FY2012 ANNUAL REPORT

MARCH 1, 2012 THROUGH FEBRUARY 28, 2013
YAKAMA RESERVATION WATERSHEDS PROJECT
BPA Project #1996-035-01-Contract #35636

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I. Introduction

A. Project Overview

In June of 2005, the Ahtanum Watershed Assessment, Toppenish Watershed and Satus Watershed Projects were combined into one project, named the Yakama Reservation Watersheds Project (YRWP). Since the last report in 2010, YRWP staff has continued several tasks including close monitoring of stream discharge and irrigation withdrawals, monitoring of juvenile steelhead and coho outmigration, steelhead spawning surveys, and analysis of irrigation extent and timing. We have also continued our restoration efforts in the three watersheds, installing a fish screen on an irrigation ditch, construction of exclosure fences, a dam and culvert removal, meadow assessment, and floodplain enhancement during the 2012 work season.

II. Restoration Projects

A. Durham Irrigation Dam Removal & Roughened Channel

Overview:

YRWP completed the Durham Irrigation Dam Removal & Roughened Channel Project September, 2012. The fish passage enhancement project is located at the Durham Irrigation Diversion on Toppenish Creek, southeast of Toppenish, WA. Factors limiting fish passage and habitat degradation at the restoration site were the result of an obsolete irrigation diversion dam. During periods of heightened instream flows, the confines of the dam abutments created a hydraulic pressure gradient, limiting successful fish passage. Another result of the heightened hydraulics was the creation of an extensive scour pool downstream of the dam which lacked roughness elements needed by multiple life history stages of Middle Columbia River Steelhead and stream stability (Figure 1). The upstream habitat adjacent to Toppenish Creek consists of wetland vegetation where, without the dams influence, a riparian corridor is hypothesized to develop in its place. The dam’s influence has contributed to increased water temperatures, absence of fish refugia, a probable shift in primary macroinvertabrate production, a seasonal fish passage barrier, and the absence of large woody debris/recruitment.

Figure 1. Durham Irrigation Dam (May 2011): Scour pool to the left (downstream) of the dam.

Methods:

The goal of the project was to remove the obsolete irrigation diversion dam, stabilize the channel with a constructed riffle and add a vegetated large wood berm for backwater fish refugia and enhanced channel stability (Figure 2). The first attempt (summer 2011) at implementing the project failed due to unanticipated stream flows (>60 cfs) causing failure of coffer dams and unsafe conditions for construction workers. The stream flow characteristics within the project reach under natural conditions would likely be at a predictable, base flow condition during the summer and early fall, however stream flows were challenging to predict at the site as they are heavily influenced by irrigation withdraw and input. To adequately dewater the site, an irrigation head gate ~15 miles upstream of the site was opened and a wetland area was flooded. This action diverted ~ 5-10 cubic feet/second (cfs) during instream work. Extra dewater pumps were used and on sight during the dewater period which helped mitigate the influence of groundwater input into the site. The irrigation dam itself was used as the upper coffer dam for the majority of instream work which allowed for less expensive and safer working conditions than using a bulk bag coffer dam. An extra culvert was installed in the dewater channel to accommodate more cfs.

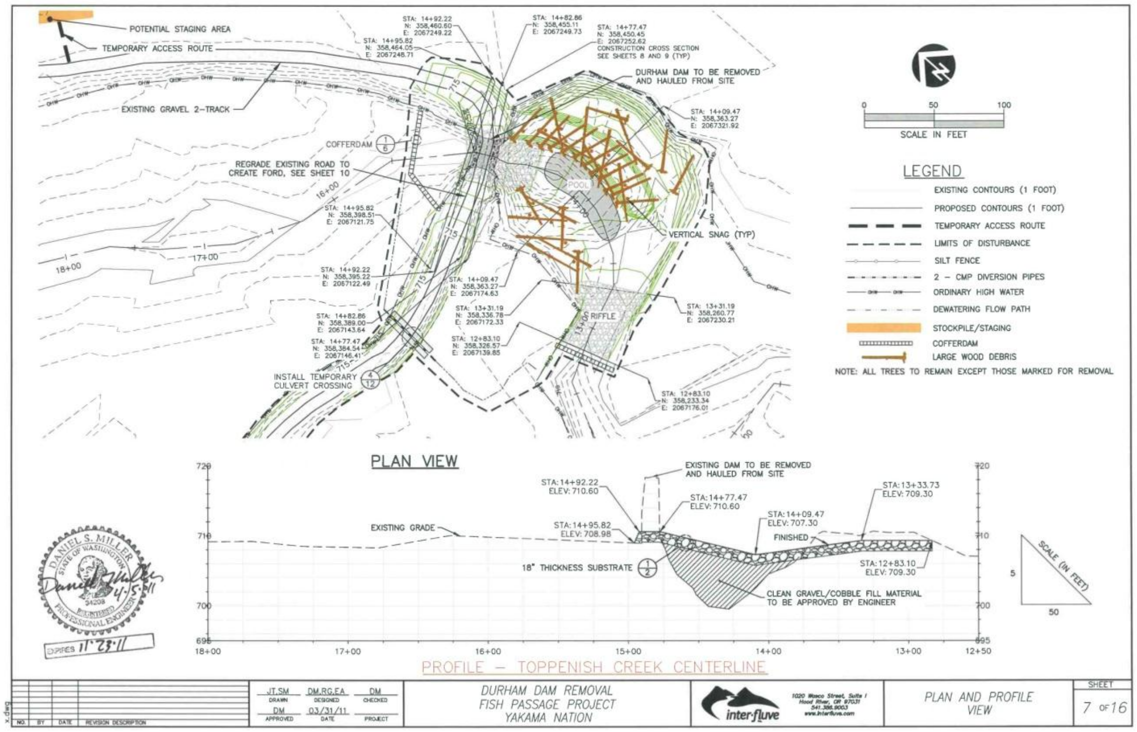

Figure 2. Goal of the project presented in engineer plan format.

To sufficiently remove fish species within the site, the site was dewatered using two 2500 gallon/minute pumps. The intakes of the pipes were inserted in a mesh cage to ensure fish species were not inadvertently sucked into the pump. When the site had been dewatered to a point where the max depth was 4 feet, fish removal was initiated. A 100 X 4 foot seine was hauled in the downstream direction from the upstream coffer to the lower coffer dam by two Yakama Nation Fish Biologists.

Fish species observed included pike minnow, sucker, large and small mouth bass, pumpkinseed sunfish, and bluegill sunfish. Upon extracting fish from the seine and releasing the fish downstream, the site was seined two more times.

A second, supporting coffer dam (earthen dam) was constructed adjacent /upstream of lower bulk bag coffer dam to prevent water from backing into the site. Approximately 1000 cubic yards of rock was added to the scour pool to bring the pool up to sub-grade. The roughened channel was completed within the isolated instream work area using a rock composition mixture prescribed in the engineer plans and the fines remaining after rock placement were rinsed into the rock interstices (See Figure 3). Work then began on the berm/island. Pilings on opposing sides of berm were installed and two layers of root balls added.

Figure 3. Roughened channel complete upstream to the dam. Excavator to the right is ~14’ higher in elevation than the elevation of the pre treatment channel elevation condition. The excavator to the left is positioned where the woody berm was constructed.

As work within the isolated instream work area was completed, efforts began to remove the dam itself. Since the dam was used to coffer the upstream extent of the site and it was to be removed, another coffer dam needed to be installed just upstream of the dam (~10’). Prior to this installation, the seine was used to remove aquatic species from that area using the same method described for the larger site downstream of the dam. The upstream coffer dam was installed and the check boards were removed from the dam. Excavation then began on dam wing walls. Finally, the dam was removed completely and the roughened channel completed (Figure 4). Unanticipated infrastructure located beneath the dam slab caused more work than anticipated for removing dam and extending the roughened channel upstream through the work area. Grading of descent and ascent of approaches to ford (replacing dam stream crossing) were constructed. Encapsulated soil lift (ESL) construction ensued- fabric, fill, and seeding, staking non woven erosion control fabric. When the fabric staking was complete, the area around the former dam was re-contoured to match existing grade, and the dewater channel was filled. Throughout

October, Yakama Nation staff planted and seeded the site with native upland and riparian plant species and watered the site for vegetative success.

Figure 4. Dam removal.

Conclusion

When the upper coffer dam was removed, the flows inundating the site were comparable to a 2 year flood event and the various components of the project responded as they were designed to do (Figure 5). The ford that was installed in place of the dam is usable at most flow elevations. The project stabilized the stream channel, provided unimpeded fish passage, and created fish refugia and forage areas. The revegetation efforts conducted by the YRWP staff appears to be responding as intended, but the success of the revegetation will be more apparent as the vegetation becomes established. The project was made possible in part by a partnership with the United States Fish & Wildlife Service National Fish Passage Program.

Figure 5. Site response following final coffer dam removal.

B. Camas Patch Meadow Assessment and Alternative Analysis

Overview:

Yakama Nation Tribal members voiced concern in August of 2011 to various representatives of the Yakama Nation Natural Resources Department over the decline of culturally important plant species (Yampa and camas root). The plant species abundance has been correlated with elevated water table conditions. Camas Patch Meadow is a headwater of Dry Creek (Figure 6). Base flows in Dry creek provide limited habitat for juvenile ESA listed Middle Columbia River Steelhead and flows are hypothesized to be partially tied to water storage in Camas Patch Meadow. An assessment of the meadow will provide valuable insight into the function of the meadow within the watershed context and alternatives for restoring the meadow for the benefit of the people and species described.

YRWP staff has completed numerous restoration efforts at the Camas Patch Meadow site including:

- Greater than 6 miles of barb wire, and buck & pole fencing installed to exclude livestock (2006-present)
- Culvert removal (2011)
- Road decommissioning (2011
- Road improvement (2011)

Figure 6. Camas Patch Meadow May, 2012

Methods:

Factors affecting the hydrologic functioning of Camas Patch Meadow are complex and will require a comprehensive understanding in order to evaluate feasible alternatives for rehabilitation. YRWP contracted an engineering firm to help direct the assessment. Accordingly, this project focuses primarily on reviewing, collecting, and analyzing site data. Groundwater monitoring wells have been installed throughout the meadow to better understand the current conditions of the meadow. Surface water monitoring sites have been developed to enhance our knowledge of the surface water inputs and outputs associated with the streams entering the meadow and Middle Fork Dry Creek exiting the meadow. Results of the site investigation and baseline analysis will help determine why certain locations within the meadow are maintaining greater base flow and water holding capacity than others (e.g., why is the unnamed tributary supporting mesic conditions but other areas of the meadow are not). It will also be important to determine which primary factors are causing dry meadow conditions and what rehabilitation efforts will assist in improving the meadow's water holding capacity and maintaining base flow through the summer months.

Conclusion:

The Camas Patch Meadow Assessment Project has been in the data collection phase since mid December, 2012. The contracted engineering firm conducted a field geomorphic, vegetation, land use, and streambed substrate assessment. Existing data will/is being incorporated with field observations for evaluating historical and current meadow conditions. Stream substrate size will be documented by collection of pebble counts for use during design for sediment continuity and stream stability. This task also includes office time for analyzing data and conducting applicable geomorphic and sediment transport analyses. 13 Groundwater monitoring wells were hand augured by YRWP staff throughout the meadow (Figure 7) following NRCS protocol (Spreecher, 2008). Well depths ranged from 3'-7'. Eleven of the wells contain HOBO data loggers and two wells will be measured by hand. Four surface water monitoring sites have been developed near where each stream enters and exits the meadow. The topographic survey of the site is postponed until conditions improve (stream channels are frozen solid which will not allow for an adequate survey). The soil profile was characterized as the bores were augured, which has already provided insightful information on how groundwater travels through the meadow.

The hydrologic analysis will be derived on the data collection methods described above and will direct future restoration actions at the Camas Patch Meadow site. This assessment has been designed to gather a long term data set on the hydrology of Camas Patch Meadow. This will include flow measurements at the Surface water monitoring sites during the ascending and descending limbs of the hydro period and frequent downloading of data loggers deployed at the site. YRWP staff feels confident that this type of assessment will lead to the successful implementation of projects that address causes of degradation rather than symptoms of degradation.

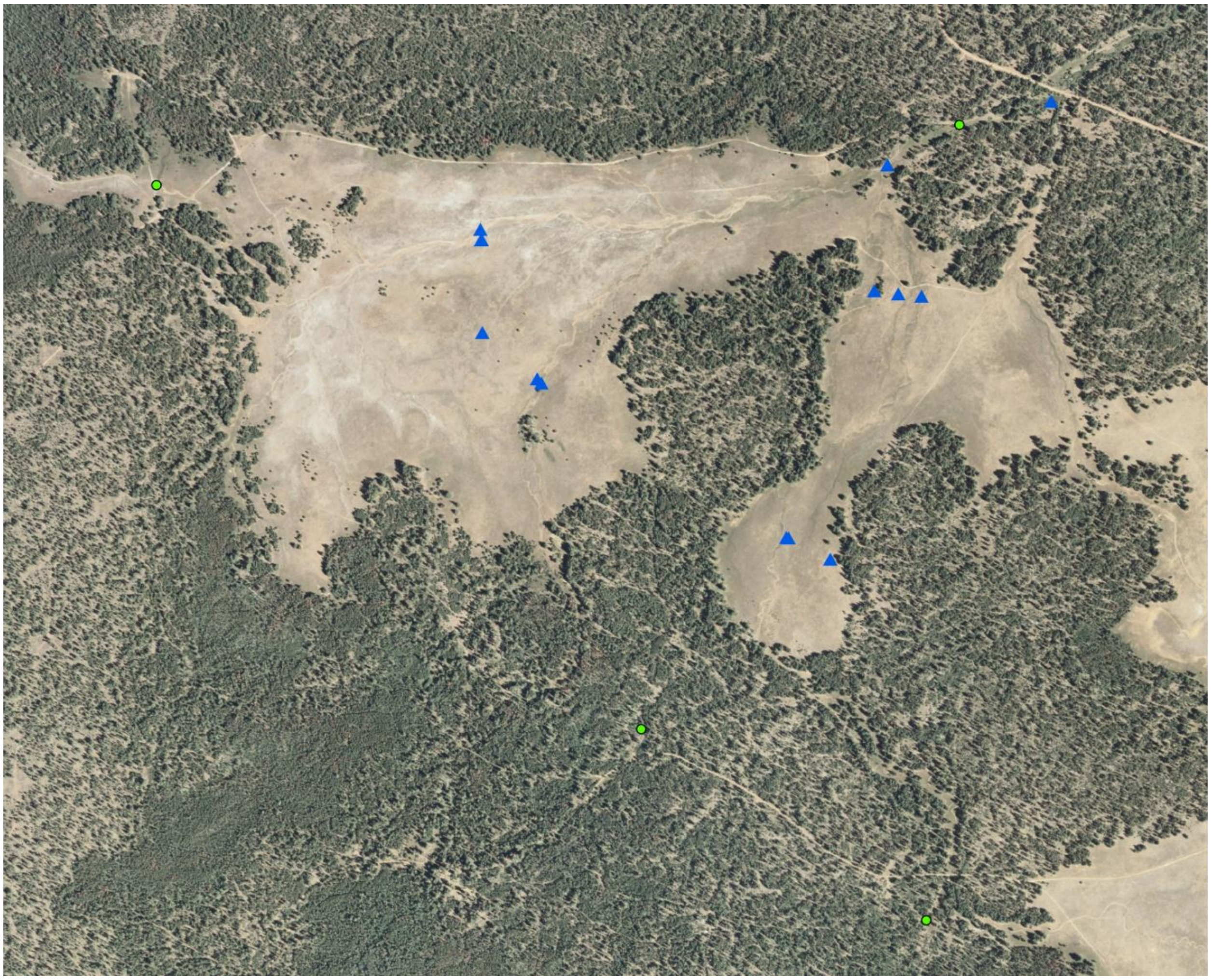

Figure 7. Blue Triangles=Groundwater monitoring sites and the green circles represent surface water monitoring sites

C. Camas Patch Meadow Fence Expansion Project

__Overview:__

In 2011, YRWP decommissioned a road that bisected Camas Patch Meadow- a culturally and ecologically important site within an ecosystem that supports many culturally important plant and fish species including Endangered Species Act Listed Middle Columbia River Steelhead Trout. Even though fish species are not present in the channels contained within the meadow, the site has a high potential for water storage which aids in addressing limiting factors to fish downstream such as water temperature, habitat, and the effects of climate change. Furthermore, the culturally important root species success is linked to elevated water table elevations. YRWP wanted to protect the portion of the meadow to the north of the road that was not fenced in previous efforts. Also, a short reach downstream of the Dry logging road culvert north of the meadow has been severely impacted by grazing. YRWP also wanted to fence this reach to exclude further degradation to the channel by feral horses and cattle.

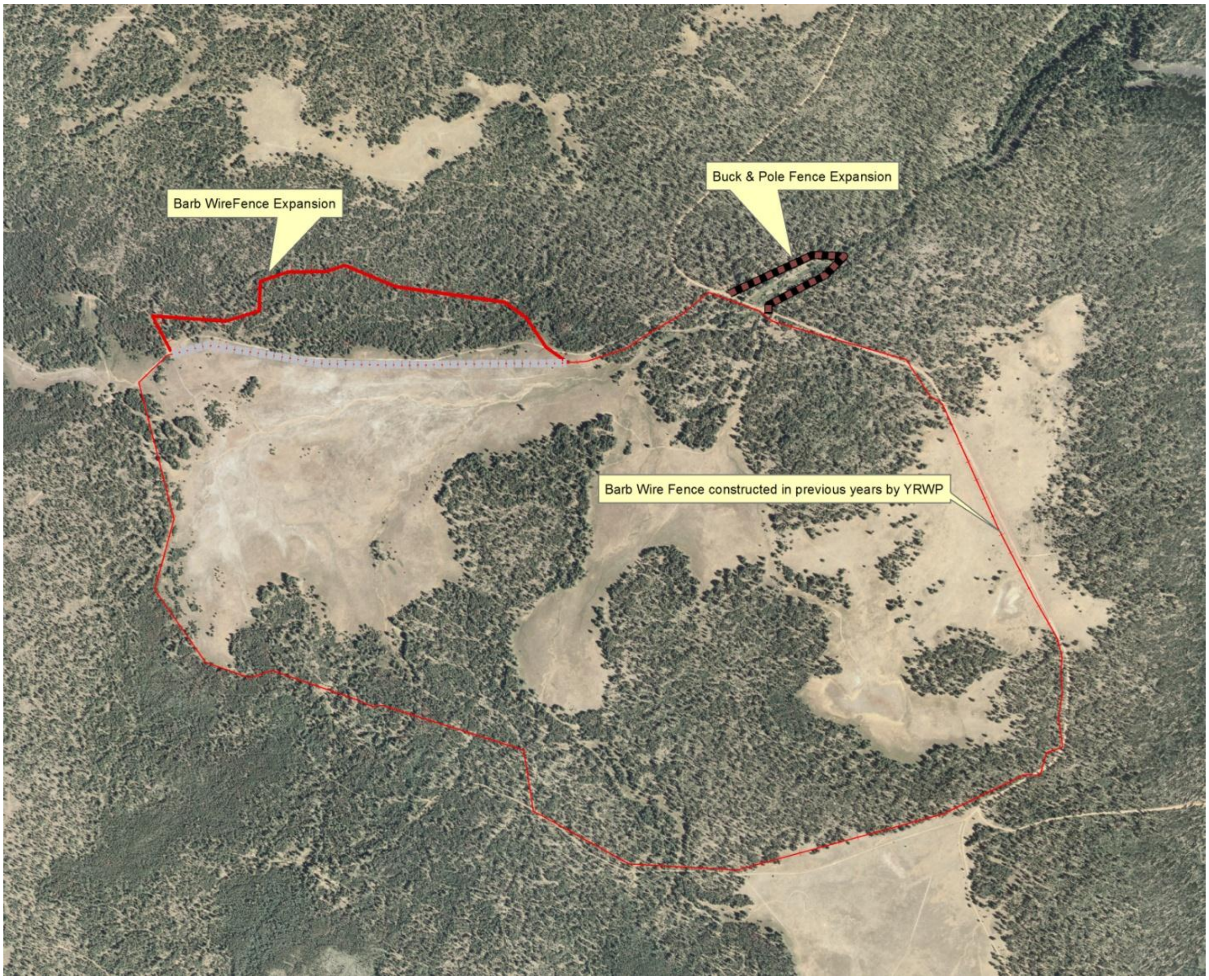

Figure 8. Extended buck and pole and barb wire fence expansion on the North face of Camas Patch Meadow.

Conclusion

The fence expansion to the north of the decommissioned road was completed summer 2012, which added another 1.5 miles of barb wire fence protection to the circumference of the meadow. The fence was constructed with 5 strand barb wire and complied with NRCS fencing protocol. The damaged reach north of the meadow was fenced summer, 2012 with .75 miles of buck and pole fencing around the circumference of the reach to encompass the meadow habitat adjacent to the channel and the channel itself. Buck and Pole fencing was used at the site to ensure horses will not be able to enter (figure 8).

YRWP staff has been fencing and maintaining fences at the Camas Patch Meadow site since 2006. The fencing completed summer of 2012 will protect the meadow for many years to come. With the effects of climate change for the Yakama Reservation region forecasted to be less snowpack, protecting and restoring water storage mechanisms such as meadows is/will (be) critical to fish, wildlife & plant species.

D. South Fork Feeder Ditch Fish Screen

Overview:

YRWP completed the installation of a fish screen on an unscreened surface water diversion located on South Fork Simcoe Creek September 2012 (Figure 9). This project addresses a cumulative problem that is associated with the Yakima Subbasin Salmon Recovery Plan stating that unscreened diversions have significant negative effects on salmon productivity (2005). Spawning surveys conducted on South Fork Simcoe Creek during 2002 to present document the presence of ESA listed Middle Columbia River steelhead trout. The installed fish screen will prevent steelhead trout from using the diversion and becoming stranded during periods of high agricultural use or at low flows.

Methods:

Instream work areas were isolated using two 100 x 4 foot seine nets (block nets) placed upstream and downstream of the fish screen installation site September 2012. Electroshocking techniques were administered to rescue aquatic life due to accumulations of debris, streambed composition, and undercut banks exhibited throughout the reach and diversion where seining for fish was not appropriate. Three passes were completed after the last salmonid was captured. Length measurements were obtained and fin clip samples were removed for genetic analysis from salmonid species. Various other species were captured including: sucker, dace, crayfish, and sculpin spp. A recovery bucket with an aerator was used to transport recovered aquatic life downstream of the work site.

Figure 9. Photo illustrating the South Fork Feeder Fish Screen post-installation

The ditch was dewatered using a bulk bag coffer dam wrapped with polyethylene plastic sheeting (visqueen) and a dewatering pump at the upstream end of the site. The creek was funneled through a pipe placed in the main channel of the creek to create a temporary stream crossing for heavy equipment. Once the diversion was successfully dewatered, the ditch was excavated to subgrade in prep for the installation of the fish screen. A gated culvert and berm was also installed to restrict high flows from entering the canal during periods of high flow (Figure 10). The fish screen was delivered and installed by Washington Department of Fish and Wildlife (WDFW), Yakama Nation fisheries biologists, design engineer, and construction crew (Figure 11). An overflow channel to spill excessive flow upstream of the screen returning water to Simcoe Creek main channel and bi-pass pipe were also installed (Figure 12). WDFW returned for an inspection post-implementation to insure successful installation of the bypass pipe, berm, and operation of the fish screen.

Figure 10. Berm constructed over gated culvert. Note fish screen in background.

Figure 11. Fish screen installation

Once construction was completed in the ditch and thoroughly inspected, the coffer dam was repositioned to route the creek through the canal bi-pass pipe and screened ditch. The rerouted creek was returned to the main channel downstream of the isolated work area upstream of the downstream block net so that fish were unable to migrate upstream. The temporary stream crossing was removed and construction began for installing the roughened channel in South Fork Simcoe Creek. Design features included a roughened channel to raise water surface elevations at the canal inlet to provide more flow into the canal during low flow conditions. Following completion of the roughened channel in the mainstem, bulk bags were removed and flow was returned to the creek. Block nets were also removed after flow was returned to its natural course. Revegetation efforts were completed October 2012. The site was seeded with native grasses and mulched with weed free native grass straw. Container plants were also planted at the site (Figure 12).

Figure 12. Photo illustrating fish screen and overflow channel. Impacted area was seeded and mulched. Pink flags indicate planted container plants.

<u>Conclusion:</u>

The project was funded by the Washington Department of Fish and Wildlife (WDFW) by providing a modular rotary drum fish screen as an "in-kind" cost share estimated, the U.S. Fish & Wildlife Service (USFWS) through the Partners For Fish and Wildlife Grant Program, and the Bonneville Power Administration (BPA). The installed fish screen will prevent fish from entering approximately 1 mile of unscreened diverted surface water. The roughened channel will be monitored for project success annually and reported to the BPA Hydraulic Division. The fish screen will be maintained by the Yakama Nation Water Code Administration with assistance provided by the Yakama Nation Fisheries Program.

E. North Fork Simcoe Creek Culvert Removal

<u>Overview:</u>

YRWP removed a culvert to improve fish passage on North Fork Simcoe Creek just above its confluence with Diamond Dick Creek August 2012 (Figure 13). The culvert, which is undersized (Figure 14) and a seasonal barrier to ESA Middle Columbia River steelhead trout, is located at T11N, R16E, S11, SW1/4, within the restricted area of the Yakama Nation Reservation. At high flows, the culvert became clogged and partially re-routed the creek down the road potentially stranding fish (Figure 15). Barriers such as the culvert is listed as a factor for MCRS decline by the Yakima Steelhead Recovery Plan and removing barriers is a critical recovery goal for the Toppenish population of MCRS.

Figure 13. Photo illustrating conditions post construction

Figure 14. Clogged culvert causing creek to partially reroute

Figure 15. Creek re-routed down the road due to clogged culvert.

Methods:

The work area was isolated from the active flowing stream. No salmonid species were captured during the fish removal effort. A tracked excavator was used to remove the culvert. Once the culvert was removed, the culvert was disassembled and hauled for recycling. Natural channel cross sections were established to mimic upstream and downstream conditions of the streambed for use as a guide for installing the roughened channel (Figure 16). The existing riparian vegetation was little disturbed; little clearing occurred. All disturbed areas were seeded and planted with riparian species appropriate for the site and mulched with weed-free native grass straw. Revegetation efforts will aid in the self-sustainability of the site through recruitment of large wood to add roughness for in channel roughness and increase floodplain water holding capacity. A concentration of willows and alder were placed along the streambanks for long term stability damaged from avulsion.

Figure 16. Roughened channel installation post culvert removal

Conclusion:

By removing the culvert on North Fork Simcoe Creek, the availability and quantity of potential steelhead spawning habitat is enhanced, fish stranding is limited, unimpeded fish passage of MCRS and resident trout provided, and hydrologic connectivity with the floodplain is improved

F. Simcoe Creek Bank Stabilization and Floodplain Enhancement

Overview:

Simcoe Creek is used by ESA listed Middle Columbia River Steelhead Trout during numerous freshwater life history stages. Steelhead productivity in the form of redds have been documented throughout Simcoe Creek and its tributaries. Simcoe Creek has aggraded severely resulting in lateral channel migration that is threatening infrastructure during flood events, excessive sedimentation, and vertical migration that is increasing hydraulic energy downstream. The substrate in this reach is entirely alluvial fine material and the stream has incised through unconsolidated soils consisting primarily of silt and sand. Lateral bank erosion is occurring at the site at a rate of 5-10 feet per year, depositing fine sediment in a reach with limited spawning habitat (figure 17). Evacuation of fine sediment through the reach is a slow process due to the low gradient position of the reach. The stream bank is vertically cut to a depth of approximately 10 ft and has lost connectivity within its historic floodplain. Robust vegetation is not present within the erosion site. The stream is naturally adjusting to inputs of water and sediment, but the active bank erosion continues to threaten infrastructure and cause detriment to fish habitat. The goal of the project is to enhance floodplain connectivity, protect/stabilize an eroding bank, and provide favorable habitat conditions for Middle Columbia River Steelhead. Large wood structures and re-vegetation of the site will slow the rate of erosion and add roughness to dissipate hydraulic energy, while providing holding habitat for adult steelhead and rearing/forage habitat for juvenile steelhead.

The property is adjacent to the right bank (looking downstream) of Simcoe Creek, approximately 0.4 miles downstream from the Agency Creek confluence (Figures 19 and 20).

Figure 17. Looking upstream at eroding bank, March 2012

Figure 18. The project site is approximately 0.4 miles downstream from the Agency Creek confluence in White Swan, WA. Agency Creek enters Simcoe Creek from the south. Top of map is oriented north.

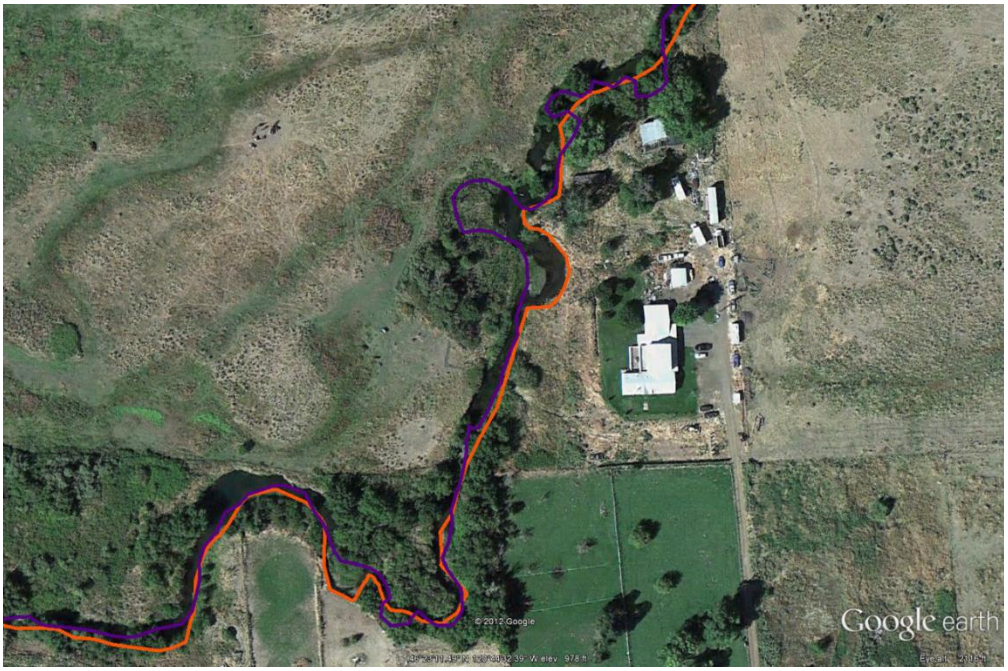

Figure 19. This photo shows 1996 (purple) and 2011 (orange) configuration (roughly) of the right bank of Simcoe Creek in the Coburn Loop area. Top of map oriented north.

<u>Methods:</u>

YRWP contracted engineering services to develop an engineering design to stabilize the eroding bank on Simcoe Creek. An engineering design was completed February 28, 2012. Existing data was gathered and reviewed that included historical site data (e.g., hydrology/hydraulics, geomorphology, land use, ecology) and aerial photographs, available survey and topographic data, soil and geologic mapping, climate change information, and other data. The contractor conducted a site survey to collect topographic data required for design and preparation of construction documents. Topographical data included the floodplain, cross sections of stream and profile of stream thalweg, and water surfaces upstream and downstream of the cross sectional survey. Stream substrate size was documented by collection of pebble counts to provide design data for sediment continuity and stream stability. Hydrologic analyses were used for the development of design flows for Simcoe Creek (flood flow estimates and flow duration statistics). Feasible alternatives for stabilizing the project reach were derived from an alternatives analysis. Construction documents and planning-level cost estimate were developed to a design-bid-build level of completion. Design tasks included preparation of design conditions hydraulic model, design features and details to provide desired bank stability and aquatic habitat, large wood stability and scour analysis.

Conclusion:

Design plans and construction documents were completed February 28, 2012. Plans for implementation are anticipated for summer 2013.

III. Operations and Maintenance

A. Stock Wells

YRWP staff repair and maintain 33 solar powered stock pumps (Figure 21) and 3 stock water pipelines in the Ahtanum and Toppenish Watersheds. These pumps and pipelines are used to provide stock water when YN minimum instream flow criteria mandate the cessation of irrigation. It is necessary to have many wells because there are many individual cattle operations, several of which may not always be served by a single well. Operating these wells has been a difficult task which we are still in the process of perfecting. Project staff anticipates constructing more stock pipelines that will be associated with the existing stock pumps. This will better meet multiple users' needs while only using one stock pump.

Figure 20. Stock pump and watering trough.

Routine maintenance of these facilities includes fixing a significant amount of broken PVC plumbing (often associated with cattle damage), replacing the electrical pieces of the pump's control systems as they wear out and upgrading the water troughs associated with the pumps.

Project staff have found that most of the infrastructure associated with the watering troughs (hoses, float switches, trough supports etc.) were too lightly built. Over the last year we have been working to upgrade this infrastructure with more rugged float switches, flexible PVC hoses instead of garden-type hoses, more sturdy stanchions for the troughs and gravel aprons around the troughs to prevent soil erosion.

In addition we have found it necessary to replace several of the protective fences surrounding the installations. The original fences were usually standard barbed wire and it has become apparent that a post and pole type fence is more appropriate for this application.

We have experienced relatively few problems with the solar arrays associated with the pumps. Several arrays have been upgraded to provide more power and thus more pumping capacity to units that experience high demand.

B. Fencing

As in past years, staff maintained over 158 miles of range unit boundary fence, 15 miles of riparian fence and 22 miles of meadow exclosure fence. The YRWP maintains range unit boundary fence in places where those fences keep cattle out of sensitive areas. Staff build and maintain riparian fencing. Some of the maintenance is done in cooperation with the Bureau of Indian Affairs' Range Program, however that program is chronically understaffed, and much of the work falls to the YRWP.

IV. Literature Cited

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