

Historically, the John Day River was one of the most significant anadromous fish producers in the Columbia River Basin (CRITFC 1995) due to its stability, strong summer stream flows, high water quality, and heavy riparian cover. Riparian areas were densely populated with aspen, poplar, willow, and cottonwood and beaver were abundant. Large spring and fall Chinook salmon migrations and numerous beaver sightings indicated the John Day River contained extensive in-stream habitat diversity. Resident trout species including westslope cutthroat (*Oncorhynchus clarki lewisi*), interior redband and bull trout gave way as habitat changed in response to land management objectives. These changes favored introduced species such as brook trout (*Salvelinus fontinalis*), smallmouth bass (*Micropterus dolomieui*), and redside shiner

(*Richardsonius balteatus*) in places historically dominated by native resident salmonids. The NFJD currently supports strong native runs of spring Chinook salmon and summer steelhead in the Columbia River Basin with minimal influence from hatchery stocks. Narum et al. 2008 confirmed the John Day River's status as a viable refuge for wild stocks with limited anthropogenic influence.

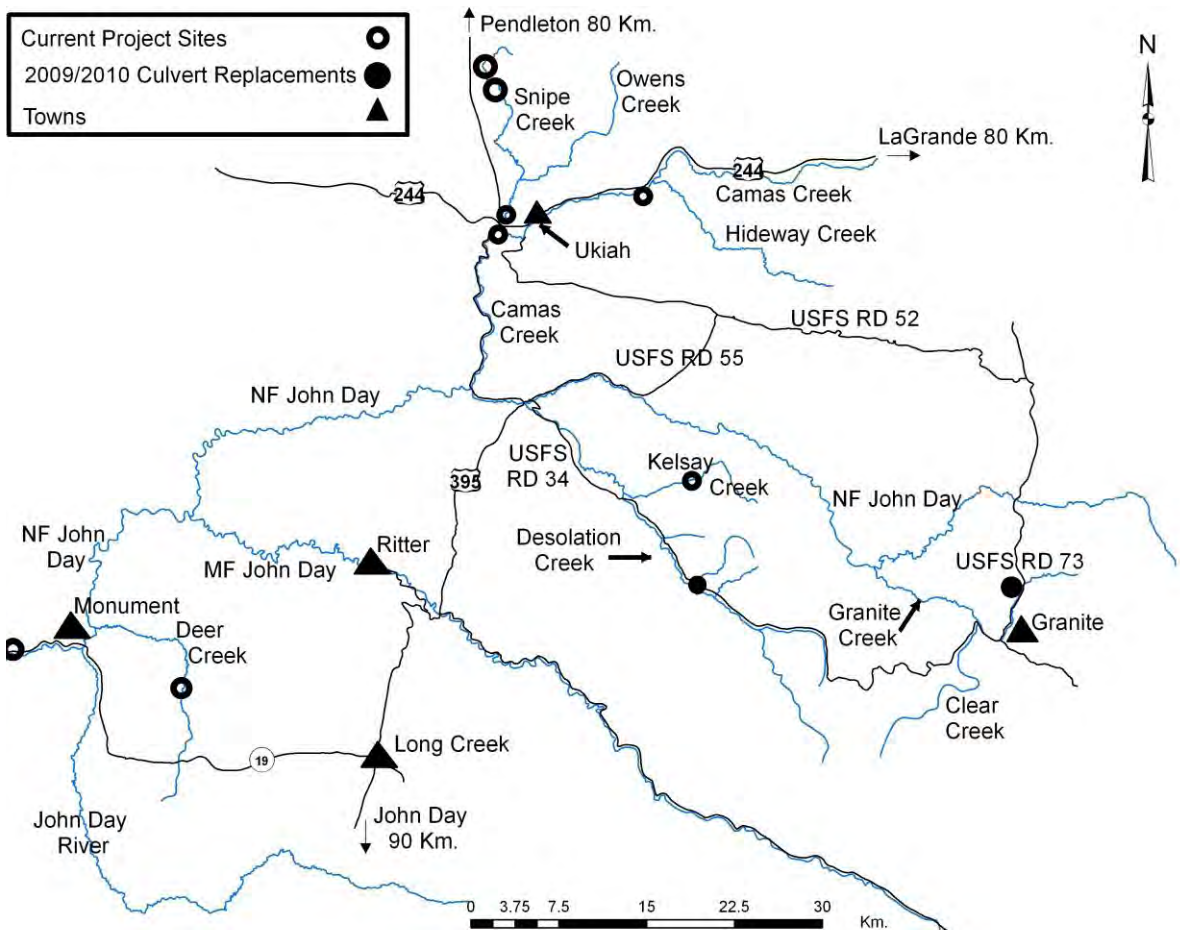


Figure III. Restoration and Protection Site Locations.

The NFJD steelhead population currently occupies ten major spawning areas (including Upper and Lower Camas, Owens, Granite, and Desolation Creek) and five Minor Spawning areas distributed throughout the basin (Carmichael, R.W., 2006). Surveys indicate approximately 1,400 kilometers of the NFJD (StreamNet, 2008) and its tributaries are currently used for spawning and rearing, with index surveys showing consistent use over time. Index area spawning surveys from 1965 to 2005 on NFJD tributaries indicate returning adult steelhead in natural production areas ranged between 369 spawners in 1990 to 10,235 spawners in 1965 (Carmichael, R.W., 2006). While these numbers are somewhat variable over time, current populations appear to be substantially less productive then historic populations (Columbia BM RC&DA 2005) and show a long term decreasing trend. Declines in the basin's summer steelhead population warranted a threatened listing under the ESA in 1999 (The North and Middle Forks John Day River Local Advisory Committee 2002).

Surveys indicate approximately 300 kilometers (approximately 57% of total stream kilometers; (StreamNet, 2008) of the NFJD and its tributaries provide spawning and rearing habitat for Spring Chinook salmon with relatively consistent use over time. However, due to run and spawn timing specific areas may not be used consistently in response to limiting factors. For instance, Granite Creek has shown a long term decline in use for unknown reasons, habitat use in Camas Creek is opportunistic and responds to available flows and water temperatures, and returning adults of the MFJD population died prematurely during 2007; likely due to elevated water temperatures (Unterwagner 2007).

Limiting habitat factors identified in the NFJD basin (Table 1) and designated in Carmichael (2006), Columbia BM RC&DA (2005), and various management plans include water quality (temperature, modified flows, nutrient input), in-stream habitat (structure, cover, sediment loading, channel morphology and processes,), and riparian health. Most streams in the NFJD basin are considered to be in relatively good condition, with the exception of elevated late summer water temperatures that exceed Oregon Department of Environmental Quality standards. In general, most indicators of channel condition within the NFJD suggest the basin is "functioning at risk".

Historic and current land use practices or threats (Table I) within the have reduced river stability, decreased high quality summer stream flows and water quality, reduced heavy riparian and floodplain cover, and compromised physical and biological processes related to these associations and structures. The loss of abundant riparian and flood plain vegetation, once robust beaver populations, and large spring and fall Chinook salmon migrations suggest the NFJD has lost a significant amount of in-stream habitat diversity and may now have an altered hydrologic cycle. Changes in the hydrologic cycle attributed to altered riparian and floodplain areas and stream morphology and processes can be indicated by increased runoff, altered peak flow regimes, reduced ground water recharge and soil moisture storage, and low late-season flow and elevated water temperatures. Historic and current land management strategies, in combination with possible changes in the hydrologic cycle, have contributed to stream channel instability (i.e., channel widening and downcutting) in some portions of the NFJD. Additionally, wildlife habitat has become increasingly fragmented, simplified in structure, and infringed upon or dominated by non-native plants (ICBEMP 2000).

Major Limiting Factors	Threats
Floodplain & Channel Structure In-Stream Habitat Sediment Routing Water quality	Riparian Disturbance Stream Channelization & Relocation Grazing Forest practices Roads Irrigation Withdrawals Mining & Dredging

Table I. Limiting factors and threats within the North Fork John Day Basin.

Changes in habitat have also resulted from a century of fire suppression activities and fire exclusion from the forest ecosystem resulting in greater forest stand densities than historic natural conditions. Dense stands are more susceptible to insect infestation, disease, and catastrophic stand replacement fires. Juniper encroachment into native grasslands resulting from altered an altered fire regime have served to increases evapotranspiration and reduce stream flows. Roads created to facilitate logging operations and fire suppression have increased in-stream sedimentation from road erosion and disturbed areas during logging operations. Culverts and other structures associated with road construction have fragmented existing in-stream and riparian, floodplain, and wetland habitats.

Altered native habitat conditions also facilitate the spread of non-native and highly adaptable species. Nonetheless, habitat conditions on public lands and some private lands are generally considered to be improving through cooperative efforts between public and private landowners, tribal programs, federal, and state agencies, and groups such as Soil and Water Conservation Districts and Watershed Councils.

2010 ACCOMPLISHMENTS

A description of individual Work Elements to which efforts were directed during 2008 include;

WE A – Produce Weed Control Compliance Documentation

Herbicide documentation required by BPA was received from the contractor and cooperators in January 2011 followed by submission to BPA. This included the 2010 actual and 2011 proposed application data for project areas on Snipe, Owens, Upper & Lower Camas, and Deer Creeks as well as the NFJD.

WE B – Identify, Prioritize, and Select Habitat Project Areas

In an effort to identify and prioritize new habitat restoration efforts, we obtained background information from numerous sources (county records, previous contacts, sub-basin and recovery plans, and consultation with landowners) and coordinated with basin shareholders. This resulted in coordination meetings with five landowners for proposed 2010 and out year efforts.

Restoration opportunities have been identified in cooperation with the UNF, WNF, and NFJDWC during 2010 and beyond when funding becomes available with planning beginning for efforts in 2014 and beyond. The Project continued to coordinate with cooperators for efforts scheduled for 2011, 2012, and 2013 and agreed to provide additional cost share towards a grant application submitted by the NFJDWC supporting cooperative restoration efforts from 2011 through 2013 addressing mine runoff and passage barrier replacements within the Granite Creek basin. Longer range planning to streamline future cooperative effort development and implementation will allow for the efforts proposed in the NFJDWC grant application and several others currently under consideration.

WE C – Provide Outreach and Education

During 2010, outreach included participation in the Monument Resource Fair, presenting at the Native American Fish & Wildlife Society meeting in Lewiston, Idaho, attending NFJDWC and Cooperative Weed Management Area meetings, and providing input regarding the recently adopted NF John Day TMDL. Educational opportunities related to the 2009 SOW were not identified. While this milestone was not included in the 2011 SOW, the Project shall participate in future educational opportunities as they are identified.

WE D – Maintain Water Developments

Water developments were maintained throughout 2010 and we will continue to coordinate with landowners regarding maintenance. Two issues arose throughout the year related to pump and controller replacement/repair. The NFJD sediment tolerant pump could not produce adequate power without the addition of several more solar panels and the controller needed to be replaced. As such, a new pump and controller were secured and installed. The Upper Camas Creek Upland pump developed issues and will be pulled and sent in for repaired under warrantee once the pasture dries enough to pull the pump with a truck in 2011.

WE E – Investigate for Livestock Trespass

Livestock trespass was investigated and rectified throughout the grazing season. Trespass occurred only on the Upper Camas Creek site due to the failure of a boundary fence.

WE F – Maintain Fences

Fence inspections throughout 2010 did not identify damage that wasn't repaired in short order and primarily occurred during spring maintenance efforts prior to the grazing season. Repairs were needed in response to fallen trees.

WE G – Maintain Vegetation

A contract for noxious weed control efforts awarded in February 2010 used herbicides on Upper Camas, Owens, Snipe, and Deer Creeks and the NF John Day sites. Significant progress has been made on the Deer Creek and NF John Day River sites allowing the Project to concentrate on reseeding selected areas with native grasses. At this point, all project areas are currently being maintained since previous efforts have largely eliminated or significantly reduced noxious weed presence. Efforts outside these areas shall continue through cooperative efforts with partners, for instance, a cooperative agreement with the City of Ukiah successfully provided weed control on Lower Camas Creek site and adjacent properties within and around Ukiah.

WE H – Collect Monitoring Data

Monitoring efforts during 2010 were undertaken to provide a baseline for future efforts since little information exists prior to cooperative efforts. This included longitudinal transects , cross-sectional transects, and photopoints. Data collected for five sites will be covered in this reports discussion.

WE I – Acquire Stream Temperature Data

Temperature loggers were installed in May 2010 and removed at the end of September 2010. Recovered files were subsequently passed on to Monument SWCD and uploaded into the NOAA database.

WE J – Install Bruin Creek Riparian Fence

One mile of three strand New Zealand wire fence along one half mile of Bruin Creek was completed in early July. There were no complications or overruns in cost and cost share consisted of $2,564 (UNF), $7,579 (CTUIR). The NFJDWC secured and administered a contract for this effort, the UNF provided materials, and CTUIR provided funds for implementation.

WE K – Install Morsey Creek Riparian Fence

Four and a half miles of four strand barbed wire fence along 2.2 miles of Morsey Creek was completed in early July. There were no complications or cost overruns and cost share included $12,639.40 (UNF) and $34,320 (CTUIR). The NFJDWC secured and administered a contract for this effort, the UNF provided materials, and CTUIR provided funds for implementation.

WE L – Install Lower Sugarbowl Riparian Fence

One mile of four strand barbed wire fence along one mile of Sugarbowl Creek was completed in early July. There were no complications or overruns in cost and cost share consisted of $1,927.70 (UNF), $5,544 (CTUIR). The NFJDWC secured and administered a contract for this effort, the UNF provided materials, and CTUIR provided funds for implementation.

WE M – Install Taylor Creek Riparian Fence

Two and three quarter miles of four strand barbed wire fence along 1.25 miles of Taylor Creek was completed in early July. There were no complications or cost overruns and cost share included $11,036.10 (UNF) and $11,500.50 (CTUIR). The NFJDWC secured and administered a contract for this effort, the UNF provided materials, and CTUIR provided funds for implementation.

WE N – Monitor the Battle Creek Culvert Replacement

Implementation for the Battle Creek culvert occurred over a three week period during July and August. During excavation, a cultural resource monitor remained on site during excavation. There were no artifacts identified during this effort.

WE O – Monitor the Granite Creek Culvert Replacement

Implementation for the Granite Creek culvert occurred over a one week period in August. During excavation, a cultural resource monitor who remained on site did not identify any artifacts.

WE P – Plant Native Vegetation (Fletcher)

During June of 2010 NRCS personnel surveyed the 2008 planting effort on the Lower Camas Creek site. Vegetation survival exceeded the 50% survival rate required by the CREP contract the landowner holds with FSA and as such, the plantings to meet that 50% survival rate were not required. Funding identified for this WE was set aside to implement the Upper Camas Creek In-stream Restoration project (WE Q).

WE Q – Rhinehart In-stream Implementation

Based upon an implementation design secured in early 2010, Fill/Removal, 404, and 401 permits were secured and a Biological Assessment was created and submitted to NOAA and NMFS for consultation regarding threatened species and Essential Fish Habitat. Consultation with CTUIR's Cultural Resource Department resulted in 'shovel' tests in two areas where floodplain excavation would occur. A significant number of artifacts resulted in a revision of the design plans in these areas which precluded implementation in 2010. The revised design shall be used to consult again with permitting agencies and implementation is expected to occur in 2011.

WE R – Fox/Cottonwood Creek Leafy Spurge Control

During 2010 personnel surveyed over 40 stream miles surveyed locating 150+ acres of Leafy Spurge. Treatments occurred under a contract with Grant Weed Control over acres 80 acres with herbicide. Bio-controls were also used to a limited degree due to a difficulty in securing the appropriate species in sufficient amounts to complete all treatments identified. Treatments and/or effectiveness monitoring over the next four years shall include;

1. Presence absence surveys throughout the basin using established protocols.
2. Treatments of both herbicides and bio-controls.

3. A final monitoring report; detailing protocols, results, and discussion.
4. Sharing of monitoring protocols and results with other agencies throughout the region. Monitoring includes mapping and assessment, permanent plots, photo points, belt transects, and perimeter mapping.

WE S – Ten Cent Creek Surveys

In an effort to support future passage barrier replacements on Ten Cent Creek, the Project completed three surveys capable of supporting culvert design efforts. Survey data has been passed on the UNF engineers who will complete design work (WE T) in late 2011 and a preliminary review of the data has not identified any issues.

WE T – Ten Cent Creek Culvert Designs

Due to several complicating factors designs for the Ten Cent Creek culvert replacements were not created. During 2009 the NFJDWC applied for and did not receive funding to support design efforts matching funds provided by CTUIR. Additionally, the UNF engineers were unable to create designs during 2010 due to an excessively high workload and an agreement between the UNF and CTUIR which would facilitate such efforts has not yet been signed. Survey data (WE S) has been forwarded to the UNF who will complete the designs in 2011 using internal funding sources. Funding allocated by CTUIR to support the design effort shall be used during the planned 2012 implementation.

WE U – Granite Creek Native Vegetation Plantings

Native vegetation plantings occurred within the Granite Creek basin on upland habitat to improve conditions on road obliterations completed in 2009. A mix of 8,400 willow, cottonwood, Bog birch, dogwood, and hawthorn were used to match species to individual site location. Cost share included hard and soft wood trees, stakes, tubes from the UNF ($13,528), funding for implementation from the NFJDWC ($24,910), and funding for implementation from CTUIR ($8,085).

WE V – Clear Creek Native Vegetation Plantings

Forty acres riparian area along Clear Creek was planted to kick start vegetative growth on mine tailings redistributed in 2007. A mix of 5,040 willow, cottonwood, Bog birch, dogwood, and hawthorn were used to match species to individual site location. Cost share included hard and soft wood trees, stakes, tubes from the UNF ($1,933), funding for implementation from the NFJDWC ($3,558), and funding for implementation from CTUIR ($6,436).

WE W – Granite Creek Noxious Weed Control

Over 40 acres were surveyed and 28.5 acres were treated along Granite and Clear Creeks for noxious weeds including: yellow toadflax, Canada thistle, bull thistle, and spotted knapweed with surveys. The NFJDWC shall continue treatments in 2011 mostly for Canada and bull thistle.

WE X – Install Lower Desolation Creek Riparian Fence

Conversations with the landowner occurred during 2010; however, an agreement could not be reached and this WE could not be completed; conversations shall continue.

WE Y – Install Upper Desolation Creek Riparian Fence

Conversations with the landowner occurred during 2010; however, an agreement could not be reached and this WE could not be completed; conversations shall continue.

WE Z Desolation Creek Watershed Analysis

Conversations with the landowner occurred during 2010; however, an agreement could not be reached and this WE could not be completed; conversations shall continue.

WE AA – Desolation Creek Range Inventory

Conversations with the landowner occurred during 2010; however, an agreement could not be reached and this WE could not be completed; conversations shall continue.

WE AB – Produce Project Deliverables

The 2011 Statement of Work and budget were submitted for approval in October of 2010 with subsequent changes in response to requests from CTUIR and BPA personnel.

WE AC – Submit Annual Report

See North Fork John Day River Anadromous Fish Habitat Enhancement Project, 2010 Annual Report.

WE AD – Periodic Status Reports For BPA

Completed and submitted as required.

DISCUSSION

Although several years of monitoring data had been collected we have not compared and contrasted across multiple years due to a lack of pre-implementation monitoring data collected before 2007 save isolated stream temperatures and photopoints. Data collection in 2007 was rushed as the Project set up a monitoring protocol in a short period of time and the Projects Technicians unfamiliarity with sampling protocols save water temperatures and photopoints. Further consideration of the protocols during late 2007 and early 2008 modified several practices resulting in the abandonment of several sampling locations. Training for both Project employees has improved sampling practices and skills which will complement standardized sampling practices to be developed by CTUIR during 2012.

For this report, five sites will be discussed including the Snipe Creek, Owens Creek, Lower Camas Creek, NFJD, and Deer Creek sites. Several inconsistencies became apparent when data from consecutive years was compared and as such, not all data will be discussed here. Several cross-sections contained unexplained inconsistencies and given that there wasn't any pre-implementation data collected longer term trends cannot be adequately explained and the Upper Camas Creek site will not be discussed since implementation hasn't occurred. Data from the Upper Camas Cree site will be used in conjunction with a 2011 survey of Camas Creek to briefly develop an understanding of existing channel and riparian conditions. Data from 2007 through 2011 generally shows that implementation was successful in reducing the effects of intensive grazing and sites are dynamically stable with landowners realizing some benefit.

Since stream discharge was not identified prior to collecting cross-sectional and longitudinal data the surface area and slope of individual habitats will not be provided. This is primarily due to our inability to quantify changes in habitat linked to a difference in discharge. Additionally there isn't a functioning stream gauge on any of the streams linked to a project suite at this time. Considerations have been given to reestablishing the gauge on Camas Creek near Ukiah (#14042500) though this has not yet occurred. As monitoring schedules are changed to reflect the need for each project discharges may be completed prior to collecting sampling data.

For clarification, codes used while collecting data were used to reduce potential complications when entering data. Table II shows these codes which will be referred to during the discussion of individual sites.

Bank Stability		Wood Class		Substrate
1	No vegetation, stable	1	Absent	Organics
2	No vegetation, unstable, active erosion	2	Wood present	Silt
3	Vegetation, unstable, no erosion	3	Wood present some cover	Sand
4	Vegetation, unstable, active erosion	4	Wood present, medium to good cover	Gravel = 6mm - 6.4cm
		5	Wood present, large wood or jams	Cobble = 6.4cm - 15.3cm
				Rubble = 15.3cm - 30.6cm
				Boulder = 30.6cm - 91.5cm
				Bedrock = > 91.5cm

Table II. Codes used to facilitate data collection.

Snipe Creek

This effort protected the floodplain and riparian areas and stream channel from grazing cattle in two pastures separated by the Albee Road (Figure IV) in 2001. The upper and lower parcels are under separate Conservation Agreements with similar treatments of riparian fencing with water gaps and/or spring developments or shallow wells to improve upland grazing conditions. In-stream work on either site was not initially completed allowing recovery through natural processes.

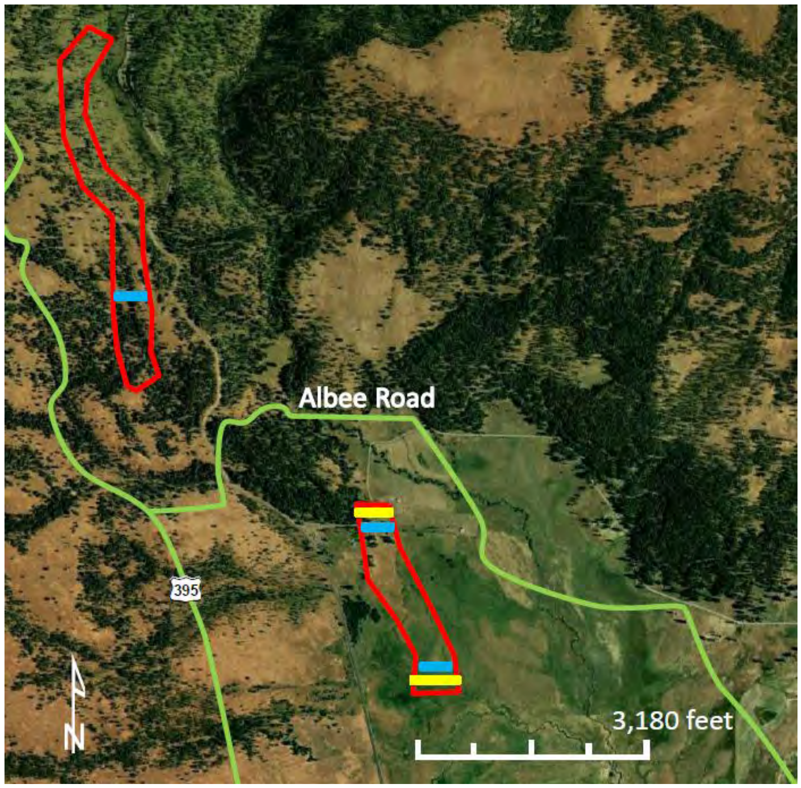


Figure IV. Snipe Creek Project site showing both the upper and lower reaches. Yellow Bars denote the approximate locations of water gaps noted in the text and blue bars denote the approximate locations of cross-sections. Snipe Creek flows from the north to south.

Historically the upper site contained a B3 or 4 type channel using the Rosgen Classification (Rosgen, 1996) based upon current conditions and historic indicators. The channel created an inset floodplain quite some time before our efforts were undertaken as indicated by well-established riparian vegetation. Although quantitative data does not exist, streambank cutting appears to have decreased and vegetation has recovered to some extent. This statement is based upon a comparison of conditions within the water gap (understanding there is an inordinate amount of use in a concentrated area) and understanding cattle's propensity to loiter within shady riparian areas. Unfortunately, a control for either site was not set up prior to 2007 most probably due to the Conservation Agreement including the entire stream on the property.

A single cross-section with associated vegetation and longitudinal data was selected to represent the upper reach on the property. Figure V indicates the channel has maintained the same general form from 2008 through 2010 with the exception of differences due to different sampling points. Predetermined distances along the cross-section are not identified for any of our cross-sections; instead, data points reflect on-site topography which may lead to differences between individual years. Additionally, the disparity between the 2008 channel width and 2009/10 cannot be explained unless the difference lies in a slightly different location. During 2009 pins were placed at both ends of the cross-sections to reduce potential discrepancies between years.

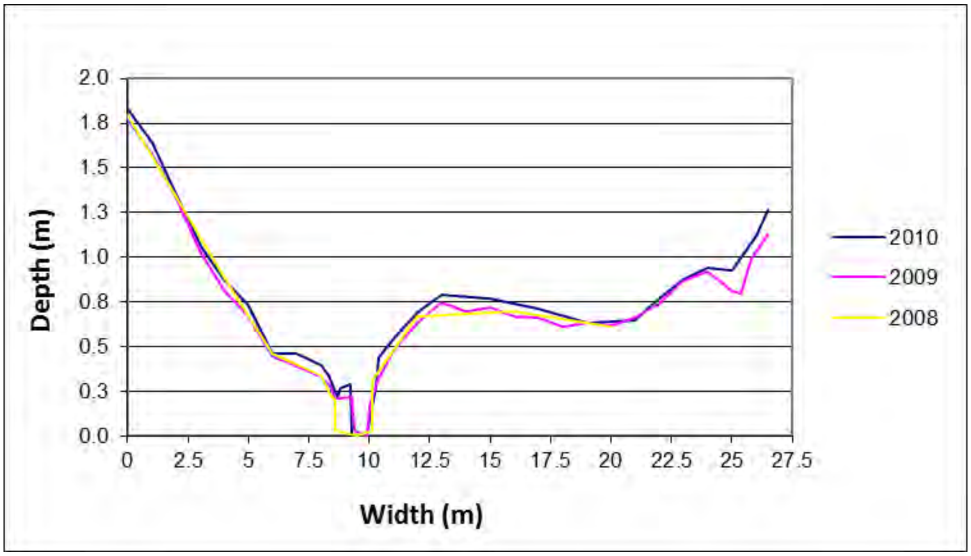


Figure V. Cross-section selected for the Upper Snipe Creek project reach.

Streambank stability was identified as vegetated and unstable without obvious erosion due to bare dirt between the water surface and bank full point. This ranking supports cross-sections in that considering that rating over three years, cross-sectional profiles, and vegetation data (Table III) the site shows little to no erosion. Pebble counts were not conducted due to the size of the active stream channel although substrate estimate show a stable channel consisting primarily of gravel. Estimates from 2010 appear to reflect vegetative regrowth on the channel margins effectively trapping fine materials from above although the early sampling effort (June vs July) may have skewed our estimates due to higher water levels. Thinleaf alder (*Alnus incana*) Table IV, Figure VI) provide significant shade to the channel. Vegetation exists on both streambanks throughout most of the protected riparian area and provides shade to the channel; Thinleaf Alder also constituents the majority of woody debris to the channel. While this is not significant woody debris recruitment will occur over time. Beginning in 2009 a Spherical Densitometer was secured and used to quantify shade estimates immediately above the left and right banks of the channel as well as the center. The densitometer indicated there was 88% shade coverage at this cross-section from the center off the stream which is somewhat lower than the estimated values. Shade estimates for the longitudinal profile (Table V) also reflect the presence of significant shade along the channel though gaps as they would naturally. Visual estimates were not corroborated with a spherical densitometer though they indicate that extensive cover exists about the stream channel. The use of a spherical densitometer in consecutive years will likely improve our visual estimates.

Data collected for the longitudinal profile (Table V) does suggest there is significant complexity within this reach and in affect habitat for aquatic species; given the channels small size. Though influenced by low water years this complexity survives though specific habitats may become less than ideal. During 2007 the lower reach on the landowner's property lost flows to the substrate in late July. While flows were diminished in this reach, runs and scour pools separated by longer riffles viable habitat remained for rearing aquatic species. Differences in habitats across the years appear to reflect differences in streamflow, sampling estimates, and changes in personnel's experience more than a change in habitat. The size of this channel and available watershed above reduce the potential for stochastic events which would create significant disturbances. Simply limiting access to the riparian area appears to have been successful.

Figure VI. Photopoints taken in 2004 (left) and 2010 (right) at the lower end of cross-section I.

Transect	Year	Habitat Type	Right Bank Stability	Left Bank Stability	Wet Width	Bank Full	Flood Prone	% Organics	% Silt	% Sand	% Gravel	% Cobble	% Rubble	% Boulder	% Bedrock	% Shade Right	% Shade Center	% Shade Left	Wood Class
29	2010	Riffle	3	3	1.9	2.1	24.2	50	-	40	10	-	-	-	-	100	100	100	1
29	2009	Riffle	3	3	0.6	2.1	23.3	10	5	-	85	-	-	-	-	100	100	100	1
29	2008	Riffle Pool	3	3	0.6	0.9	20.1	-	-	-	100	-	-	-	-	100	100	100	1

Table III. Cross-sectional data collected on the Upper Snipe Creek site from 2008 through 2010. Distances are in meters.

		2010		2009		2008	
Transect	Direction	% Composition	Species	% Composition	Species	% Composition	Species
29	Left	9.5	Water	26	Grass - Sedge	26	Grass
		29.5	Grass	58	Grass - Snowberry	57	Grass - Snowberry
		40.0	Grass - Rose	16	Grass - Strawberry	17	Grass - Strawberry
		21.0	Grass -Strawberry				
	Right	9.5	Water	14	Alder	14	Alder
		9.5	Grass/Alder	26	Grass	26	Grass
		37.0	Grass	60	Grass - Snowberry	60	Grass - Snowberry
		44.0	Grass - Rose - Snowberry				

Table IV. Cross-sectional vegetation collected on the Upper Snipe Creek site from 2008 through 2010.

Year	Habitat Type	Habitat Depth	Habitat Width	Habitat Length	Bank Full	Flood Prone	Right Bank Stability	Left Bank Stability	% Organics	% Silt	% Sand	% Gravel	% Cobble	% Rubble	% Boulder	% Bedrock	% Shade Right	% Shade Center	% Shade Left	Wood Class	Species Present
2010	Riffle	0.04	1.61	6.53	2	14.09	3	3	23.33	2.78	33.33	23.33	13.33	3.33	0.56	-	56	74	84	2	
2009	Riffle	0.04	0.89	5.66	1.90	16.67	3	3	13.84	6.67	44.1	23.59	9.70	2.10	-	-	97	89.5	91	2	ST.
2008	Riffle	0.04	0.82	5.57	2.00	14.00	3	3	13.33	6.67	40.00	40.00	-	-	-	-	100	90	100	2	Z
2010	Run	0.08	3.01	4.61	2.22	13.27	3	3	6.42	17.14	53.57	15.71	6.43	-	0.70	-	51	71	83	2	
2009	Run	0.10	1.23	3.56	2.08	16.12	3	3	5.00	29.54	42.73	17.73	4.09	0.91	-	-	93	85	92	1	ST.
2008	Run	0.11	1.29	4.48	1.49	11.87	3	3	13.33	39.17	15.00	14.17	15.00	2.50	0.80	-	88	80	90	2	Z - ST
2010	Scour Pool	0.09	1.50	2.00	1.90	16.60	4	4		-	60.00	40.00	-	-	-	-	90	100	100	3	
2008	Scour Pool	0.11	1.55	2.45	3.85	11.30	3	3	0.00	37.50	27.50	30.00	5.00	-	-	-	100	100	100	4	
2010	Back Water	0.04	1.20	2.40	4.20	13.30	3	4	-	45.00	50.00	5.00	-	-	-	-	100	100	100	1	
2009	Side Channel	0.06	1.00	2.00	3.60	13.40	4	4	5.00	35.00	50.00	10.00	-	-	-	-	100	100	100	1	
2008	Plunge Pool	0.13	1.20	2.10	2.00	23.70	4	3	-	5.00	45.00	40.00	10.00	-	-	-	100	100	100	2	

Table V. Longitudinal data collected on the Upper Snipe Creek site from 2008 through 2010. Distances are in meters.

The lower site lies within a broad low gradient valley and therefore likely maintained an E5 or 6 channel based upon historic indicators and the Rosgen classification system (Rosgen, 1996). Conversations with the landowner and botanists suggest the floodplain and riparian areas contained healthy populations of Quaking aspen (*Populus tremuloides*) and other species adapted to wet conditions. Old channels suggest the channel in this reaches upper areas hasen't changed dramatically recently although an inset floodplain of approximately 0.5 meters has formed in many points. Downcutting increases as one moves downstream (south) to where the lowest cross-section just above the reaches lower point is incised approximately 1.6 meters without a well-developed inset floodplain although a weak floodplain created on a meander with the channel incised another meter below that. This down cutting likely resulted at least in part from head cuts developed below the landowner's property and downstream channel straightening as suggested by aerial photographs. (Figure VII).

Much of the reach (primarily the lower two thirds) is gradually moving toward a Rosgen 'F' type channel as erosion collapses stream banks during high flow events. This characteristic is visible in cross-section 32 (Table VI) although some disparity does exist within the cross-sectional flood prone and bank full widths though they are likely due to measuring inconsistencies in tall grasses. Streambank collapse and in affect channel widening occurs throughout much of this lower reach all be it rather slowly due a rooting depth of approximately 0.5 meters and dense vegetative growth. Additionally, highly seasonal flows the bulk of which occur when the ground is at least partially frozen in early spring reduce streambank erosion rates. Thick grasses growing within the channel and on collapsed streambank soils also disguise active erosion

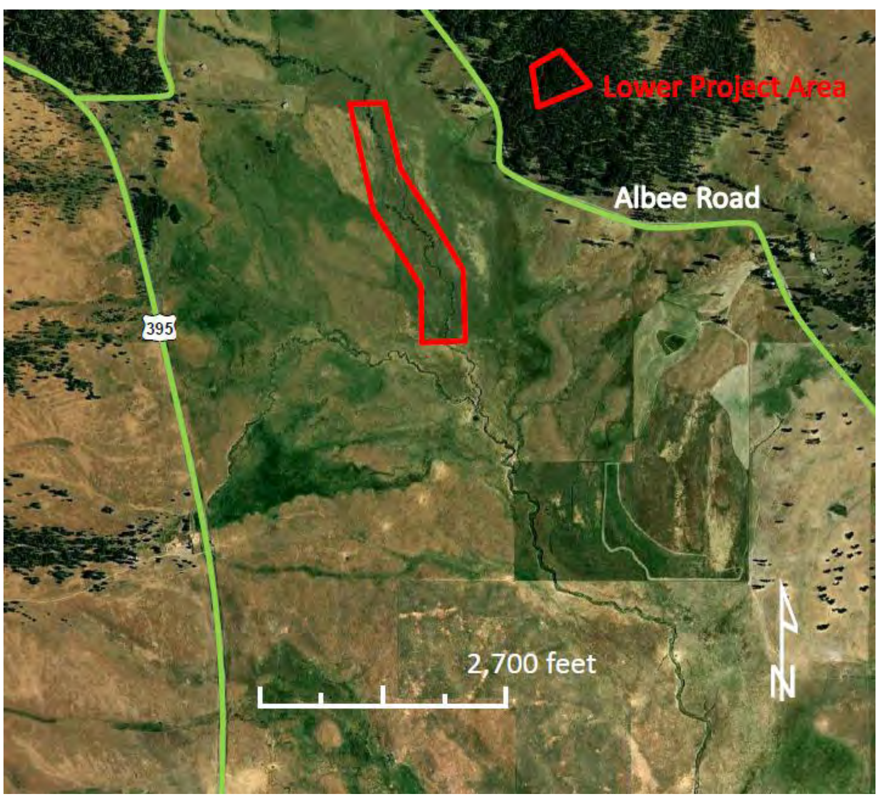


Figure VII. Project Area denoted in Red with an inset and somewhat straightened channel below without apparent grade control stopping the head cut.

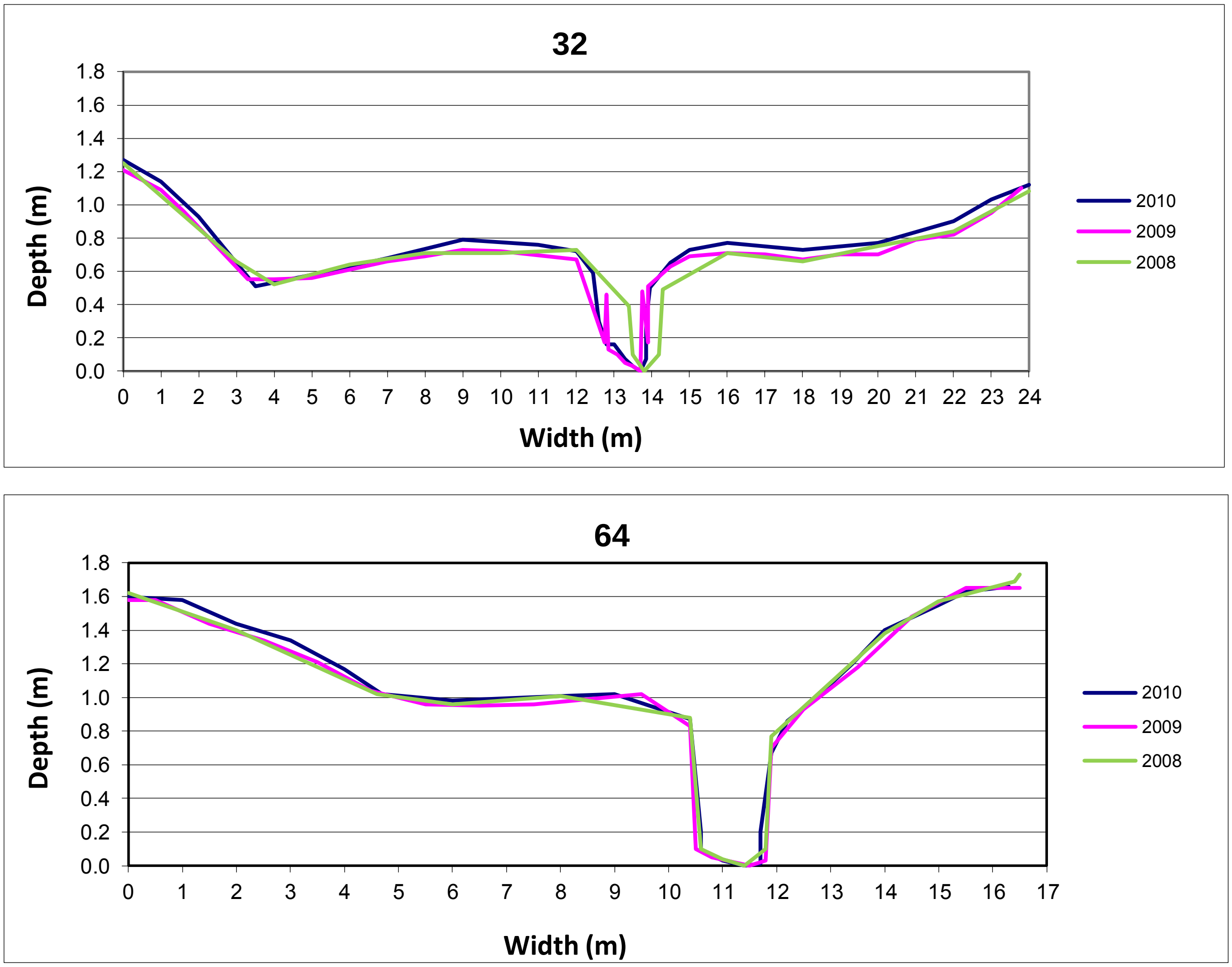


Figure VIII. Cross-sections on the Lower Snipe Creek site.

Substrate within both cross-sections has also remained consistent with respect to material type and proportions as have percent shade left and right, and wood class (Table VI). Due to both cross-sections location within a broad floodplain where large trees don't exist and combined with an inset channel one would expect substantial shade from native grasses (Table VII) on the streambank; however, these aren't substantial enough to provide shade to the center of the channel. Where Thinleaf alder or Quaking aspen do exist they provide shade to the entire channel and are typically associated with deeper water and the presence of aquatic species. Woody vegetation adjacent to the channel also provides in-stream structure though without a substantial supply woody debris continues to be a minimal factor at best. Native hardwood plantings did not survive well due to a depressed water table, browse by wildlife, culling by beaver, and competition with existing vegetation (Table VII). Figure IX shows the growth of ponderosa pine which is now better suited to the dryer floodplain; without elevating the groundwater table they will continue to thrive.

The longitudinal profile (Table VIII) indicates that habitat types are similar across years as one may expect. The channel is gradually widening although variable floodprone and bankfull measures are inconsistent across years, likely due to sampling experience gained. Sediments are relatively consistent across the years and variable estimates for shade are of concern although the values may be accurate when considering grass within the channel. Measures using the spherical densitometer reflect a more reasonable estimate of approximately two percent shade.

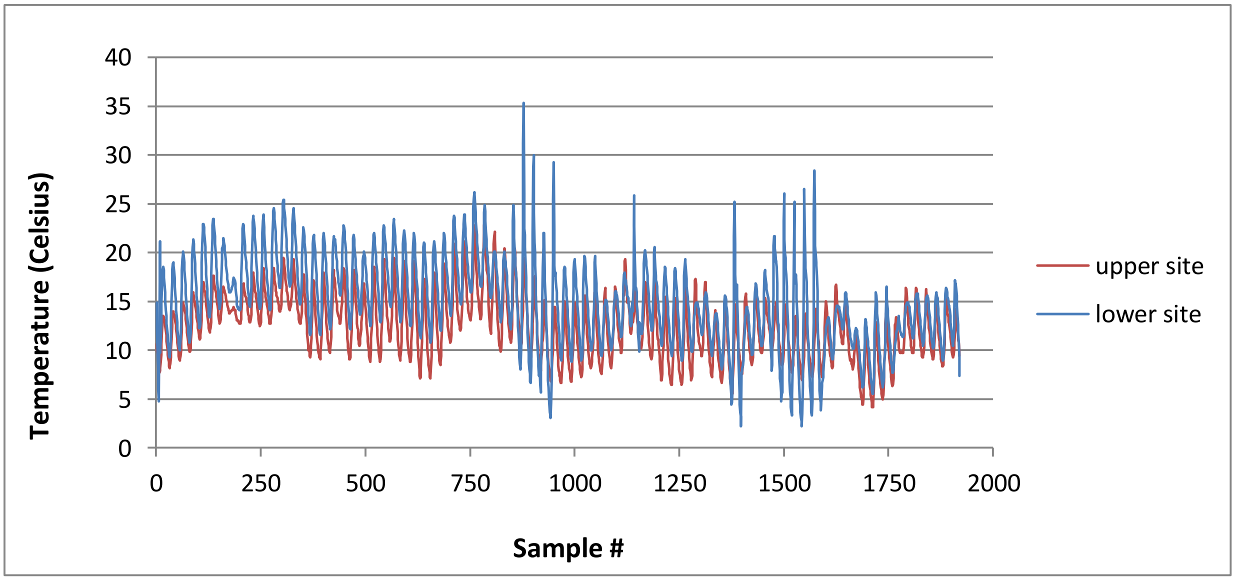
Future efforts will continue to record visually estimated shade although only as a general reference relating measures from the spherical densitometer to grasses not apparent in the densitometer readings.

Both the upper and lower areas within this lower treated area are susceptible to flows entering upstream sediments leaving a dry channel. Table VIII identifies a dry channel in 2007 which existed throughout the lower project area due to Snipe Creeks entering a shallow alluvial fan followed by the broad floodplain above the landowner's property where stremflows enter the substrate as the shallow water table drops. This only occurs during the driest years and has happened as long as the landowner can remember. While these soils are known the dry up for two months a year channel headcuts previously noted below the site are likely at least to some extent responsible for these occurrences.

Figure IX. Photopoints on Lower Snipe Creek taken in 2004 (left) and 2010 (right) looking upstream from the middle of the reach looking upstream (north).

Since data reflecting pre-implementation conditions cannot be located a comparison of longer term stream temperature trends is not possible although data has been collected since at least 2006. In addition the comparison across years would be more useful if forces such as long wave radiation and the like could be filtered from the signal; unfortunately time and technical constraints prohibit this. Interruptions in the temperature signal (Figure X) also exist in most data sets, in some, to the extent the data is of little use. In an attempt to limit signal disturbance, temperatures from 1 August through 31 August were selected for direct comparison.

The signals character shown in Figure X confirmed by a Paired 'T' tests (α 0.05) suggests there is a difference in the mean values of data collected at the upper and lower boundaries of the lower project site for both 2006 and 2010. Descriptive statistics support the appearance of higher mean temperatures, wider data ranges, and greater variance in the lower sites (Table IX). Unfortunately this is contrary to attempts to improve site stability and channel characteristics along with water quality. Stream temperatures do however maintain mean temperatures at or close to those for both Bull and Steelhead trout and with adequate streamflows may provide refuge from higher temperatures in Camas Creek.



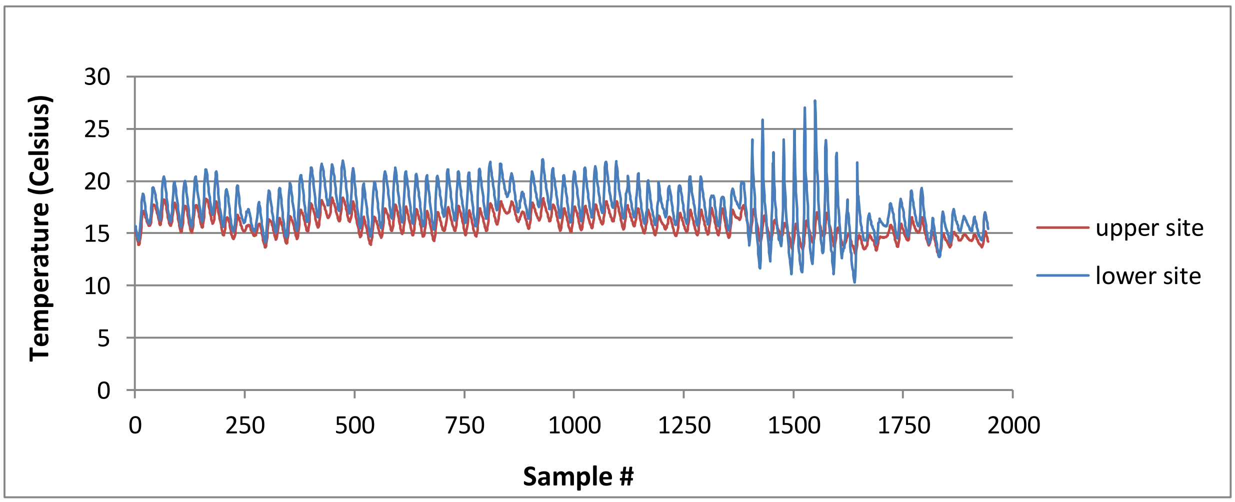


Figure X. Stream temperature data collected on Snipe Creek on the Lower project site from 22 June 2006 through 9 September 2006 (top) at one hour intervals and 22 June 2010 through 9 September 2010 (bottom) at one hour intervals. Note disturbances in the temperature signal in both graphs such as points 1394 – 2679 in the bottom graph.

Transect	Year	Habitat Type	Right Bank Stability	Left Bank Stability	Wet Width	Bank Full	Flood Prone	% Organics	% Silt	% Sand	% Gravel	% Cobble	% Rubble	% Boulder	% Bedrock	% Shade Right	% Shade Center	% Shade Left	Wood Class
32	2010	Glide	3	3	1.25	1.5	21	30	30	40	-	-	-	-	-	10	0	10	1
	2009	Glide	3	3	1.15	0.95	19.7	10	50	40	-	-	-	-	-	100	100	100	1
	2008	Glide	1	1	0.9	0.7	19.5	-	95	5	-	-	-	-	-	80	0	80	1
64	2010	Riffle	4	4	1.1	1.5	17.0	50	-	50	-	-	-	-	-	10	0	10	1
	2009	Glide	4	4	1.1	1.5	16.5	90	10	-	-	-	-	-	-	70	10	40	1
	2008	Riffle Pool	1	1	1.25	1.57	9.6	50	50	-	-	-	-	-	-	30	0	30	1

Table VI. Cross-sectional data for the Lower Snipe Creek site collected from 2008 through 2010. Distances are in meters.

		2010		2009		2008	
Transect	Direction	% Composition	Species	% Composition	Species	% Composition	Species
32	Left	5	Water	100	Grass	100	Grass
		95	Grass				
	Right	5	Water	100	Grass	100	Grass
		95	Grass				
64	Left	6	Water - Grass	100	Grass	100	Grass
		39	Grass				
		55	Sedge				
	Right	6	Water	100	Grass	100	Grass
		94	Grass				

Table VII. Vegetation data for the Lower Snipe Creek site collected from 2008 through 2010. Distances are in meters.

Reach	Year	Habitat Type	Bank Full	Flood Prone	Right Bank Stability	Left Bank Stability	% Organics	% Silt	% Sand	% Gravel	% Cobble	% Rubble	% Boulder	% Bedrock	% Shade Right	% Shade Center	% Shade Left	Wood Class	Species Present
Upper	2010	Riffle	2.12	16.20			50.00	-	50.00	-	-	-	-	-	20	10	10	1	
	2009	Riffle	1.23	20.97	3	3	25.70	42.10	27.10	4.30	-	0.70	-	-	90	90	100	1	
	2008	Riffle	1.55	23.05	3	3	20.83	39.17	38.33	1.67	-	-	-	-	96	89	93	1	
	2010	Glide	1.50	13.42			15.00	-	84.00	0.50	-	0.50	-	-	51	56	49	2	
	2009	Glide	1.26	22.67	3	3	19.50	61.50	16.50	2.50	-	-	-	-	99	96	98	1	
	2008	Glide	1.28	18.59	3	3	4.60	77.10	15.70	1.80	0.70	-	-	-	91	76	88	2	St.
	2007	Dry Channel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Lower	2010	Riffle	2.75	7.40	4	4	20.00	62.50	15.00	2.50	-	-	-	-	10	0	20	1	
	2009	Riffle	3.65	14.20	4	4	15.00	85.00	-	-	-	-	-	-	20	23	50	1	
	2008	Riffle	2.40	10.20	3	4	35.00	60.00	5.00	-	-	-	-	-		0	0	1	
	2010	Glide	3.63	7.43	4	4	27.00	53.00	20.00	-	-	-	-	-	17	0	17	1	
	2009	Glide	3.63	10.47	4	4	53.33	46.67	-	-	-	-	-	-	97	70	77	1	Z
	2008	Glide	1.87	7.49	3	3	31.40	56.40	10.70	1.40	-	-	-	-	0	0	0	1	Z
	2009	Riffle Pool	4.10	13.20	4	4	30.00	70.00	-	-	-	-	-	-	80	20	10	1	
	2008	Riffle Pool	2.20	6.87	3	3	40.00	45.00	15.00	-	-	-	-	-	0	0	0	1	
	2008	Scour Pool	2.30	8.90	3	3	-	70.00	30.00	-	-	-	-	-	1	1	1	1	
	2007	Dry Channel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Table VIII. Longitudinal profile data collected at the Lower Snipe Creek site from 2008 through 2010. Distances are in meters.

		Upper	Lower
2006	Mean	11.09	12.97
	Standard Error	0.10	0.14
	Standard Deviation	2.80	3.96
	Sample Variance	7.85	15.70
	Range	14.87	26.17
	Minimum	4.46	2.24
	Maximum	19.33	28.41
2010	Mean	15.71	17.24
	Standard Error	0.04	0.10
	Standard Deviation	1.09	2.61
	Sample Variance	1.19	6.79
	Range	5.06	17.39
	Minimum	13.02	10.30
	Maximum	18.08	27.7

Table IX. Descriptive statistics for stream temperature data from 1 August through 31 August during 2006 and 2010 for the Lower Snipe Creek Projects Site.

Owens Creek

This effort protected the Owen Creek's immediate riparian area and stream channel from grazing cattle (Figure X). Implementation included the development of a well to increase watering opportunities located adjacent to the building in Figure X and a single water gap. Prior to implementation significant downcutting of the stream channel occurred likely in response to the presence of SR 244 constraining the active floodplain and constricting streamflows and intensive grazing pressure. Channel improvements were intended to occur through natural processes and pre-implementation data was not collected.

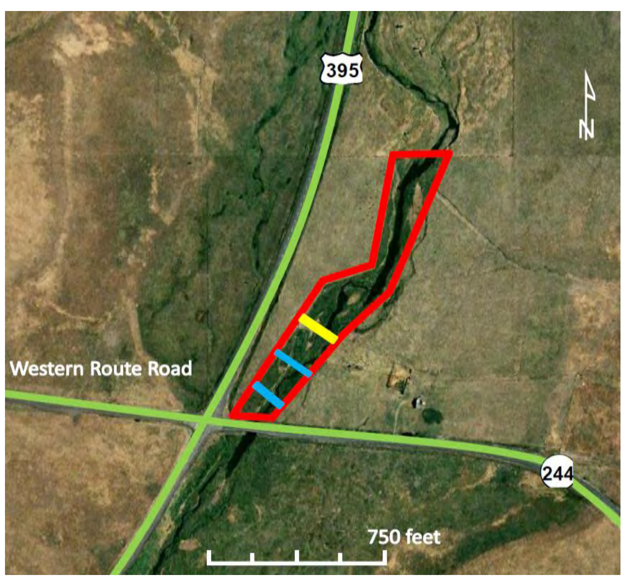


Figure X. Owens Creek Project site in red showing the approximate location of cross-sections in blue and water gap in red noted in the report's body.

Based upon surrounding features this reach likely maintained an E5 channel using the Rosgen Classification (Rosgen, 1996). This reach is low enough in a watershed which contains a significant number of broad flat meadows that would have historically produced high quality flows well into the summer. Unfortunately, head cuts have developed throughout much of the watershed significantly reducing shallow groundwater storage capability. As a result of this reaches such as those in the Snipe Creek project area may dry up during the summer months.

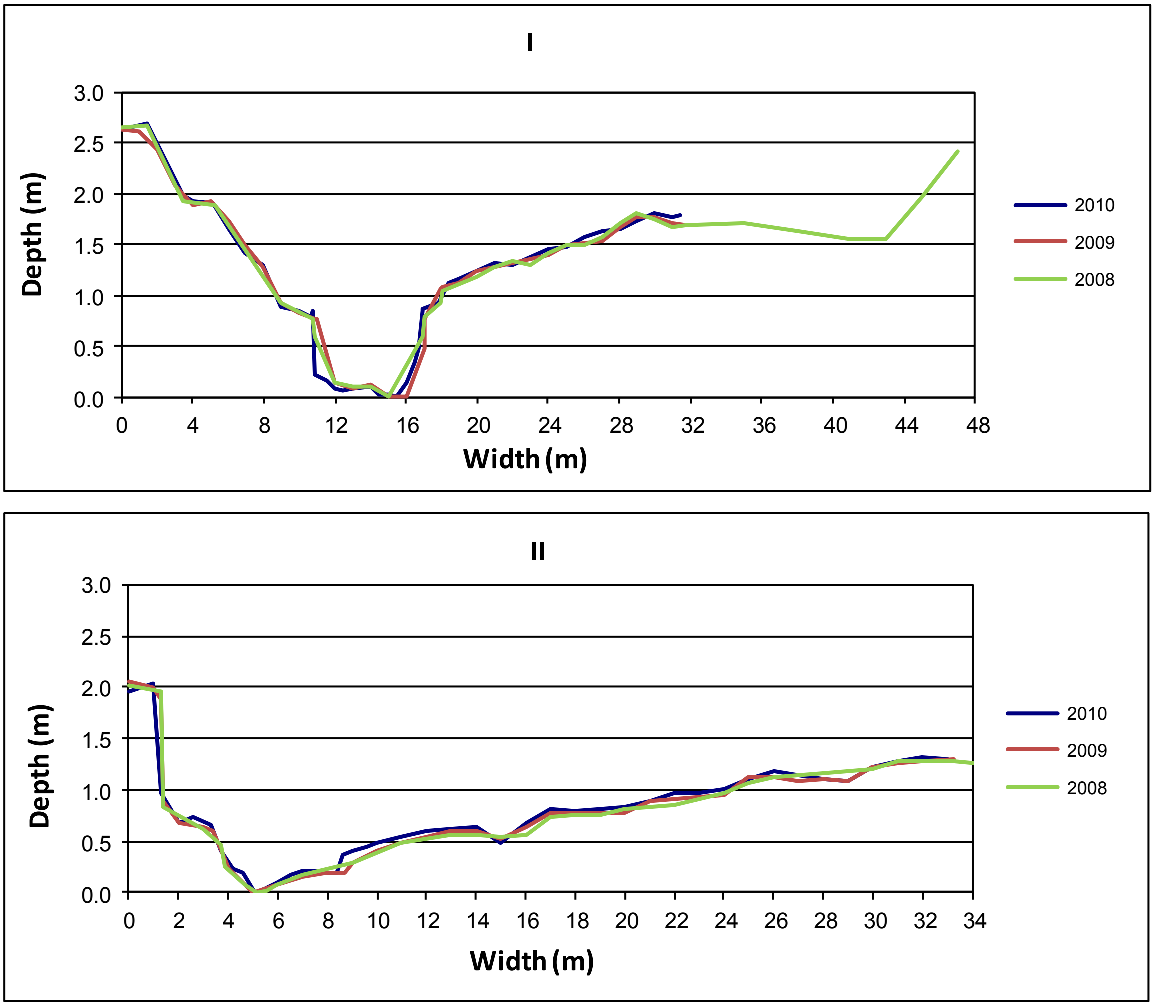


Figure XI. Cross-sections collected for the Owens Creek site from 2008 through 2010.

Since monitoring began in 2008 data suggests the site is relatively stable. Figure XI shows cross-sectional data collected for the three years with minimal change in either the channel or riparian area. There has been some channel widening in cross-section I which may be attributed stream flow discharge and duration constricting to pass under the SR 244 Bridge just below the cross-section II. Cattle have been unable to access the riparian area and channel since the projects inception save a water gap which would have reduced streambank cutting; the occurrence of elk and deer within the site should be relatively low. Table X and photopoints (Figure XII) indicate there may be some instability on the left side of cross-section I due to channel widening and the right side of cross-section II due to bare dirt exposed by a cut bank above the bankfull elevation where high flow events may erode; however, the cross-section diagrams show little actual erosion of the cut bank. High flow events moving through are pushed against the cutbank by a meander that will eventually become vegetated once energies are dissipated and vegetation provides stability leaving a wider inset floodplain. A change in cross-sections I's bankfull width of three meters is due to on the ground conditions while collecting data and not to actual changed in channel form.

While we cannot tie wet widths over consecutive years, cross-section I maintains a well-defined channel; the top of which shows little change. Combining this with similarly sized sediments and proportions and vegetation (Table XI) across the years and the balance of information, the channel appears dynamically stable under current constraints. While addressing conditions upstream may have some influence upon the existing conditions they would not likely prove deleterious as increased storage would increase residence time within and below the broad meadows and delay or buffer against high flows events downstream.

Sediments have remained consistent in their size and distribution, shade has remained the same, and woody debris has not changed due to the sites location on a broad floodplain with vegetation consisting primarily of grass (Table XI) and woody debris captured well upstream of the site. A group of naturally recruited Quaking aspen are present well outside the channel and to date native vegetative plantings have not occurred.


Figure XII. Photopoints taken in 2004 (left) and 2010 (right) from SR 244 looking upstream. Note the cut-bank present in both photographs.

Transect	Year	Right Bank Stability	Left Bank Stability	Wet Width	Bank Full	Flood Prone	% Organics	% Silt	% Sand	% Gravel	% Cobble	% Rubble	% Boulder	% Bedrock	% Shade Right	% Shade Center	% Shade Left	Wood Class
I	2010	3	4	6.1	6.25	40+	25	10	5	60	-	-	-	-	-	-	-	1
I	2009	3	3	7	9.1	40+	10	20	5	50	15	-	-	-	-	-	-	1
I	2008	3	4	6.5	9.4	40	90	-	-	10	-	-	-	-	-	-	-	1
II	2010	4	3	4.9	6.3	40+	90	10	-	-	-	-	-	-	-	-	-	1
II	2009	4	3	4.5	5.6	40+	50	5	-	40	5	-	-	-	-	-	-	1
II	2008	4	3	1.2	5.5	40.5	20	-	-	80	-	-	-	-	-	-	-	1

Table X. Owens Creek site cross-section data collected from 2008 through 2010. Note all distances are in meters.

		2010		2009		2008	
Transect	Direction	% Compositio n	Species	% Compositio n	Species	% Compositio n	Species
I	Left	30	Water	100	Grass	100	Grass
		70	Grass				
	Right	30	Water	23	Grass	23	Grass
		24	Sedge	1	Willow	1	Willow
		8	Grass	76	Grass	76	Grass
		2	Willow				
		36	Grass				
II	Left	25	Water	100	Grass	100	Grass
		75	Grass				
	Right	7	Dirt	100	Grass	100	Grass
		25	Water				
		68	Grass				

Table XI. Owens Creek site vegetation data collected from 2008 through 2010. Note all distances are in meters.

Lower Camas Creek

This effort cooperatively protected 388 acres of floodplain, riparian, and stream channel (Figure XIII) from intensive grazing practices by installing a mile of riparian fence south of Camas Creek, constructing four upland impoundments south of Camas Creek and one spring development to provide off stream watering. In addition 1,100 feet of levee along Camas Creek were removed and the landowner entered the floodplain and riparian areas into a CREP agreement which included native vegetation plantings.

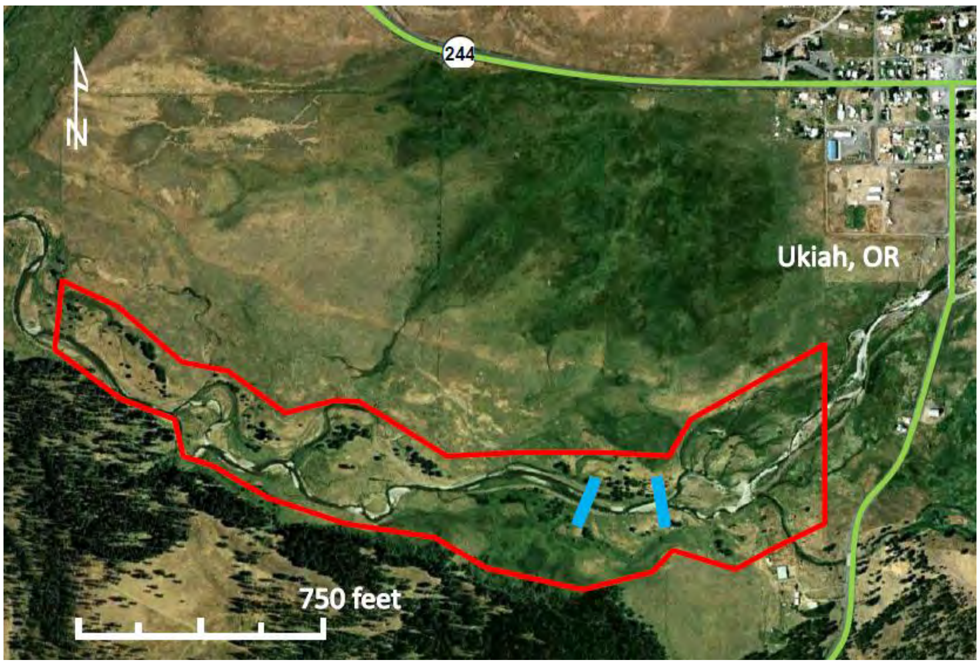


Figure XIII. Camas Creek Project site in red showing the approximate location of cross-sections in blue noted in the report's body.

The site lies below the confluence of Camas and Pine Creeks and a weak alluvial fan underneath Camas Creek into which streamflows disappear during the summer months as the water table's elevation decreases. The restored site itself remains in water throughout the year and is strongly influenced by ground water from springs on the property and deep groundwater sources moderating surface water temperatures to some extent. In all likelihood Camas Creek historically maintained a C3 type channel using the Rosgen Classification (Rosgen, 1996) based upon current conditions and historic indicators. The channel itself was relatively mobile as indicated by terraces well off the existing creek with paleo-channels closer in. Although Camas Creek lies within a broad low gradient valley sediments temporarily deposited on the weak alluvial fan above would have moved through this reach regularly. The site also resides just upstream of a knick point created by an east/west trending fault that set the elevation for the Camas Valley just above. Additional faults to the north form the northern extent of the basin and a higher elevation bench drained by Owens and Snipe Creeks. Monitoring has identified cut banks of 1.5 meters within this area suggesting at least localized down-cutting in the sites lower half that has strongly influenced sediment distribution within the channel. In fact a gravel bar created during the 2006 implementation has increased in height enough that catch debris and maintain vegetation while downstream the elevation of a gravel bar increased dramatically during 2011. Unfortunately, cross-sections were not placed in these locations so changes cannot be quantified.

Above the site a series of levees and past management practices have constrained streamflows to the existing channel which has in all likelihood influenced sediment distribution and movement. While this is an entirely different issue it does weigh upon processes within the site and while not quantified must be considered or at least noted.

Monitoring data collected since 2007 combined with 2005 cross-sections (Figure XIV) used to design and implementation efforts indicate Camas Creek changed as a result of the 2006 implementation effort and become dynamically stable. Large flow events have modified the existing channel and generally speaking, narrowed the active channel through deposition of up-stream sediments while deepening the channel on specific locations. As an example consider cross-section 150 in Figure XIV. Although not indicated bankfull, widths are approximately 24 meters for both the pre and post implementation cross-sections with depths of approximately 1.0 to 1.2 meters. Though these numbers are roughly equal the shape of the current channel provides lower surface to depth rations during the summer months when the influence of solar radiation is greatest. For both cross-sections 39.6 and 150 the channel now has access to side channels beyond where levees previously prohibited access.

Cross-sections also indicate annual adjustments occur in response to what are at this time unquantified events such as stream discharge due to annual and stochastic events, sediment migration, and the passage of debris. Cross-section 39.6 has continually increased it depth while cross-section 150 has aggraded approximately 0.05 meters below the bankfull level and adjustments at cross-section 39.6 are a response to the shifting confluence of Pine and Camas Creeks. Over the past several years a side channel on Camas Creek has become less active shifting discharge into a southern channel moving the confluence of Camas and Pine Creeks further east forcing the natural meander near cross-section 39.6 further to the north and into a cut bank. As a result the toe of the northern stream bank has moved one meter north creating a vertical drop which will likely continue for some time until an inset floodplain has formed. Variable streambank stability across cross-sections is visible in Table XII.

The implementation effort also improved habitat complexity (TableXIII). One time riffles now include runs, riffles, and scour pools due to the altered channel morphology and installed J-hooks. The pre-implementation channels spewed out sediments and discharge below cross-section 245.7 creating an over widened shallow channel and above that point a plain-bed confined channel. With the release of Camas Creek during high flow events and the installation of J-hooks the floodplain has been reconnected and stable structures have created and maintained scour pools. While the existence of specific habitats may depend on discharge individual habitats have been maintained.

Sediment within the pre-implementation cannot be quantified although there is no reason to believe their distribution would not have reflected that displayed in Tables XII and XIII. These visual estimates are supported by the results of pebble counts in Table XIV and through an effort in 2011 where cross-sections and pebble counts were collected in the larger Ukiah Valley in addition to cross–sections and pebble counts on the Upper Camas Creek site. Though the data for the other sites have not been analyzed in detail they appear to fall in line with channel form and sediment distributions through this project site. Camas Creek currently maintains an over widened plain-bed channel form with armored sediments in many areas. Scour chains installed in 2007 indicated that channel armor to a depth of approximately 15 centimeters was mobilized at least once a year. Cobbles overlying finer grained gravels and sands existed throughout Camas Creek where samples were taken using a one meter by one meter area.

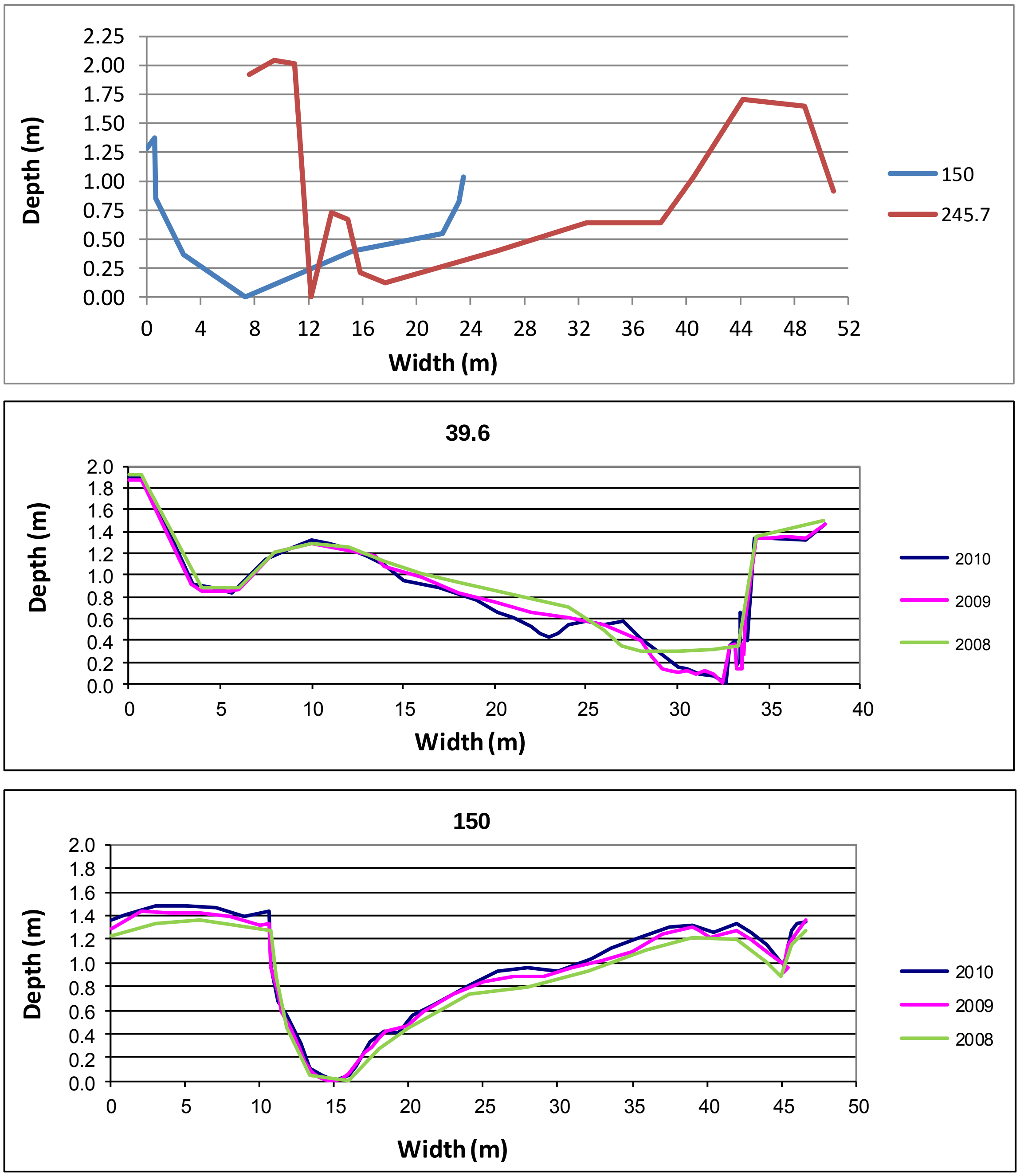


Figure XIV. Pre-implementation cross-sections collected for design efforts (top) and post-implementation cross-sections (middle and bottom). Labels of 39.6, 150, and 245.7 are distances measured from the confluence of Pine and Camas Creeks.

Streamside shade as indicated in Tables XII and XIII does not existsave in the presence of isolated vegetation and where Camas Creek flows nearer to the southern valley wall and topography affords limited shade. These visual estimates were supported through the use of a spherical densitometer at cross-sections 39.6 and 150 with readings of one percent shade. Native vegetation on the floodplane primarily consists of Black hawthorn (*Crataegus douglasii*) with isolated Black cottonwood (*Populus balsamifera trichocarpa*) and Ponderosa Pine (*Pinus ponderosa*). Efforts by the landowner and the Farm Services Agency were undertaken in 2007 and 2008 to improve native vegetation populations and though many survive some plantings did not take and other were lost to browse or high flows. In addition to a lack of woody vegetation capable of providing shade Table XV identifies the extent of gravel adjacent to and within the active channel. During spring runoff the entire channel and much of the floodplain is inundated. While established grasses and vegetation are capable of withstanding erosive forces those areas within the active channel have not yet regained their ability to support hardy vegetation.

Data contained in Table XIII may appear to suggest more variability or change between both habitats and estimates of metrics; however, this is more likely due to measurement error. That is, our ability to identify bankfull and floodprone widths consistently. Recovering vegetation and gently sloping streambanks increase the difficulty of identifying these features (Figure XV). The balance of the data within Table XIII appears to support previously mentioned qualities of the site.

Figure XV. Photopoints collected for the Camas Creek site from 2007 (left) and 2010 (right). Photographs were taken mid-way through the levee removal area looking down stream (west).

Transect	Year	Habitat Type	Right Bank Stability	Left Bank Stability	Wet Width	Bank Full	Flood Prone	% Organics	% Silt	% Sand	% Gravel	% Cobble	% Rubble	% Boulder	% Bedrock	% Shade Right	% Shade Center	% Shade Left	Wood Class
39.6	2010	Riffle/Run	4	2	13.25	33.5	40+	5	-	-	30	65	-	-	-	0	0	0	1
	2009	Riffle	2	3	5	33.6	40+	-	-	-	70	30	-	-	-	0	0	0	1
	2008	Run	4	1	6.4	32.8	40+	10	-	-	50	40	-	-	-	0	0	0	1
	2007	Run	4	3	5.8	33.6	40+	10	20	20	45	5	-	-	-	5	0	0	1
150	2010	Run	3	2	8.45	21.7	40+	90	-	-	10	-	-	-	-	0	0	0	1
	2009	Scour Pool	3	2	7.4	17.35	40+	-	40	-	40	20	-	-	-	0	0	0	1
	2008	Run / Scour Pool	1	3	8.4	35	40+	40	-	-	40	20	-	-	-	0	0	0	1
	2007	Glide	3	4	7.4	24.1	40+	-	-	10	60	30	-	-	-	0	0	0	1

Table XII. Cross-sectional data for the Lower Camas creek site collected from 2007 through 2010 Distances are in meters.

Year	Habitat Type	Habitat Depth	Habitat Width	Habitat Length	Bank Full	Flood Prone	Right Bank Stability	Left Bank Stability	% Organics	% Silt	% Sand	% Gravel	% Cobble	% Rubble	% Boulder	% Bedrock	% Shade Right	% Shade Center	% Shade Left	Wood Class	Species Present
2010	Riffle	0.25	12.40	12.43	32.49	> 40	3	3	26.25	-	-	41.25	29.37	3.13	-	-	0	0	0		Sculpin - Z
2009	Riffle	0.15	5.73	20.82	19.36	> 40	3	3	4.44	5	-	42.22	43.89	4.44	-	-	4	0	0	1	
2008	Riffle	0.15	9.98	28.67	25.53	> 40	2	2	17.35	-	3.31	46.28	32.23	0.82	-	-	0	0	2	1	Z/ST
2007	Riffle	0.26	7.13	58.13	25.67	> 40	3	3	6.67	3.33	23.33	50	15	1.67	-	-	0	0	2	1	Z
2010	Run	0.24	5.88	39.01	28.80	> 40	3	3	58.5	-	-	19.5	19	3	-	-	0	0	0	1	Z
2009	Run	0.28	6.84	40.39	19.17	> 40	3	3	15.71	10.71	-	40.71	30	2.86	-	-	23	10	20	1	Z -ST
2008	Run	0.33	8.26	59.28	24.96	> 40	2	2	19	4	-	36	39	2	-	-	4	2	4	1	Z - ST
2007	Run	0.40	7.43	51.58	31.42	> 40	3	3	9.17	12.5	18.33	44.17	15	0.83	-	-	0	0	2	1	Z
2010	Scour Pool	0.41	4.00	6.50	20.00	> 40	4	2	87.5	-	-	12.5	-	-	-	-				1	Z
2009	Scour Pool	0.32	3.63	9.10	21.52	> 40	3	3	23.33	25	-	28.33	21.67	1.67	-	-	0	0	0	2	ST - Z
2008	Scour Pool	0.42	4.10	9.65	22.60	> 40	1	1	30	-	5	35	30	-	-	-	0	0	0	2	ST - Z
2007	Scour Pool	0.56	4.53	6.97	25.20	> 40	3	3	5	28.33	13.33	46.67	6.67	-	-	-	0	5	0		ST - Z
2010	Back Water	0.15	3.05	18.88	29.24	> 40	2	3	46	33	-	19	2	-	-	-	6	0	2	1	Z
2009	Back Water	0.15	3.38	17.22	20.83	> 40	4	4	60	25	1	10	4	-	-	-	16	0	4	1	Z
2008	Back Water	0.19	3.20	21.40	4.90	> 40	2	3	48.33	15	11.67	20	5	-	-	-	27	27	27	1	Z - ST
2007	Back Water	0.34	5.60	11.10	39.20	> 40	4	3	60	40	-	-	-	-	-	-	0	5	5	1	Z
2010	Riffle Pool	0.10	6.20	7.00	40+	> 40	4	4	40	50	-	10	-	-	-	-	30	10	30	1	Z
2008	Isolated Pool	0.04	6.30	72.00	23.10	> 40	1	1	5	5	-	50	40	-	-	-	0	0	0	1	Z
2007	Isolated Pool	0.21	2.88	22.75	13.85	> 40	4	3	30	35	12.5	22.5	-	-	-	-	2.5	0	2.5	1	Z

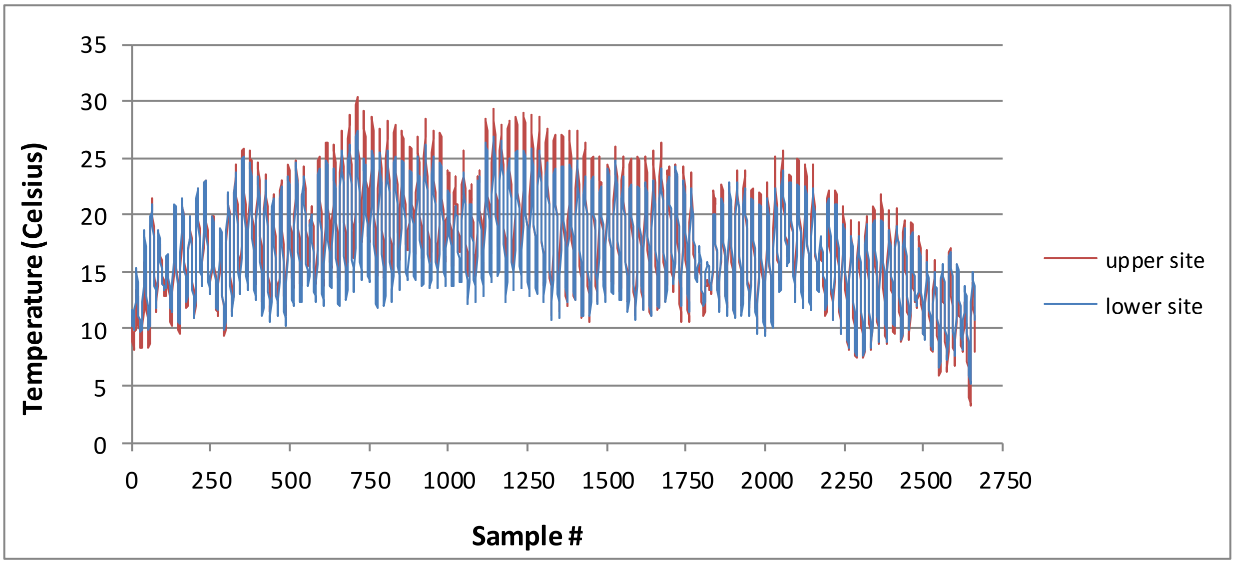
Table XIII. Longitudinal profile for the Lower Camas Creek site from 2007 through 2010. Distances are in meters.

Transect	Year	Bin	Frequency	Cumulative %	Transect	Year	Bin	Frequency	Cumulative %
39.6	2010	0	0	0.00	150	2010	0	0	0.00
		0.06	0	0.00			0.06	0	0.00
		6.4	40	0.40			6.4	74	0.74
		15.3	53	0.93			15.3	25	0.99
		30.6	7	1.00			30.6	1	1.00
		91.5	0	1.00			91.5	0	1.00
		91.6	0	1.00			91.6	0	1.00
	2009	0	0	0.00		2009	0	0	0.00
		0.06	0	0.00			0.06	0	0.00
		6.4	47	0.47			6.4	36	0.36
		15.3	51	0.98			15.3	59	0.95
		30.6	2	1.00			30.6	5	1.00
		91.5	0	1.00			91.5	0	1.00
		91.6	0	1.00			91.6	0	1.00
	2008	0	0	0.00		2008	0	0	0.00
		0.06	0	0.00			0.06	0	0.00
		6.4	87	0.87			6.4	76	0.76
		15.3	13	1.00			15.3	23	0.99
		30.6	0	1.00			30.6	1	1.00
		91.5	0	1.00			91.5	0	1.00
		91.6	0	1.00			91.6	0	1.00
	2007	0	0	0.00		2007	0	0	0.00
		0.06	0	0.00			0.06	0	0.00
		6.4	89	0.89			6.4	79	0.79
		15.3	10	0.99			15.3	21	1.00
		30.6	1	1.00			30.6	0	1.00
		91.5	0	1.00			91.5	0	1.00
		91.6	0	1.00			91.6	0	1.00

Table XIV. Pebble count data collected for the Lower Camas Creek site from 2007 through 2010. Bins reflect sediment size gradations from Silt through bedrock.

		2010		2009		2008		2007	
		% Composition	Species	% Composition	Species	% Composition	Species	% Composition	Species
36.9	Left	22	Water	30	Cobble	7	Water	2	Gravel/Grass
		22	Rock	1	Grass	53	Cobble	22	Gravel
		5	Dirt	20	Cobble	13	Grass	1	Grass
		14	Grass/Willow	6	Sedge - Cobble	4	Cobble / Mud	2	Gravel/Sedge
		8	Grass/Rock	6	Willow - Grass	23	Grass	23	Gravel
		17	Grass	32	Grass			50	Gravel/Grass
		12	Tree Mat	5	Tree Mat				
	Right	22	Water	46	Grass	13	Bank / Gravel	100	Grass
		25	Grass	4	Hawthorn	47	Grass		
		3	Hawthorn	50	Grass	7	Hawthorn		
		50	Grass			33	Grass		
150	Left	14	Water	5	Cobble	12	Water	14	Grass
		4	Rock	5	Grass	3	Cut Bank	3	Dirt/Grass
		5	Grass	14	Tree Mat	4	Grass	9	Grass
		12	Tree Mat	76	Grass	13	Tree Mat	7	Dirt/Grass
		65	Grass			16	Sage	67	Grass
						52	Grass		
	Right	14	Water	22	Cobble	14	Water	20	Gravel
		5	Rock	4	Willow - Cobble	11	Cobble	7	Gravel/Willow
		3	Grass	45	Grass - Cobble	28	Grass / Cobble	27	Gravel/Grass
		5	Tree Mat	29	Grass	18	Gravel	43	Grass
		46	Grass			29	Grass	3	Hawthorn
		16	Grass						

Table XV. Cross-sectional vegetation transect data for the Lower Camas Creek site from 2007 through 2010.



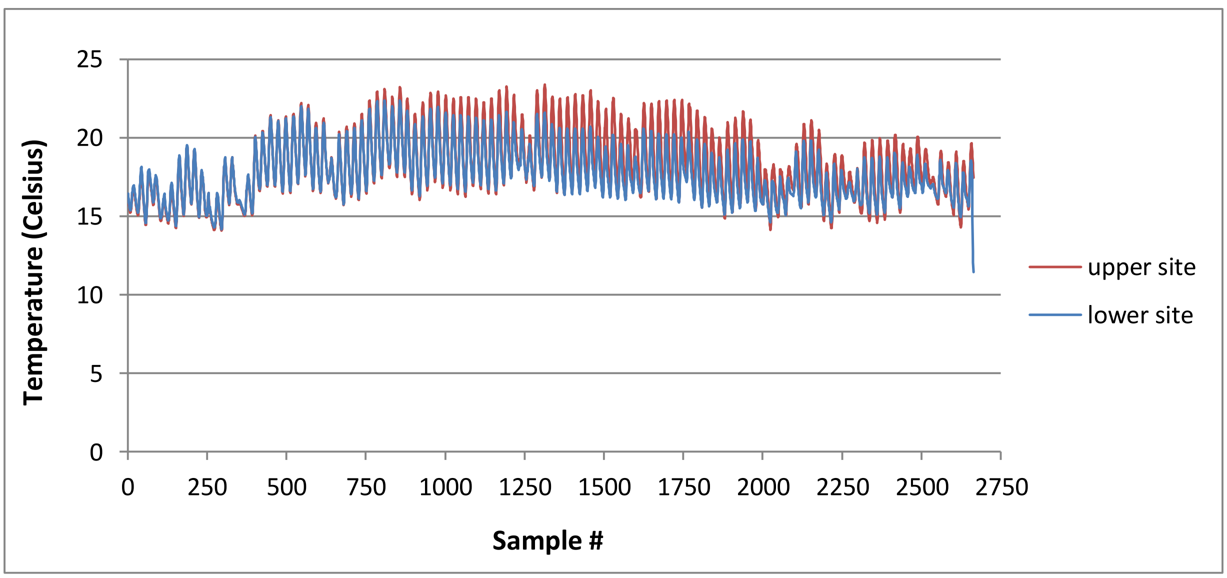


Figure XVI. Stream temperature data collected on Camas Creek from 6 June 2006 through 24 September 2006 (top) at one hour intervals and 6 June 2010 through 24 September 2010 (bottom) at one hour intervals.

		Upper	Lower
2007	Mean	17.63	17.36
	Standard Error	0.16	0.14
	Standard Deviation	4.4	3.82
	Sample Variance	19.38	14.6
	Range	17.7	15.4
	Minimum	9.7	9.3
	Maximum	27.4	24.7
2010	Mean	17.59	18.72
	Standard Error	0.052	0.08
	Standard Deviation	1.41	2.076
	Sample Variance	1.99	4.31
	Range	6.07	8.87
	Minimum	14.62	14.13
	Maximum	20.7	23.01

Table XVI. Descriptive statistics for stream temperature data from 1 August through 31 August during 2006 and 2010 for the Deer Creek Projects Site.

Without data reflecting pre-implementation conditions cannot be located a comparison of longer term stream temperature trends is not possible although data has been collected since at least 2006. In addition the comparison across years would be more useful if forces such as long wave radiation and the like could be filtered from the signal; unfortunately time and technical constraints prohibit this. Interruptions in the temperature signal also exist in many data sets, in some, to the extent the data is of little use. In an attempt to limit signal disturbance, temperatures from 1 August through 31 August were selected for direct comparison.

The signals character (Figure XVI) confirmed by a Paired 'T' tests (α 0.05) suggests there is a difference in the mean values of data collected at the upper and lower boundaries for both 2006 and 2010. Descriptive statistics (Table XVI) support what may appear to be higher mean temperatures during 2007 although signal variance is clearly greater in 2007. Unfortunately this is contrary to attempts to improve site stability and channel characteristics along with water quality as mean temperatures would ideally decrease along with signal variance. Little shade and minimal flows during August could account for elevated water temperatures several degrees Celsius above those in Snipe Creek and comparable to the lower elevation temperatures of Deer Creek. While it is unfortunate that stream discharge, air temperature, and long wave radiation data is not readily available, significant local groundwater resources provide a possible though unqualified explanation of the 2007 temperatures. During 2007 base flows were exceedingly low in the Camas Creek basin as witnessed by the loss of flows in Snipe Creek. Assuming this was also the case in Camas Creek groundwater inputs one can feel by placing their hand on the substrate may have had a greater influence upon the temperature signal. Ground water inputs constituting a greater portion of total discharge may have tempered higher daytime temperatures while providing refuge for aquatic species while decreasing night time temperatures below what they could have during higher stream discharges. The presence of aquatic species within the reach suggests this may be true although quantitative data in support of this is lacking.

Deer Creek

This effort cooperatively protected 219.2 acres of floodplain, riparian, and stream channel from intensive grazing practices by installing 16 miles of riparian fence along with 11 water gaps and 15 spring developments for off stream watering. Prior to the current landowners purchasing the property and CTUIR's involvement the property was used as winter pasture for cattle and was in extremely poor condition. Deer Creek itself contained little structure and riparian and floodplain vegetation was in poor condition. Since the projects inception, a stable beaver population has been naturally established, vegetation has recovered, and the channel captures and maintains woody debris. Cattle no longer have access to the riparian area or stream channel save several water gaps though deer and elk are known to use it.

Without pre-implementation data and in a rush to begin gathering data of some sort one site on the lower reach (Figure XVII) was selected to supplement photopoints. A cross-section for this site (Figure XVIII) indicates that the site has maintained some level of stability and although streambank stability estimates (Table XVII) vacillate between stable and unstable there have not been any avulsions within the sampled area or on the balance of the property. Bank full estimates measures remain stable across the years as with sediment save 2008. That year the cross-section was considered a run as opposed to riffle likely due to the earlier date (middle July) data was collected. Sedge and grass provide the majority of streamside shade and indicated in Table XVIII has remained constant throughout the years although there have a fining of vegetation type.

The longitudinal profile (Table XIX) reflects the habitat available to aquatic species throughout the landowner's property where beaver dams are located. With minimal base flows and the majority of precipitation arriving during late fall through early spring this watershed like all others in the area is extremely flashy and lacks both the structure and flows necessary to create and maintain robust habitat. Pools are largely tied to beaver dams with much of the remaining habitat occulting on small runs and scour pockets. Habitat within the sampled reach consists of riffles, runs, and some combination of the two labeled riffle pools where a clear distinction between the two cannot be identified. Metrics vary within all habitat types and are likely due to factors such as weakly defined bankfull widths where in many locations sedge and gently sloping streambanks made it difficult to identify hard points. As with the cross-sections streamside shade to the right and left of each habitat is provided by sedge and grass (Table XVIII, Figure XIX). Wood appears to be filtered out of the channel up-stream of the sampled reach as indicated by regular maintenance due to captured woody debris in water gaps above the sampled channel.

Figure XVII. The monitored portion of the Deer Creek Project site in red showing the approximate location of cross-sections in blue and water gaps in yellow noted in the report's body.

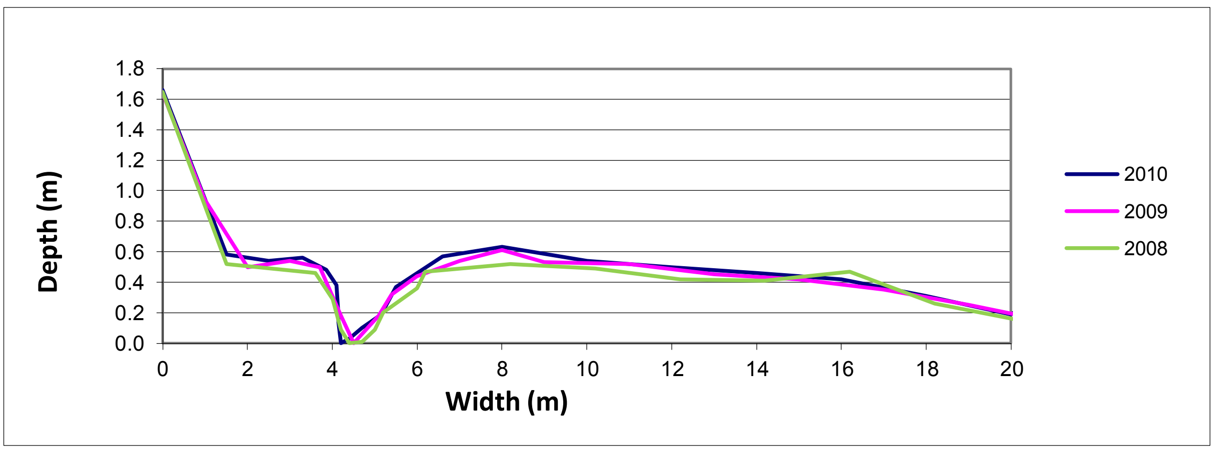


Figure XVIII. Cross-section collected on Deer Creek to monitor implementation effectiveness.

Figure XIX. Photopoints collected for the Deer Creek site during 2003 (left) and 2010 (right).

Year	Habitat Type	Right Bank Stability	Left Bank Stability	Wet Width	Bank Full	Flood Prone	% Organics	% Silt	% Sand	% Gravel	% Cobble	% Rubble	% Boulder	% Bedrock	% Shade Right	% Shade Center	% Shade Left	Wood Class
2010	Riffle	4	3	1	1.65	22.3	15	5	-	80	-	-	-	-	100	0	90	1
2009	Riffle	3	3	0.9	1.6	17	30	-	-	70	-	-	-	-	100	5	100	1
2008	Run	3	3	0.9	1.5	17	90	-	-	10	-	-	-	-	100	10	100	1
2007	Riffle	4	4	1.37	1.65	19.2	20	60	-	20	-	-	-	-	40	0	10	1

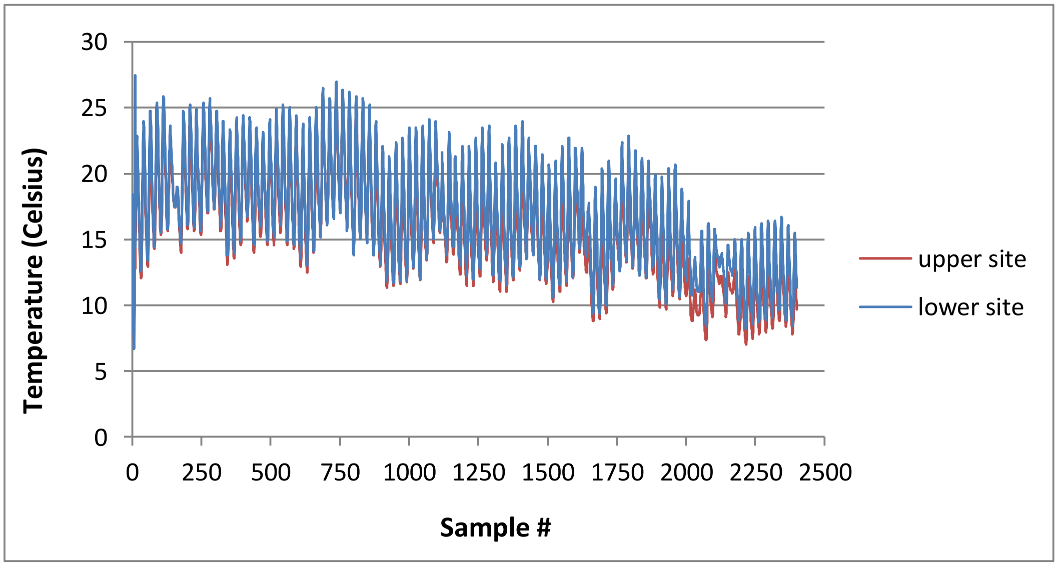
Table XVII. Cross-section data for Deer Creek collected between 2007 and 2010. Distances are in meters.

	2010		**2009**		**2008**		**2007**	
Direction	**% Composition**	**Species**	**% Composition**	**Species**	**% Composition**	**Species**	**% Composition**	**Species**
Left	5	Water	30	Grass	8	Water	91	Grass
	9	Sedge	20	Dry Grass	22	Grass	9	Sage
	18	Grass	35	Sage Brush	20	Dry Grass		
	23	Dry Grass	15	Dry Grass	38	Sage Brush		
	18	Dirt			12	Dry Grass		
	17	Sage Brush						
	10	Grass						
Right	5	Water	30	Grass	8	Water	100	Grass
	11	Sedge	20	Dry Grass	33	Golden Rod		
	18	Grass	35	Sage Brush	2	Willow		
	8	Willow	15	Dry Grass	17	Golden Rod		
	58	Grass			40	Grass		

Table XVIII. Cross-section and vegetation data for Deer Creek collected between 2007 and 2010. Distances are in meters.

Year	Habitat Type	Habitat Depth	Habitat Width	Habitat Length	Bank Full	Flood Prone	Right Bank Stability	Left Bank Stability	% Organics	% Silt	% Sand	% Gravel	% Cobble	% Rubble	% Boulder	% Bedrock.	% Shade Right	% Shade Center	% Shade. Left	Wood Class
2010	Riffle	0.10	1.63	12.55	2.10	14.65	4	3	17.5	2.5	-	40	35	5	-	-	100	10	95	1
2009	Riffle	0.13	1.35	14.85	1.75	19.70	3	3	55	-	-	2.5	37.5	5	-	-	100	15	100	1
2008	Riffle	0.08	1.20	6.83	1.53	19.33	3	3	43.33	-	-	23.33	30	3.33	-	-	100	47	100	1
2010	Run	0.27	1.70	14.50	2.75	22.30	3	4	15	10	5	65	10	-	-	-	100	0	80	1
2009	Run	0.30	1.70	17.50	1.80	17.00	3	3	70	20	5	5	-	-	-	-	100	50	100	1
2008	Run	0.17	1.70	7.50	2.08	20.13	3	3	43.33	25	-	8.33	10	13.33	-	-	100	33	100	1
2007	Riffle Pool	0.09	1.22	11.80	2.01	21.80	4	3	-	30	20	-	5	30	12.5	2.5	40	15	40	1

Table XIX. Longitudinal profile data for Deer Creek collected between 2007 and 2010. Distances are in meters.



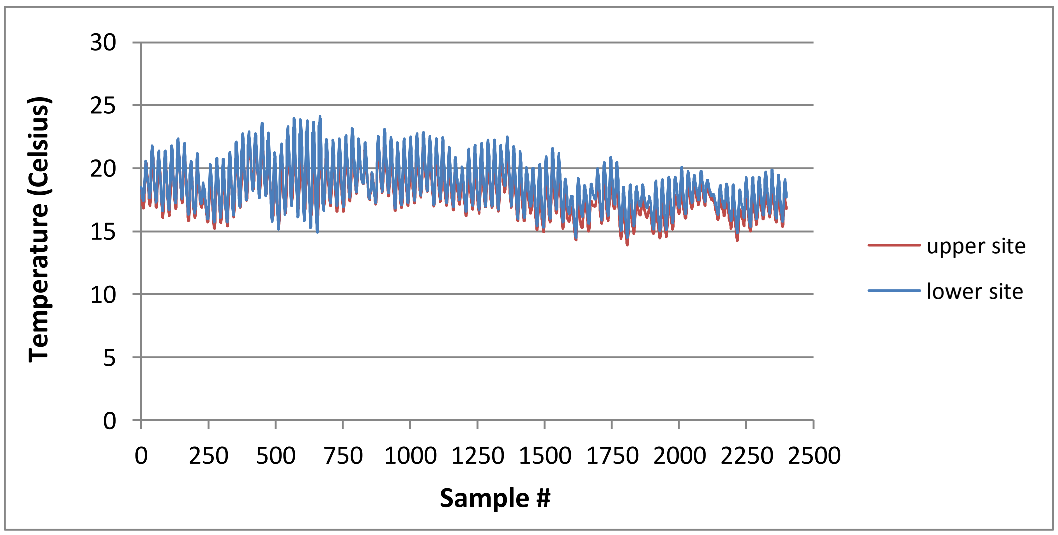


Figure XX. Stream temperature data collected for Deer Creek from 23 June 2006 through 30 September 2006 (top) and 23 June 2010 through 30 September 2010 (bottom) at one hour intervals.

		Upper	Lower
2006	Mean	15.67	16.99
	Standard Error	0.12	0.12
	Standard Deviation	2.89	3.43
	Sample Variance	8.38	11.77
	Range	13.78	14.77
	Minimum	8.82	9.35
	Maximum	22.6	24.12
2010	Mean	18.06	18.84
	Standard Error	0.06	0.07
	Standard Deviation	1.60	1.82
	Sample Variance	2.57	3.31
	Range	7.71	8.33
	Minimum	14.30	14.52
	Maximum	22.01	22.85

Table XVIII. Descriptive statistics for stream temperature data from 1 August through 31 August during 2006 and 2010 for the Deer Creek Projects Site.

Since data reflecting pre-implementation conditions cannot be located a comparison of longer term stream temperature trends is not possible although data has been collected since at least 2006. In addition the comparison across years would be more useful if forces such as long wave radiation and the like could be filtered from the signal; unfortunately time and technical constraints prohibit this. Interruptions in the temperature signal also exist in several data sets, in some, to the extent the data is of little use. In an attempt to limit signal disturbance, temperatures from 1 August through 31 August were selected for direct comparison.

The signals character shown in Figure XX confirmed by a Paired 'T' tests (α 0.05) suggests there is a difference in the mean values of data collected at the upper and lower boundaries of the project site for both 2006 and 2010. Descriptive statistics (Table XVIII) do not support the appearance of higher mean temperatures, wider data ranges, and greater variance during 2006. Mean temperatures were similar for both 2006 and 2010 although signal variance was much greater than 2010. Unfortunately this is contrary to attempts to improve site stability and channel characteristics along with water quality as mean temperatures would ideally decrease along with signal variance. Temperatures decrease toward the end of August during 2006 and 2010 as one would expect in response to cooler night time temperatures having more of an influence upon diurnal fluctuations. The influence of this upon the temperature signal may explain the disparity between 2006 and 2010 data although other factors such as stream discharge, differences in long wave thermal inputs, and others were not accounted for. However, stream temperatures do appear able to support aquatic species in at least some years based solely upon temperatures such as in 2006 where mean temperatures were two to three degrees Celsius lower than those in 2010 and even in 2010 the temperature signal displayed a cyclical nature often associated with the movement of fronts through an area. Aquatic species are often able to deal with elevated water temperatures provided they decrease sufficiently during the night.

NFJD

This effort cooperatively protected 6 acres of riparian area and floodplain from grazing cattle (Figure XXI). Efforts did not address the incised river only streambank cutting by cattle and native vegetation (Figure XXII) through plantings and treating noxious weeds in addition to a well replacing the loss of watering opportunities directly from the river. Two planting efforts produced few viable plants due to a combination of the dry climate, ineffective watering, and roots being cut, vegetation tops grazed, or plants pulled by wildlife. Future efforts will utilized water from a pivot pump installed by the landowner and larger vegetation planted deeper in the ground to improve success. Weed treatments have been much more successful and though they continue, have required less effort each year.

Additional efforts not directly related to this project occurred during 2009 placed a pivot pump within the pasture south of the project site and moved its diversion from midway through the project site to above the bridge visible in Figure XXI eliminating the need for push-up dams , their maintenance, and improving irrigation efficiency.

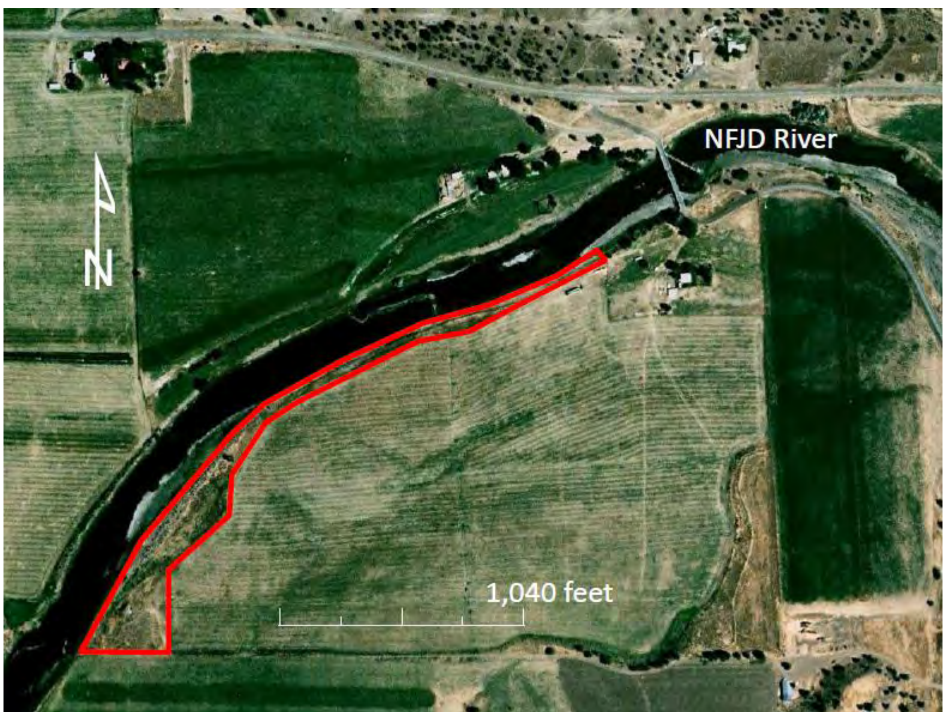


Figure XXI. The monitored portion of the NFJD Project site in red showing the approximate location of cross-sections in blue and water gaps in yellow noted in the report's body.

Figure XXII. Photographs taken of the implementation site in 2007 (left) and 2010 (right).

Conclusion

Over the past several years we have become much more familiar with public and private landowners and the resources within the NFJD. The Project will continue to develop and implement restoration efforts in our 'priority' basins (Camas, Desolation, and Granite Creek) and on the NFJD and Deer Creek near Monument, Oregon and cooperative efforts outside these areas shall be considered on a case by case basis and depend on benefit to wildlife and available cost-share funds. Our approach shall continue to stress 'whole system or ridge to ridge' recovery practices, to address in-stream, riparian, floodplain, and upland components in a single effort or in cooperation with agencies or groups addressing basin-wide restoration. This approach will provide a greater long term benefit then singular efforts over a broad area.

This report has brought to light several things which we shall improve upon including but not limited to sampling protocols and specific metrics during project development. During 2012 CTUIR will be working to develop standardized monitoring protocols that should allow for more judicious use of resources.

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APPENDIX I

Sites maintained (Riparian Conservation Agreement exists) during 2010 by the CTUIR's NFJD Habitat Project. (Modified from Shaw, 2007)

Stream	Location	Stream (Km)	Riparian (Acres)	Upland (Acres)	Riparian Fence (Km)	Upland Fence (Km)	Water Gaps	Water Developments	Native Plantings
Camas Creek (Upper Camas Creek GA)	T5S R32E, Section 2 S1/2,	1.3	40	-	2.6	-	3	-	-
Camas Creek (Upper Camas Creek GA)	T5S R32E, Section 11 S1/2, Section 14	-	-	250	-	2	-	1	-
Camas Creek (Lower Camas Creek GA)	T5S R31E, Section 15 S½, Section 14 SW¼, SW¼	1.6	388	-	3.2	-	-	-	Approx. 16,000
Camas Creek (Lower Camas Creek GA)	T5S R31E, Section 15 S½, Section 14 SW¼, SW¼, Section 22 N½, Section 23 N1/2	-	-	600	-	-	-	5	-
Owens Creek (Lower Camas Creek GA)	T5S R31E, Section 10, Section 15	0.5	5.2	-	1.0	-	1	1	1800
Snipe Creek (Lower Camas Creek GA)	T4S R31E, Section 3, Section 4, T3S R31E, Section 32	1.3	34.4	-	2.3	-	2	2	Approx. 7,500
Snipe Creek (Lower Camas Creek GA)	T4S R31E, Section 3, Section 10	2.2	54	-	4.4	-	5	4	-
Deer Creek (Cottonwood Creek GA)	T8S R28E, Section 33, Section 34	0.8	22	-	8.4	-	5	4	-
	T9S R28E, Section 3, Section 4	3.4	90.2	-	-				
Deer Creek (Cottonwood Creek GA)	T8S, R28E, Sec. 32, Section 33	0.3	9	-	7.6	-	6	11	7500
	T9S, R28E, Sec. 3	3.5	98						
Lower NFJD (LNF John Day GA)	T9, R27E, Section 7	0.8	7.3	-	0.8	-	-	1	Approx. 4880

APPENDIX II

Restoration efforts undertaken by the Project and cooperative partners during 2010 where a Riparian Conservation Agreement did not exist.

Stream	Location	Stream (Km)	Riparian Treatments (Acres)	Upland Treatments (Acres)	Riparian Fence (Km)	Upland Fence (Km)	Water Gaps	Water Develop-ments	Native Plantings	Passage Barriers Removed
Battle Creek (Desolation Creek GA)	T8SR33E, Section 20	-	-	-	-	-	-	-	-	1
Granite Creek (Granite Creek GA)	T8SR36E, Section 22	-	-	-	-	-	-	-	-	1
Fox Creek (Long Creek GA)	T10SR28-30E, T11SR28E, R10ST27-28E, R9ST27-28E	-	60*	20*	-	-	-	-	-	-
Granite Creek (Granite Creek GA)	T8SR35E Section 22-24, 25-27	-	7.5	17	-	-	-	-	8400	-
Clear Creek (Granite Creek GA)	T9SR35E Section 14	-	4	-	-	-	-	-	5040	-
Bruin Creek (Lower Camas Creek GA)	T8SR33E, Section 6	0.8	9*	10*	1.6	-	-	-	-	-
Taylor Creek (Lower Camas Creek GA)	T5SR29E, Sections 10, 11	1.6	36*	10*	3.2	-	-	-	-	-
Sugarbowl Creek (Lower Camas Creek GA)	T5SR30E, Sections 9, 16	0.8	18*	10*	1.6	-	-	-	-	-
Morsey Creek (Lower Camas Creek GA)	T4SR30E, Sections 29, 30, 32, 33	3.65	85*	15*	7.3	-	-	-	-	-

* Estimates were made of both riparian and upland areas within the riparian enclosure due to the difficulty of parsing out specific habitats. Fences used existing temporary fence lines or topography to buffer riparian areas.