Please find attached a response from The Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) for Project # **2008-301-00**, *Habitat Restoration Planning, Design and Implementation within the boundaries of the Confederated Tribes of the Warm Springs Reservation of Oregon, lower Deschutes River, Oregon*.

This response is intended to address a condition placed on this project, for the Beaver Creek work area, as part of the Council decision made on February 7, 2012.

Following is a summary of the Council decision and condition placed on the three work areas. Please note that this decision was based on the three qualifications identified in the ISRP's last review (ISRP document 2011-27).

1. The CTWSRO will submit further detail as requested by the ISRP for each work area as detailed in the following.
   a) Beaver Creek: Upper Beaver, Coyote, and Quartz creeks enhancement will be made available for review during Spring/Summer 2012;
   b) Mill Creek: Potters Pond to Boulder Creek restoration available Spring/Summer 2012; and
   c) Warm Springs River: Large woody debris additions/placements available for review in late 2012/early 2013 or reviewed during the Geographical Review.

   Bonneville will include as part of contracting specific deliverable of the details for the three proposed project work areas that can be used as the basis to evaluate project merit and action effectiveness. In response to the ISRP request, at a minimum the deliverables will include site-specific detail defining baseline habitat condition; expected improved condition post implementation; a description of how restoration will contribute to improved parameters of focal species for each site; and a description of project evaluation criteria and monitoring to determine action effectiveness. Site-specific monitoring and results will be included in annual reporting requirements for the project. Implementation of the three work areas will be based on a favorable review by the ISRP.

2. The goal of this CTWSRO habitat project is to protect, manage, and restore aquatic habitats in Reservation watersheds, given the Council's understanding of the focus of this project, the Council expects adequate monitoring of physical aspects of restoration actions to detect whether the desired physical change is achieved. The Council understands the difficulty of detecting a fish population response at a local project scale. The Council therefore anticipates regional status and trend and watershed effectiveness programs, such as IMWs, to provide within the appropriate timeframe the evidence that these type of habitat restoration actions do contribute to improved fish condition and productivity.

3. The qualification raised by the ISRP is addressed in #2 above and in the work area submittal and review by the ISRP as addressed in #1.

Based on the ISRP review the Council supports continued planning and design associated with projects in Beaver Creek, Mill Creek and Warm Springs River. Implementation of the plans in Beaver Creek, Mill Creek and the Warm Springs are conditioned on favorable review from the ISRP.

The response received on November 2, 2012 is for the Beaver Creek: Upper Beaver, Coyote, and Quartz creeks enhancement work area and included the following.

- A memorandum for the Mill Creek: Potters Pond to Boulder Creek restoration (pdf)

If you have any questions please give me a call.   Mark

THE CONFEDERATED TRIBES OF THE WARM SPRINGS RESERVATION OF OREGON

Branch of Natural Resources, Fisheries Department

M E M O R A N D U M

To: Rich Alldredge, Independent Science Review Panel Chairman

From: Scott Turo, Fisheries Habitat Manager
Jen Graham, Fisheries RM&E Manager

Date: November 2, 2012

Re: ISRP Review 2011-27 for BPA Project #2008-301-00 "Habitat Restoration Planning, Design and Implementation within the Boundaries of the Confederated Tribes of the Warm Springs Reservation of Oregon, Lower Deschutes River, Oregon"

Project Site Response: Beaver Creek: Upper Beaver, Coyote, and Quartz creeks enhancement

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We would like to thank ISRP for their last review (2011-27) and comments. This response is specific to habitat restoration to be completed in upper Beaver Creek, Coyote and Quartz creeks. Since our last submission, planning and project design has continued per the Council recommendation. A suite of projects were identified in the narrative to be completed in Beaver, Coyote and Quartz creeks. These projects have either been implemented, are in planning, design, or have been eliminated (Table 1; Figure 1).

Table 1. Status of projects in BPA Project #2008-301-00 narrative[1] submitted to ISRP on December 22, 2011 for review.

Stream	Implemented*	Planning	Design	Eliminated**
Upper Beaver				
Bridge & Road Removal (S-501)***	X			
Culvert Removal (S-501)		X		
S-500				X
S-510				X
S-512***	X			
Lower Quartz Creek				
Sediment Reduction			X	
Coyote Creek				
Meadow Improvements		X		
Road Density Reductions		X		

*Project implemented using funds from the Natural Resource Conservation Service (NRCS) and mitigation funds from a gasoline spill near the mouth of Beaver-Butte Creek a tributary of Beaver Creek at rkm 30.7. Bonneville Power Administration funds were used as a match to administer the contracts.
**Projects eliminated but will be completed by other efforts in the CTWSRO Branch of Natural Resources (BNR).
***Includes minor habitat restoration actions.

[1]Narrative located at: https://pisces.bpa.gov/release/documents/DocumentViewer.aspx?doc=P123728

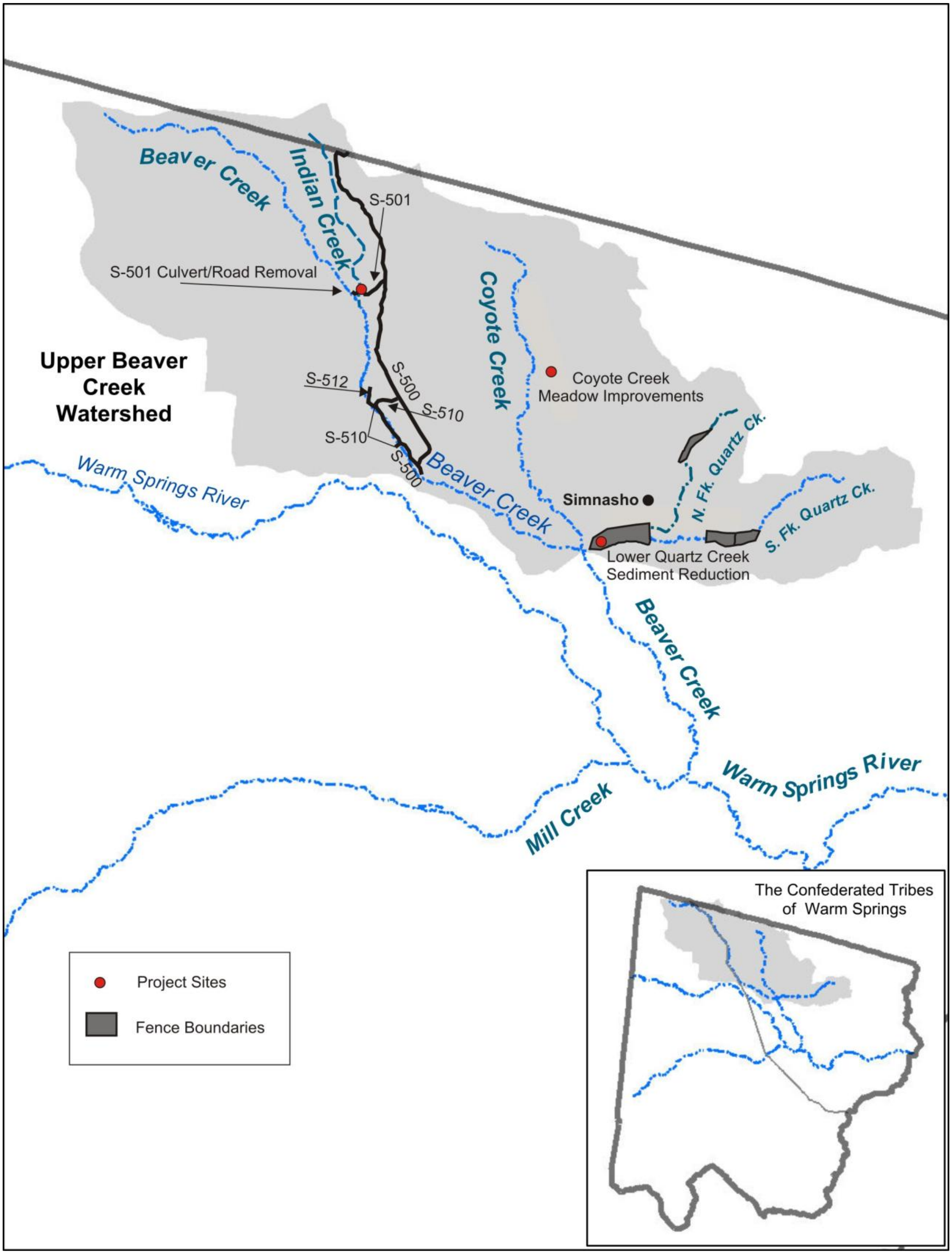

Figure 1. Vicinity map for projects in BPA Project #2008-301-00 narrative that are implemented, in planning, design or eliminated since ISRP review 2011-27 in the Beaver Creek Watershed, lower Deschutes River Subbasin, Oregon.

Introduction:
The following suite of projects are to protect or make improvements in the Beaver Creek Watershed and are in agreement with regional and local planning documents including the Columbia River Basin Fish Accords, The Deschutes River Subbasin Plan (NWPCC 2003), NWPCC Fish and Wildlife Program (NWPCC 2009), Mid Columbia River Steelhead Recovery Plan (Carmichael *et al.* 2008), and the CTWSRO Integrated Resource Management Plans (IRMP; CTWSRO 1992*a*; CTWSRO 1992*b*)[2].

Projects implemented during summer 2012 in upper Beaver Creek (*i.e.*, S-501 bridge and culvert and S-512) will improved spawning, foraging, holding, and rearing habitat for focal species (spring Chinook *Oncorhynchus tshawytscha* and steelhead *O. mykiss*) and an assemblage of native fishes (*e.g.*, Pacific lampreys *Entosphenus tridentatus*) by:

- Reducing sediment loads through:
    - Removing sections of road/skids trails
        - Restore floodplain connectivity
    - Planting native vegetation along stream banks
- Increasing channel complexity and roughness through:
    - Addition of large woody debris that will assist the streambed to:
        - Sort particles
        - Develop pool habitats
        - Increase interaction with the floodplain
        - Increased hiding habitats

Anthroprogenic activities in Quartz and Coyote creeks have caused high sediment loads in lower Beaver Creek (rkm 0 – 12; Figure 2). These activities include but are not limited to anthroporgentic activities such as agriculture, grazing, timber harvest and roads and/or skid trails associated with timber harvest and wildfire supression. The CTWSRO IRMPs, which guide natural resource management (they are also tribal law) on Reservation, have standards for allowable road densities by land management unit (e.g., wildlife management, riparian) and fine sediment levels (percent composition) within Reservation waters. Bulk core samples taken directly downstream of Quartz Creek, in 2003, showed that fine sediments (6.3 mm or less in diameter) constituted 47% of the sample (unpublished data, CTWSRO), and from 1986 - 1990 habitat measurements in Lower Beaver found fines (5.0 mm or less in diameter) constituted 26.4% of the sample. These are both above the IRMP standard of 20% or less (CTWS 1995, CTWSRO 1992*a*; CTWSRO 1992*b*). The high percentage of fine sediments in the stream bed is likely related, at least in part, past agricultural practices, high road densities, timber harvest, and grazing. The IRMP standards call for road densities to be less than 2.8 km/section, 1.5 km/section, and 0.6 km/section, in commercial, forested, and wildlife management zones, respectively. Currently, roads and/or skid trail densities exceed IRMP standards (CTWSRO 1992*a*; CTWSRO 1992*b*).

During the summer of 2012, sensitive wetland/floodplain areas within the Quartz Creek Subwatershed were fenced to remove anthropogenic activities (*i.e.*, grazing) prior to implementation of the restoration action. Approximately half (8.6 km out of 17.4 km) of the

[2] For full descriptions see Section C (Rational and significance to regional programs) pp. 10 - 14 of the narrative submitted to ISRP on December 22, 2011.

total stream was fenced (Figure 1). The next step will be allowing natural re-vegetation within the riparian zone (Figure 3) and upland terrace and if needed the planting of native vegetation. Re-vegetation will assist in stabilize banks and act as erosion control, reducing sediment into the stream and will ultimately reduce sediment delivery to spawning and rearing habitats in lower Beaver Creek. The same approach will be applied in Coyote Creek by fencing a large meadow/wetland complex (Log Spring at rkm 9.2).

Figure 2. Example of sediment entering lower Beaver Creek from Quartz Creek (rkm 11.9; left photo) and Coyote Creek (rkm 12.2; right photo), lower Deschutes River Subbsin, Oregon.

Figure 3. Example of stream bank recolonization by willows (*Salix* sp.) and other native plants after cattle have been removed, Quartz Creek Subwatershed (left), and native grasses in Log Springs Meadows, Coyote Creek Subwatershed (right), lower Deschutes River, Oregon.

Existing and Expected Site Conditions

Upper Beaver - Culvert & Road Removal (S-501)

We will be removing a corregated, 1.5 m-diameter, perched culvert located at rkm 1 on Indian Creek (Figure 3) and recontouring the banks as it will not be replaced. Approximately 100 m of road prism on each side of the culvert will be removed at the same time as the culvert. The banks will be re-sloped to historic dimensions. Log structures will be placed in stream to assist in grade control.

During summer low flow, there is a 0.3 m drop from the bottom of the culvert to the surface of the stream (Figure 4). Above the culvert, there are about 3 km of suitable spawning and rearing habitat. Electrofishing surveys in 1998 were conducted to document the distribution of bull trout (*Salvelinus confluentus*) in Reservation streams. No bull trout were documented in Indian Creek and no mention of other fishes were reported. However, during juvenile fish distribution surveys (BPA Project #2008-311-00) September 2012, *O. mykiss* were observed downstream of this culvert. Whether the culver is a partial fish-barrier is unknown, but it is unnecessary because the road has been removed. Beyond potentially increasing fish distribution upstream by removal of the culver, we expect to improve hydrologic connectivity in Indian Creek, which serves to integrate upstream-downstream linkages and exchange of matter and energy between the channel and floodplain/riparian system and contributes to ecological function and integrity (Ward 1989).

Figure 4. A corregated culvert on Indian Creek connected to a road prism to be removed to reconnect the stream to its natural floodplain in the Beaver Creek watershed, lower Deschutes River, Oregon.

<u>*Lower Quartz Creek - Sediment Reduction Project*</u>

This project is located behind a 22.3 ha riparian and upland terrace exclusion fence that includes a total of 1.6 kms of lower Quartz Creek Subwatershed (including portions of the main stem, north and south fork Quartz creek; Figure 5). The fence removes the anthropogenic effects that negatively impacted lower Quartz Creek Subwatershed (*i.e.*, grazing practices), and will protect restoration work to be completed.

North Fork Quartz Creek was re-routed into South Fork Quartz Creek some time in the past (Figure 5). Resulting in channel simplification, increased energy (*i.e.*, increased stream velocity) from joining the two forks into a much shorter segment (about half of historic, currently about 60 m), and other direct (grazing) and indirect (road densities) anthropogenic effects resulted in scouring of the current (historic South Fork) channel. Lack of complexity (*e.g.*, pools, sinuosity) in the stream failed to dissipate energy and allow sediments to settle. Rather, the high sediment load was transported downstream and into the main stem of lower Beaver Creek negatively impacting production of focal species and other native fishes. Severe channel incision and head cutting occurred as a result of the high velocity water and heavy sediment coming out of Quartz Creek (Figure 6). Cross sectional data and the associated photo from just upstream of the current channel shows the severity of the incision in the north fork (reference points are C1 and C2 on Figure 5). The current channel of North Fork Quartz Creek is about 2 m deeper than that of the historic channel (from invert elevation of the stream bed to the floodplain terrace, 4 m and 2 m, respectively, Figures 7 and 8).

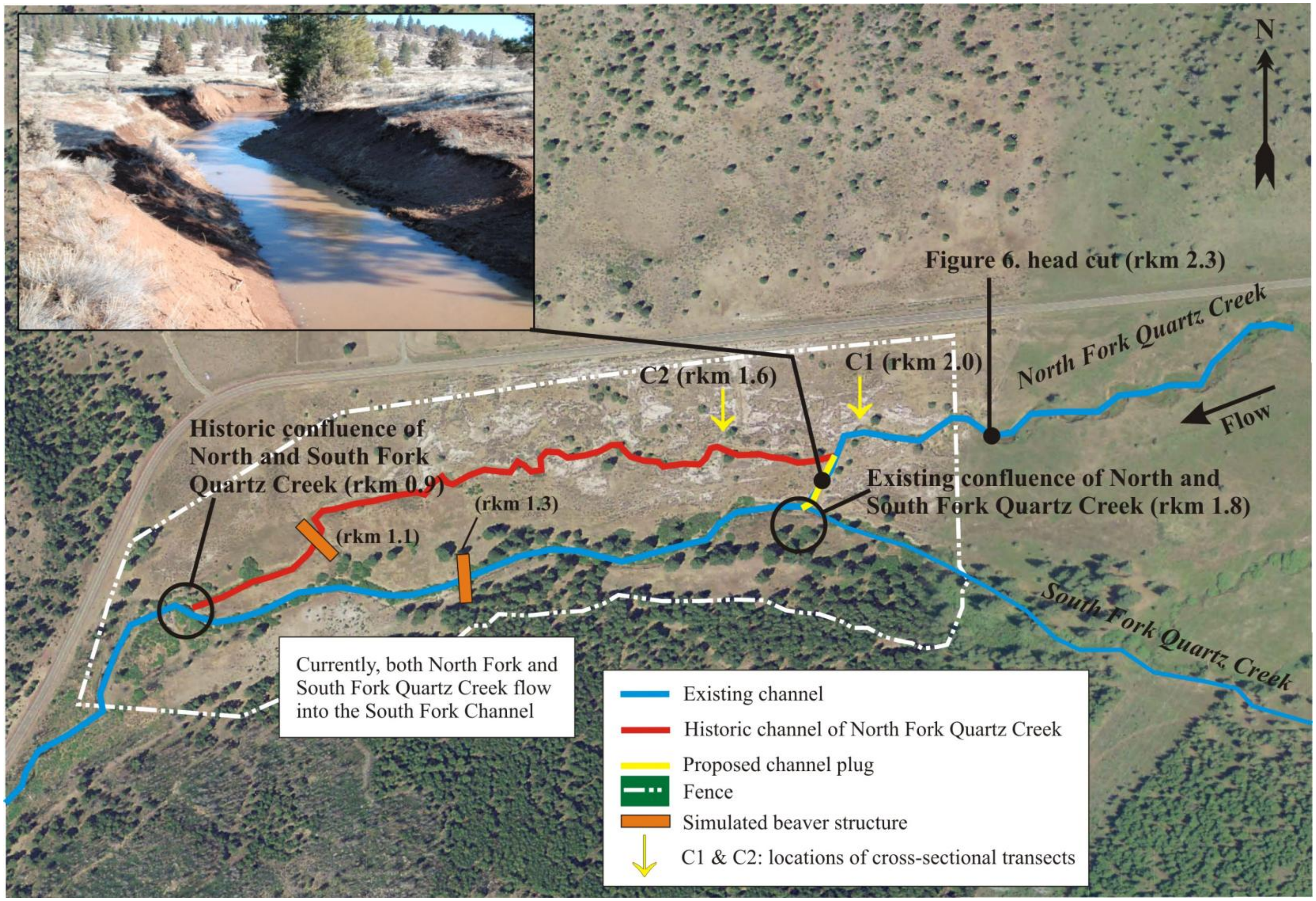

Figure 5. Map of lower Quartz Creek (rkms defined on figure) project area showing current channel (in yellow) near its confluence with the south fork which is being plugged with flow being re-routed into a historic channel (in red). Cross-sectional data with photos are also denoted on the map by yellow data (described in the narrative) along with simulated beaver structures (orange bars). This project is currently being designed by NRCS and is a deliverable in the project's BPA contract.

Figure 6. Head-cutting in north fork Quartz Creek (rkm 0.9 to rkm 1.7 in historic channel, defined in Figure 5), lower Deschutes River Subbasin, Oregon

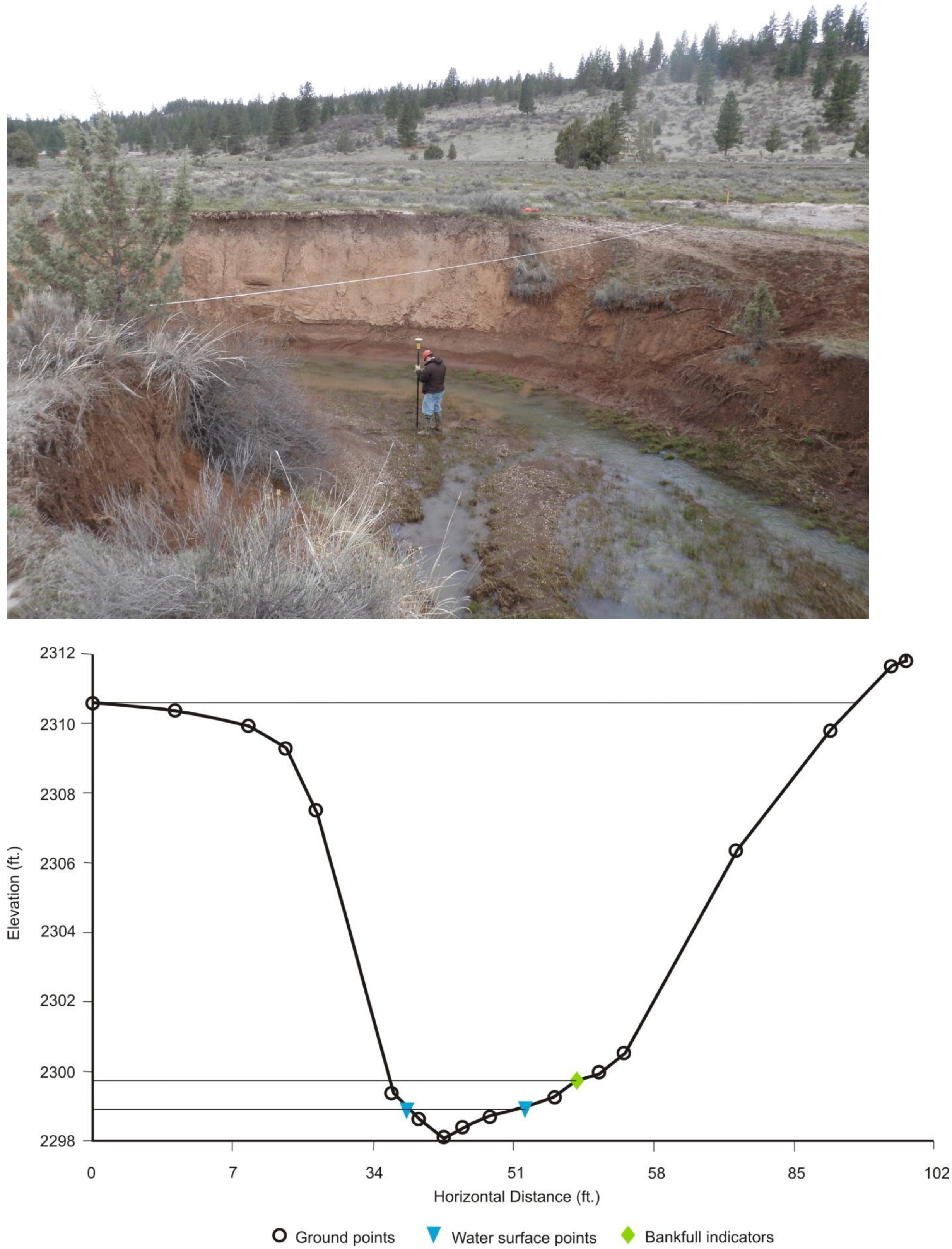

Figure 7. Photo and cross-sectional transect of North Fork Quartz Creek (rkm 2 as defined Figure 5) upstream of the confluence with South Fork Quartz Creek (C1, Figure 5), lower Deschutes River Subbasin, Oregon.

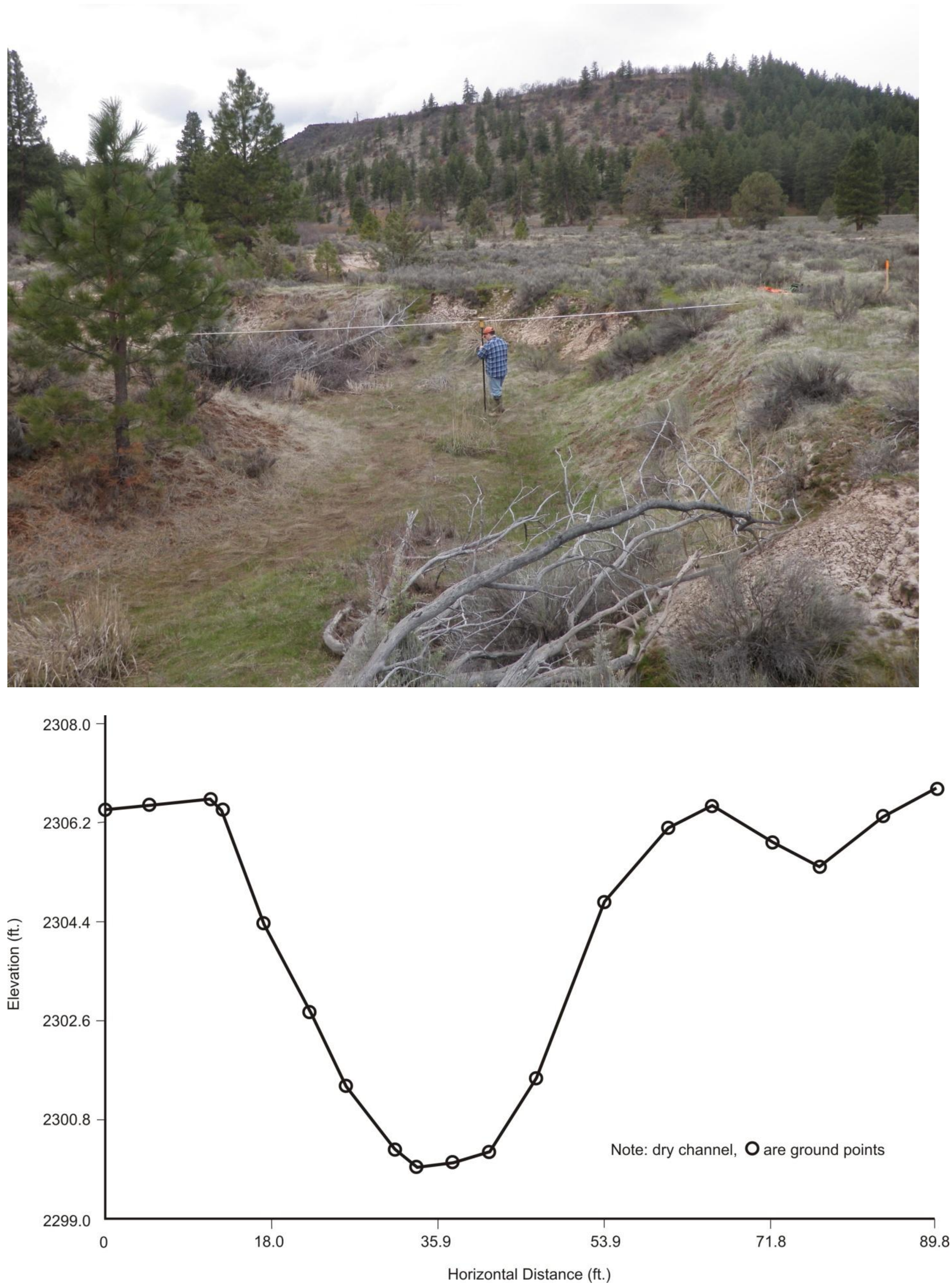

Figure 8. Cross-sectional transect of the historic channel of North Fork Quartz Creek (rkm 1.6, defined in Figure 5) downstream of the current confluence with South Fork Quartz Creek (C2, Figure 5) lower Deschutes River, Oregon.

Re-aligning North Fork Quartz Creek into the historic channel will add approximately 850 m of channel, decrease the stream gradient and increase the sinuosity. The complexity of the channel will be increased as juniper was placed in the historic channel years ago, as well as gabions that remain in good condition. Stream banks will be sloped (at least 2:1) to mitigate vertically unstable banks. Materials taken from re-graded stream banks will be moved to the current channel and act as a plug to route the water back into the historic channel (Figure 5). Planting native vegetation along banks and passive re-vegetation will further stabilize banks.

Sediment will be entrained three ways by this project:

- Two simulated beaver dams will be placed in succession to create small seasonal wetland ponds that will entrain sediments (Figure 9);
- Increased length and sinuosity in the historic channel will reduce the overall slope of the channel and allow suspended sediment to settle out in various locations in the channel; and,
- Stabilizing banks by excluding grazing and replanting and/or allowing native vegetation to passively re-vegetate banks.

Simulated beaver structures will be constructed in the North and South forks of Quartz Creek to create seasonal ponds that will allow suspended sediment to settle and promote vegetation growth. Presently, beavers are in low numbers in this area. It is presumed that habitat conditions, such as the lack of willows and other riparian vegetation, are unfavorable for beavers to inhabit this area. This approach is intended to re-establish functional diversity by re-integrating a dynamically important component of the river-floodplain system, the beaver. By initiating the process with a simulated beaver dam, which will be constructed from small logs and sticks (Figure 9), increased water-surface elevation behind the structure will raise the water table and support riparian vegetation (Jungwirth 2002; Polluck *et al.* 2007), which will in turn provide food and material for future dam construction and maintenance by beavers that re-colonize or are re-introduced into the area.

Beavers facilitate recovery of riparian vegetation, floodplain functions and stream channels (Demmer and Beschta 2008) by initiating channel-floodplain feedbacks (Beechie *et al.* 2010) and are a desired component of this restoration design. A long-term study of beaver dams in a low-gradient mountain stream, Bridge Creek, in eastern Oregon demonstrated that beaver dams, whether functioning or breached, and in combination with a natural flow regime, resulted in increased area and diversity of riparian plant communities, more complex channels, stream aggradation and sediment storage (Demmer and Beschta 2008, Polluck *et al.* 2007). The location of proposed simulated beaver dams is immediately downstream of head cutting. Simulated beaver dams will be lower than the floodplain terrace and are expected to become overtopped during high water events as a natural beaver dam. As in the case of a natural beaver dam, even a dam that is partially breached contributes to ecological recovery. Beavers will eventually take the lead in the recovery effort at Coyote Creek. As the riparian plant community vegetates and problem beavers become available for relocation, if natural re-colonization has not yet occurred, they will be released at this site.

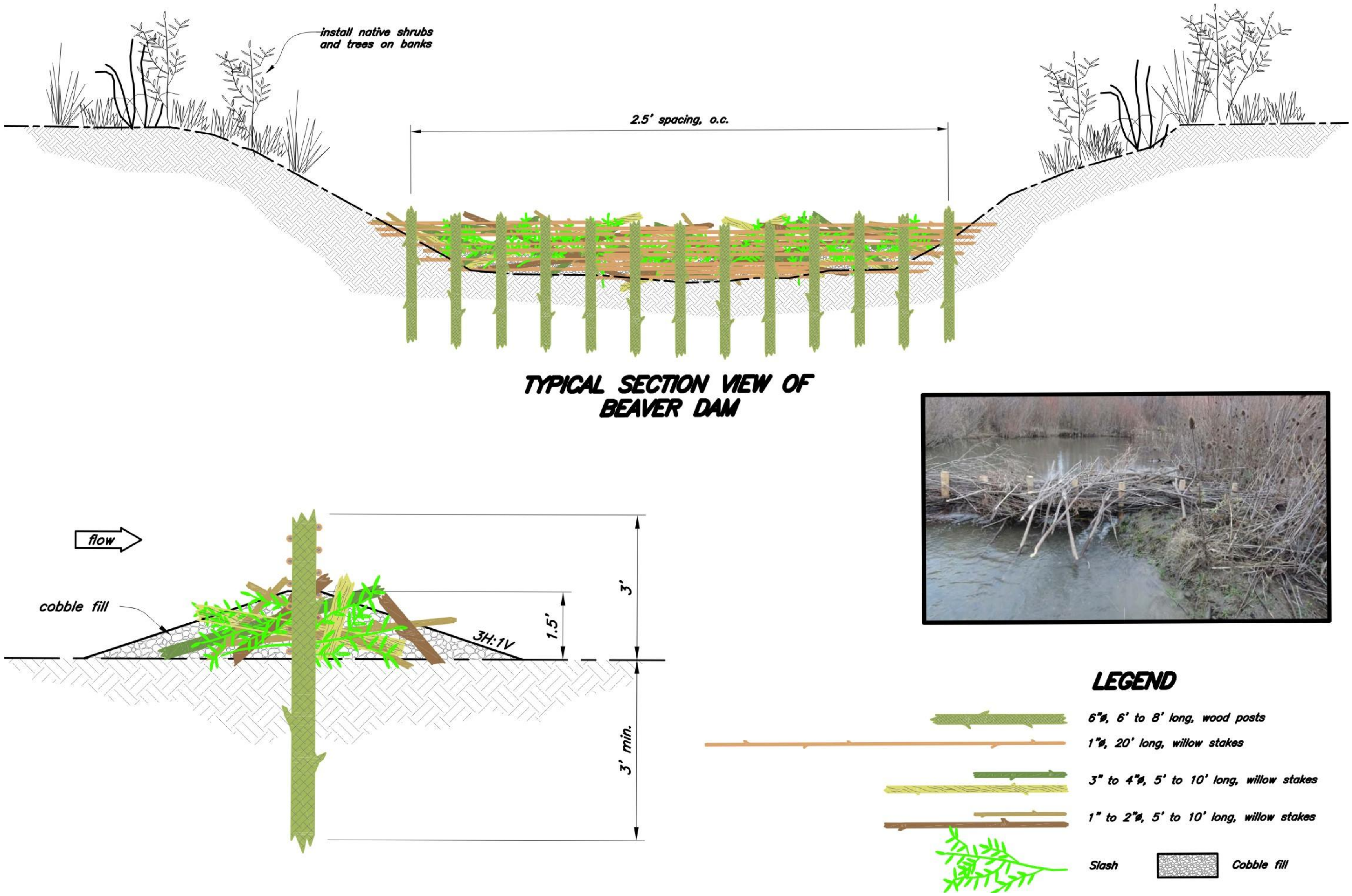

Figure 9. Simulated beaver dam structure design (placement of simulated in beaver dams on Figure 5).

Existing and Expected Site Conditions:

Coyote Creek - Meadow Improvements

Stream erosion in Coyote Creek has resulted in nearly vertical banks up to 3 m deep (widths greater than 10 m), creating incised sections of Coyote Creek that continue to erode (Figure 10). This incision has been attributed to overgrazing of domestic livestock, past farming practices, and poor road placement.

Figure 10. Example of vertically incised terraces along Coyote Creek, lower Deschutes River Subbasin, Oregon.

Previous instream efforts have been made to stop or slow channel incision, including installation of gabions and placement of log structures at head-cut knick points. However, these efforts failed to stop upstream migration of head-cuts or to aggrade the stream bed. In many causes, past restoration efforts are causing further erosion. In the late 1970s, earthen berms with undersized culverts were constructed across Log Springs Meadow (Figure 11). The design was to store excess water during high flow events upstream of the berm and allow seepage under the berm through the culverts. However, the design failed to correct the problem as culverts became plugged with debris, water flowed around the berm and caused further erosion.

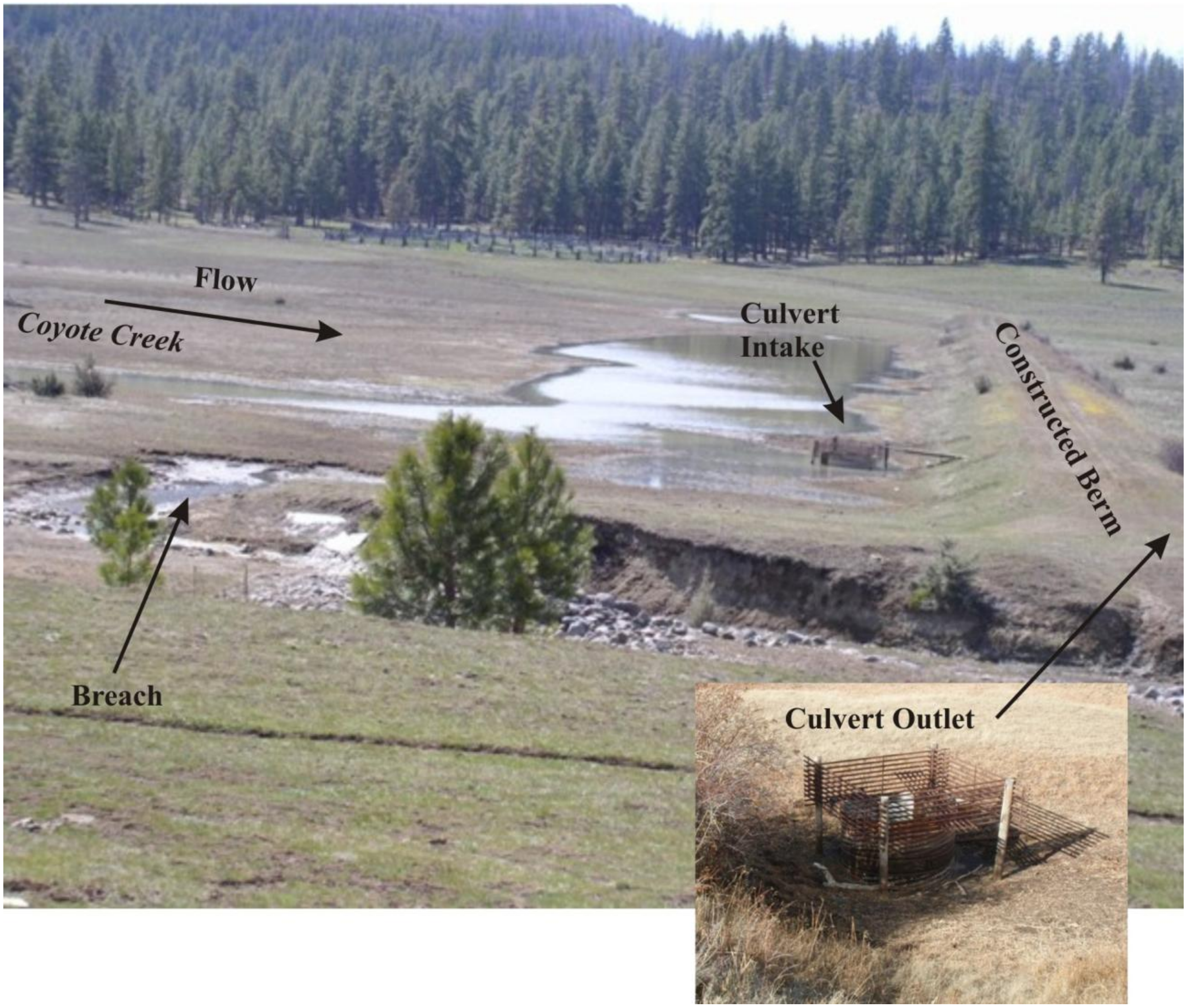

Figure 11. Berm breached at Log Springs Meadows, Coyote Creek Subwatershed, lower Deschutes River Subbasin, Oregon.

As in the lower Quartz Creek project, we will work with NRCS to develop a plan and design that controls sediment transport, dissipates energy before the stream reaches the berms, and elevates ground water levels to aid vegetation recovery. The first step will be to protect the area by building a fence that encompasses the meadow and excludes livestock. Specific features of the project design will be: bank sloping, construction of wetland features to entrain fines (*e.g.*, simulated beaver dam structures [Figure 9]), and planting/re-vegetation. The design will also address improvements and/or repair of the current berms.

Road Density Reductions

Currently, the CTWSRO GIS layers show road and skid trail densities exceed IRMP standards (Figure 12; CTWSRO 1992*a*; CTWSRO 1992*b*) with densities ranging between 0.6 km and 7 km per section. Roads have already been ground-truthed and prioritized to be decommissioned in 2013 using funds from NRCS and BPA. Roads hydrologically connected to Coyote Creek (Figures 13 and 14) and its tributaries were given the highest priority followed by:

1. Road location—roads located in floodplains, and perennial or ephemeral drainages that capture and direct surface run off to the stream network.

2. Evidence of erosion—Roads that are not need for future management that show signs of active erosion and surface runoff.
3. Density of roads—Unneeded roads in areas of high road densities will be removed to reduce the total compacted surface area of the watershed and promote infiltration.

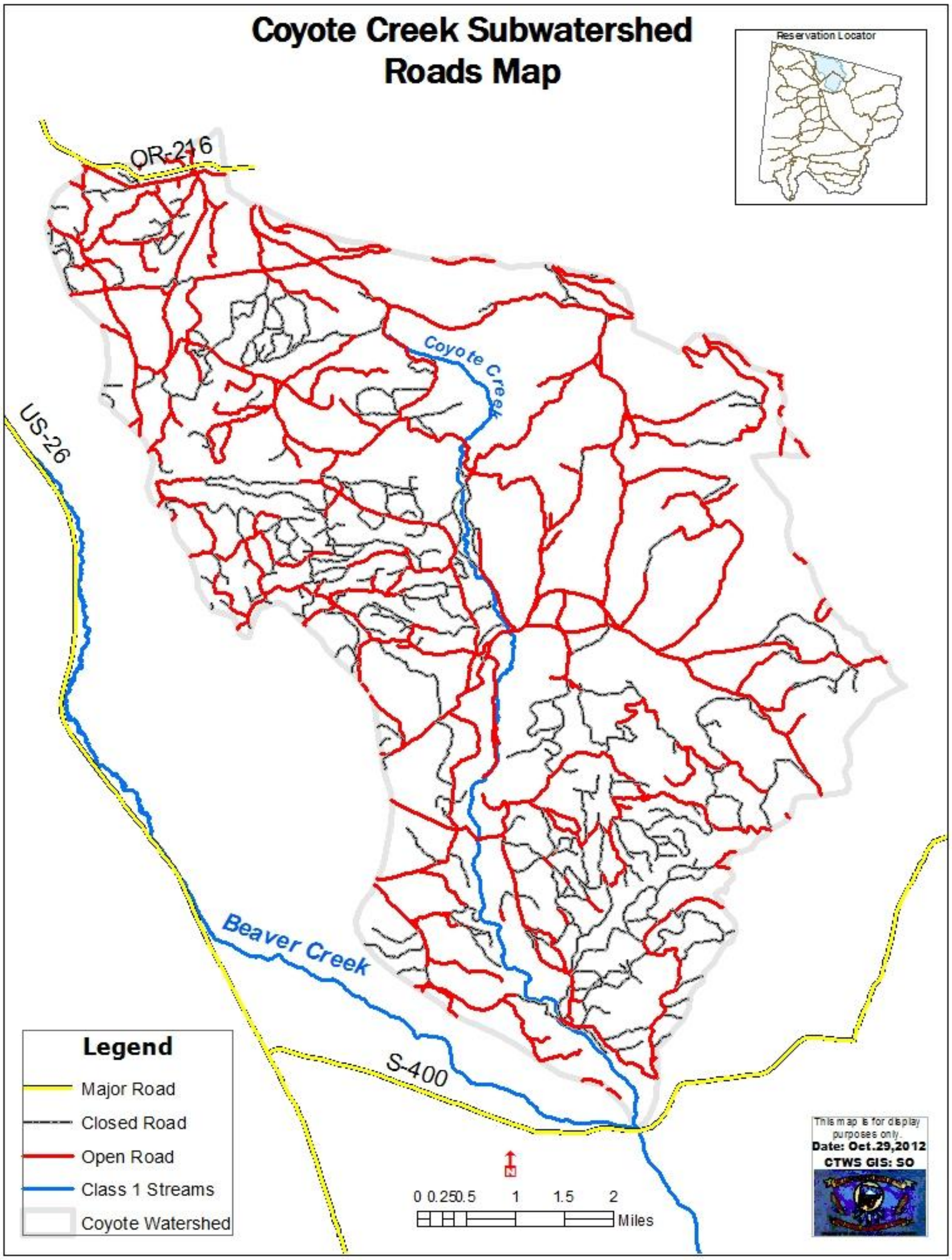

Figure 12. Map of road roads in Coyote Creek Subwatershed, lower Deschutes River Subbasin, Oregon.

Figure 13. Example of a high priority road (left) and skid trail (right) to be decommissioned due to hydrologic connectivity to Coyote Creek Subwatershed, lower Deschutes River Subbasin, Oregon.

Figure 14. Example of a road showing surface erosion in the Coyote Creek Subwatershed, lower Deschutes River Subbasin, Oregon.

Prior to any road decommissioning, the prioritized road list must be go through the CTWSRO IRMP review and approval process. The of prioritized roads for removal will be reviewed by a interdisciplinary team (ID team) of natural resource professional (*e.g.*, water quality, range, wildlife) who will consideration take express and address concerns various concerns related to their specific discipline and next steps (*e.g.*, approval to forward with additional reviews, mitigations, necessary federal documentation). A public comment period is also open to the tribal membership through public scoping meetings and written comments. After the comment period closes, the project will be finalized and submitted for approval by the Resource Managers Interdisciplinary Team (RMIDT). The final step in the process is approval by RMIDT. The RMIDT process will take into account not only the resource concerns but potential socio-economic concerns and further public concerns associated with project implementation and determine further mitigation and determine vote whether or not to approve the project. If the project is approved, a Tribal Council resolution will be approved and project implementation can occur. Approved projects adhere to mitigation or additional requirements generated through the all review processes. Running congruent to the Tribal IRMP process is any necessary Federal processes (*e.g.*, ESA, Section 106).

Significance for Fishes:

Anticipated improvements for target species and other native fishes

- Improved spawning and rearing habitat

There is a marked difference in fish habitat quality in Beaver Creek upstream and downstream of the confluence with Quartz and Coyote creeks. While there are differences in channel geomorphology (*e.g*., gradient, valley type and associated landforms) longitudinally among stream reaches in Beaver Creek, a large part of this difference is undoubtedly due to sediment inputs from anthropogenic alteration of Quartz and Coyote creeks described earlier. Spring Chinook and steelhead spawn in Beaver Creek during periods that coincide with seasonal high flows that carry sediment; spring Chinook spawn in the fall and steelhead spawn during spring. Accumulated fine sediment in the gravel can restrict inter-gravel flow and block emergence of fry (Everest et al. 1987). The suitability of incubation habitat depends on how much, what size and when sediment is transported (Lisle and Lewis, 1992). Sediment delivery by high flow events during the several weeks or months of incubation is key to embryo survival. Therefore, restoration efforts in Quartz and Coyote creeks that aims to prevent sediment from becoming entrained in the first place and also reduces velocities allowing sediment to become sequestered in depositional areas should ensure that unusually high sediment loads are not being delivered to downstream spawning areas when incubation occurs.

Monitoring by BPA project 2008-311-00[3] *& Significance*

Areas upstream of the confluence with Quartz and Coyote creeks (rkm 20 to 34) are regarded

[3] Project 2008-301-00 "Monitoring wild populations of spring Chinook salmon (*Onchorhynchus tshawytscha*) and summer steelhead (*O. mykiss*) in tributaries of the lower Deschutes River with the boundaries of the Confederated Tribes of the Warm Springs Reservation of Oregon Reservation" lists this project as being related and will assist with biologically monitoring as appropriate (p. 13). Link to project narrative https://pisces.bpa.gov/release/documents/DocumentViewer.aspx?doc=P123837&session=c699a137-6768-4342-8915-af15804dfa44 redd count RM&E methods pp. 19 – 26 and juvenile density RM&E methods pp. 28 – 39.

more productive spawning grounds in Beaver Creek while downstream reaches (rkm 0 to 20) are considered marginal. Between rkm 20 and 34, Beaver Creek winds though a deciduous forested bottom predominated by low gradient floodplain/wetland complexes. This area provides important spawning and rearing habitat for spring Chinook, steelhead, Pacific lamprey and resident fishes. Spring Chinook and steelhead spawning continues upstream of rkm 32.3 (Uppermost habitat project at rkm 32.3; Figure 15). For spring Chinook and steelhead, redd surveys index reaches 5-7 [Figure 15., rkm 20 – 34] represent 11% of the total area surveyed in the Warm Springs drainage, yet accounted for 15% of the redds on average for spring Chinook from 1987 – 2010 (Figure 16) and 36.7% of the steelhead redds, on average from 2006 to 2011 (Figure 17).

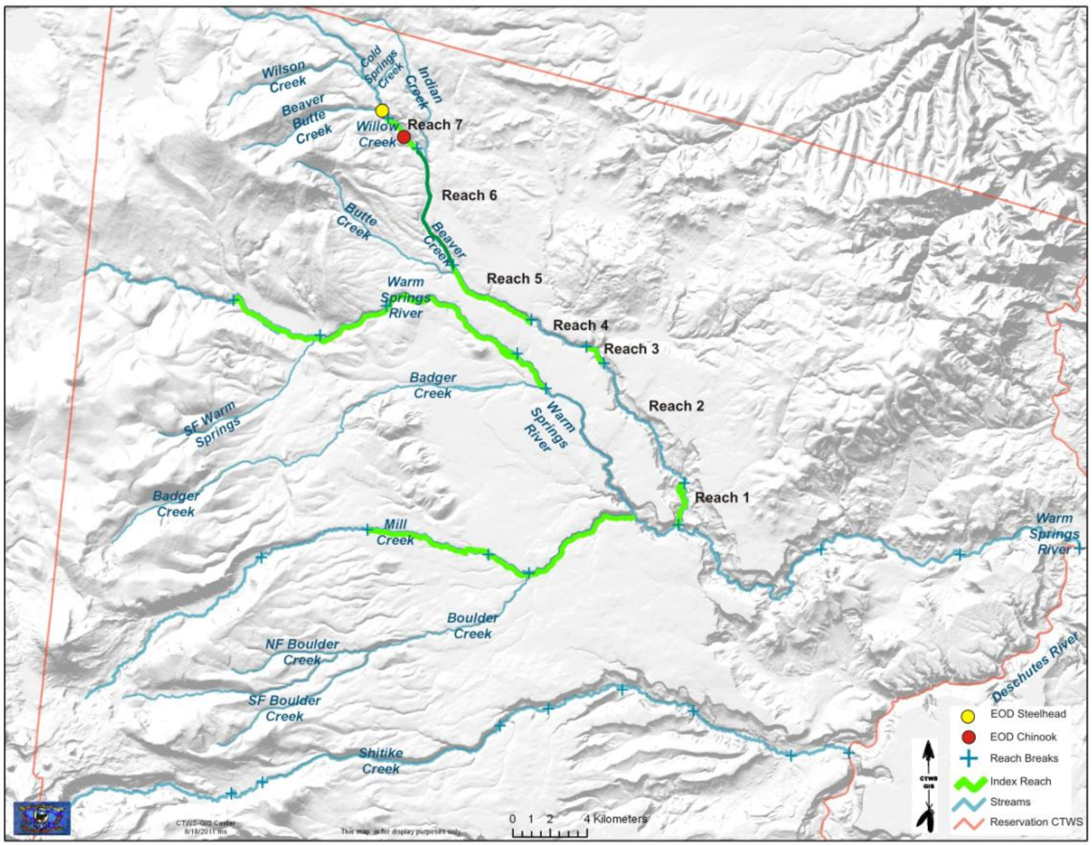

Figure 15. Redd distribution for steelhead and spring Chinook, in index reaches, in the Warm Springs River and tributaries, lower Deschutes River Subbasin, 2011.

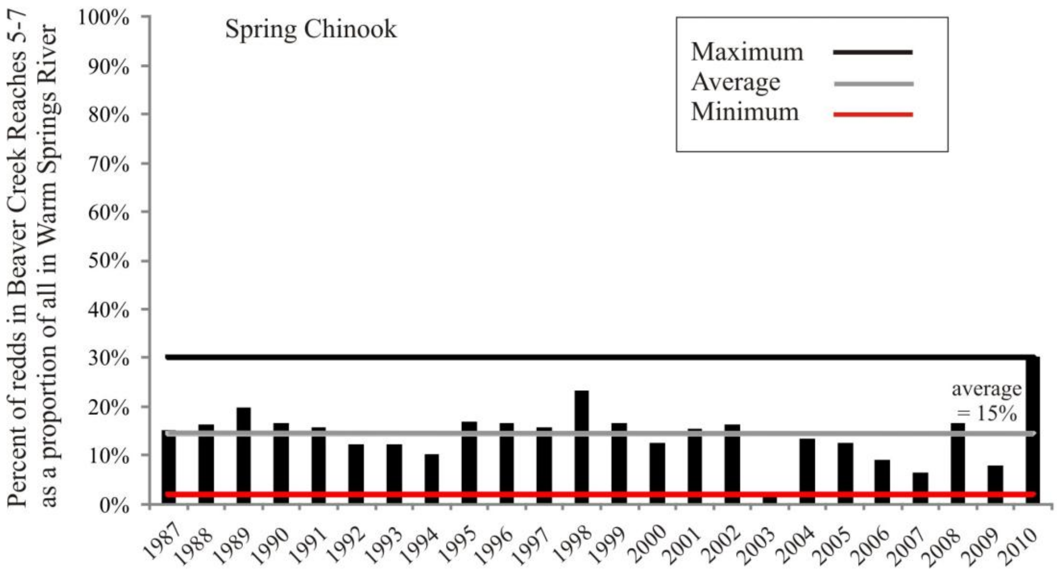

Figure 16. Percent (including minimum, maximum, and average) of spawning occurring in Index Reaches 5 – 7 (rkm 20 – 34) for spring Chinook in Beaver Creek as a percent of the total spawning in the Warm Springs River Watershed, lower Deschutes River Subbasin, 1987 – 2010.

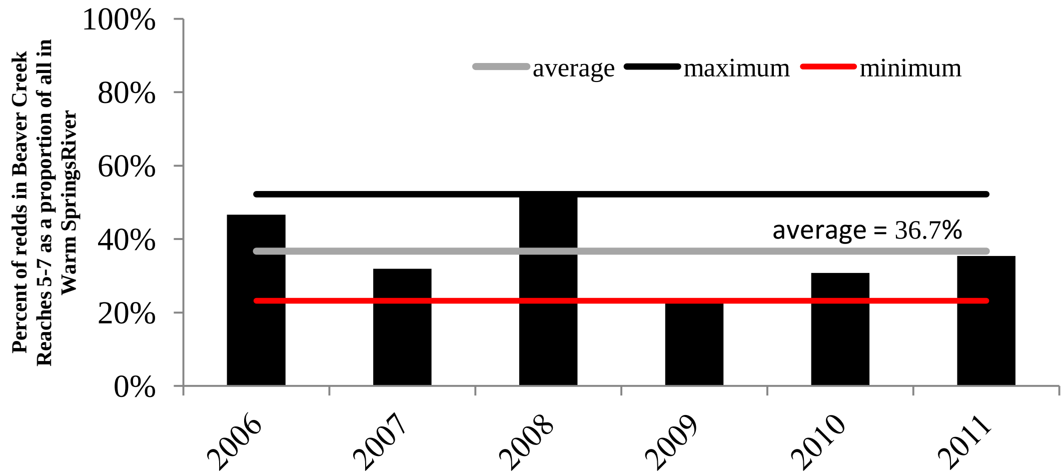

Figure 17. Percent (including minimum, maximum, and average) of spawning occurring in Index Reaches 5 – 7 (rkm 20 – 34) for summer steelhead in Beaver Creek as a percent of the total spawning in the Warm Springs River Watershed, lower Deschutes River Subbasin, 2006 – 2011

Lower Beaver Creek (rkm 0 – 20 [reach 1 – 3]; Figure 15) does not appear to be as significant of a spawning area for spring Chinook and steelhead as reaches upstream of rkm 20. For spring Chinook, redd surveys index reaches 1 - 3 [Figure 15., rkm 0 to 20] in Beaver Creek represent

11% of the total area surveyed in the Warm Springs drainage, and accounted for 9% of the redds on average for spring Chinook from 1987 – 2010 (Figure 18). Index reaches for steelhead include reach 1 and 3 (Figure 15) represent 4% of the total area surveyed in the Warm Springs drainage. Except for 2008, when 4 redds were counted, (4% of total redds in the Warm Springs drainage), no redds were recorded from 2006 to 2011.

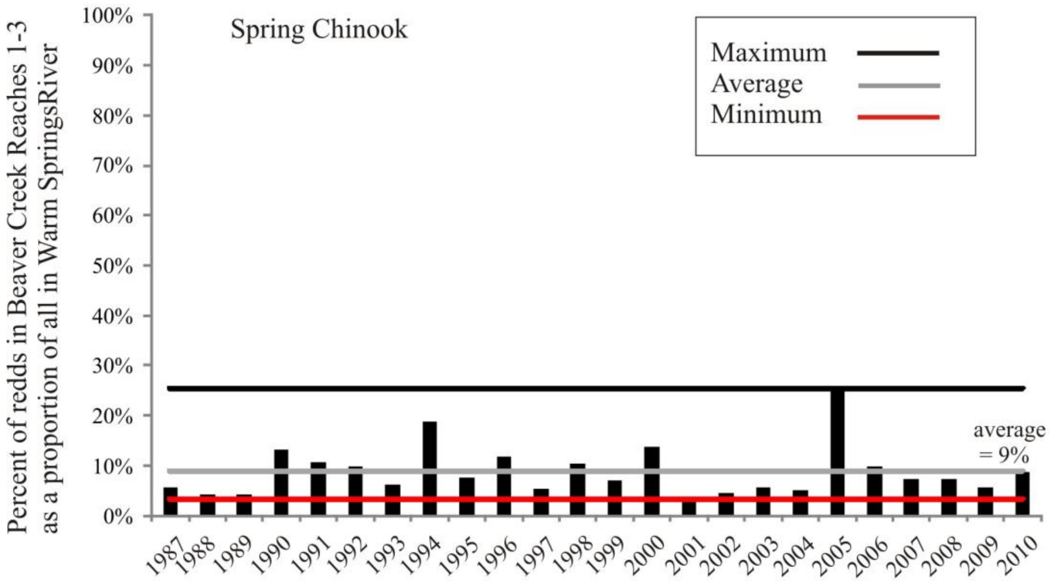

Figure 18. Percent (including minimum, maximum, and average) of spawning occurring in Index Reaches 1 – 3 (rkm 0 – 13.4) for spring Chinook in Beaver Creek as a percent of the total spawning in the Warm Springs River Watershed, lower Deschutes River Subbasin, 1987 – 2010.

After restoration projects in Quartz and Coyote creeks are completed and vegetation has had a chance to increase bank stability, we expect less sediment inputs to lower Beaver Creek. While spawning areas have a more patchy distribution in lower Beaver Creek, reduced sediment inputs during incubation periods may increase probability of egg to fry survival for spring Chinook and steelhead.

Monitoring:

Physical monitoring will be conducted to document spatial and temporal changes of the restoration site. Monitoring parameters will include channel cross-section, longitudinal profiles, photo points, and McNeil core samples as described in the project narrative to track the quality of the spawning habitat. Standardized methods will be used. The CTWSRO is engaged and aware of ongoing efforts to further standardize methods through regional efforts such as ChAMP and ISEMP with direct participation in PNAMP's http://www.monitoringmethods.org through partnership with BPA.

Biological monitoring is beyond the scope of this project. However, projects funded by the Columbia River Accords, for spring Chinook, steelhead, bull trout and Pacific lamprey, research and monitoring, within the boundaries of the CTWSRO will be complimentary to the habitat work being completed. Specifically, the spring Chinook and steelhead natural production monitoring project (BPA Project #2008-311-00) will be used to monitoring trends of "fish-in" "fish-out" of the Warm Springs River and Shitike Creek through juvenile outmigration monitoring and adult escapement. Linking fish response to a site-specific habitat project is extremely difficult and requires a sample design that takes into account a number of variables (*e.g.*, temporal and spatial replication), which are cost prohibitive and logistically impossible. However, CTWSRO is engaged with effectiveness monitoring programs (*e.g.*, Middle Fork John Day IMW) and anticipate that the outcome of these types of activities will allow a benefit to be quantified biologically.

Costs:

Following is a rough breakdown (by percentage) of how costs will be distributed amongst funders (BPA and "other") from planning to physical effectiveness monitoring (Table 2). Planning, administration, and design are currently underway with funds secured through BPA, Beaver Creek Spill Settlement Mitigation Funds and NRCS. We are continuing to secure funds for implementation that will continue through 2017.

Table 2. Project Planning and administration, design, implementation, and monitoring costs by approximate percentage by funding source (BPA and "Other") for Potter's Pond, Mill Creek, lower Deschutes River Subbasin, Oregon.

Project Stage	BPA	Other*
Planning and Administration	80%	20%
Design	0%	100%
Implementation**	20%	80%
Physical Effectiveness Monitoring	100%	0%

*not all funding secured – potential funding sources (*e.g.*, PCSRF, BPA, NRCS, Oregon Watershed Enhancement Board)

**Total implementation costs to date are $75 remaining costs are estimated at $425 For a total of $500 for construction, revegetation and protection fencing.

Literature Cited:

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