

## Final Report

### Project #09-1461, Tepee Creek Restoration - Phase 2 Construction

Submitted by David Lindley on 02/19/2014

Accepted by David Caudill on 02/20/2014

#### CONTACTS

**Primary Sponsor:** Yakama Nation

**Lead Entity:** Klickitat County LE

**Managing Agency:** Rec. and Conserv. Office

**Project Contact:** Will Conley  
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**Alt Project Contact:** David Lindley  
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**Billing Contact:** Jamie Brisbois  
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**RCO Grant Manager:** David Caudill  
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#### DESCRIPTION OF THE COMPLETED PROJECT

**Project Start Date:** 12/10/2009

**FundingEnd Date:** 03/01/2014

**RCO Closure Date:**

Tepee Creek, a tributary to White Creek in the Klickitat River subbasin, provides important spawning and rearing habitat for ESA-listed Middle Columbia River steelhead. The White Creek watershed as a whole is the most important steelhead spawning and rearing tributary watershed within the Klickitat subbasin, accounting for up to 40% of the observed steelhead spawning in the entire Klickitat subbasin in some years. Tepee Creek has accounted for up to 21% of the observed spawning in the Klickitat subbasin in recent years, however in most years it likely accounts for between 5 and 10%. Extensive reaches of Tepee Creek have become incised and are now intermittent in many places that anecdotal evidence suggests were once perennial. Flood plain connectivity was reestablished between river miles 4.5 to 5.3 with the ultimate goal of increasing floodplain storage, reducing severity of active channel hydraulic conditions during high flows, enhancing instream habitat, and potentially restoring baseflows to this and downstream reaches. In order to restore overbank flow frequency to the pre-disturbance floodplain, gravels were imported and pool-riffle sequences constructed. In addition, LWD jams were constructed along channel margins to maintain pool depth, provide cover, and restrict bank erosion. This approach has been successfully implemented previously as part the Tepee Creek - IXL Meadows Restoration Project (constructed in 2006 and 2007).

#### SITE LOCATION

**General Area of Project:** Tepee Creek, tributary of the Klickitat River

**Waterbodies:** Tepee Creek

**Cong District:** 04  
**Cong District 2012:** 04  
**County:** Yakima  
**HUC:** Klickitat  
**Leg District:** 15  
**Leg District 2012:** 14  
**Salmon Recov Reg 05:** Mid Columbia  
**Section:** 22  
**Township/Range:** T08NR14E  
**WAU:** Tepee Creek



#### Sponsor Clarifications:

Sponsor verified the above information is correct and complete.



Yakama Nation; Teepee Creek Restoration - Phase 2  
Construction (#09-1461), , 11/20/2013, Attachment #179173,  
Teepee II #2, Final

## PROJECT NARRATIVE

### Tepee Creek Restoration - Phase 2

#### Contracting Timeline:

- 12/10/2009 - Project Start Date
- 3/31/2013 - Original Project End Date
- 3/01/2014 - Revised Project End Date\*
- 11/07/13 - Project Completed

\*Requested time extension (12 months) approved by RCO based on extenuating circumstances (abnormally dry late-summer/fall followed by unseasonable wet fall/early winter)) that resulted in a condensed work window. The unusually dry fall led to the highest fire danger in September and early-October (IFPL level 4 = total shutdown of forest lands). Then, rain accumulation in the month of November exceeded the thirty year average (these factors delayed and temporarily suspended construction of Tepee Creek Phase 2). Significant progress was made in October and November 2012 but ultimately the project had to be completed in 2013 based upon concerns over long term project performance.

#### Project History and Elements

##### 2010

- Quantification of baseline physical habitat to inform fit-in-the-field construction
- Instream habitat assessments (pool depth, pool volume, pool forming factor, channel width, 3 of LWD jams, 3 of individual LWD pieces, etc)
- Riparian habitat conditions (species composition, % canopy cover, etc)
- Stream and air temperature
- Installed 12 shallow groundwater monitoring wells; 6 require periodic visits to take instantaneous measurements and 6 have continuous data collection (hourly) via INW PT2X pressure transducers with on-board datalogger

##### 2011

- Continued baseline inventory data collection:
- Quantification of physical habitat
- Measurements of shallow groundwater elevations
- Refined elements of the project design
- Continued planning and discussions regarding source of rock for riffle production

##### 2012

- Crafted specifications, solicited bids, selected contractor, and awarded subcontract for construction
- Contractor mobilized
- Completed rock production of streambed stone I and streambed stone II (materials for riffle construction)
- Large woody debris (LWD) collection - approx. 70% complete
- Construction of riffles within the upstream 1000' of project reach - 70% complete
- Reactivation of 1450 feet of historic channel
- Construction of LWD jams - approx. 60% complete
- Conducted erosion control and revegetation (native seed mix) on disturbed and constructed areas
- Finished winterizing the site and de-mobed for the season on 12/1/12

##### 2013

- Due to performance related issues with the original subcontractor a different subcontractor was selected to finish construction
- Contractor mobilized
- Additional logging completed including removal of conifer encroachment in aspen stand
- Construction of grade control structures at downstream extent of project
- Piling of unused slash at strategic locations for burning at later date
- Finished grading riffles constructed in 2012
- Crafted specifications, bid documents, solicited bids and selected contractor for livestock exclusion fencing (to be constructed Spring 2014)
- Filled approx. 1300 feet of contemporary channel downstream of reactivated historic channel to provide grade control
- Construction of 26 LWD jams
- Finish grading of floodplain surfaces
- Placement of LWD roughness elements

##### 2014

- Construction of 5300 feet of 4-strand barbed wire livestock exclusion fence around the perimeter of 13 acres (Spring)

#### Construction/Engineering Contractors

Design for riffle construction and in-stream habitat enhancement elements (LWD placement) were conducted jointly by Yakama Nation Fisheries staff hydrologist and a Professional Engineer (PE) from Inter-Fluve Inc. of Hood River, OR. Rock production, logging (LWD), and other construction activities were performed by C.I. Lovell Inc. of Harrah, WA (2012) and Tom Arnold Logging Inc. of White Salmon, WA (2013).

#### Project Outcomes

The primary outcome of the project was the restoration of floodplain connectivity for a .7 mile reach of Tepee Creek between river miles 4.5 and 5.2. As a result floodplain storage will increase, hydraulic severity during high flow events will be reduced, and there is the potential for perennial flow within the reach. Conifers have been removed from the meadow increasing the suitability of the valley bottom for native, medicinal, and traditional food plants. The quality (structure, cover, and residual depth) of 26 pools has been increased through the addition of LWD. Project elements to address in-stream conditions had two prongs: reactivate a relic (historic) channel (~2100 ft) and raise the streambed to create riffles in the current channel (~1500 ft). Methods employed:

- LWD was placed for transitions between the imported gravel and existing valley bottom surfaces. LWD will encourage local scour to maintain pool depths and volumes, control lateral erosion, and provide primary habitat.
- A roughened channel, on a steepened grade (approximately 3%) provides downstream control for the reach and transition between restored bed elevations and the somewhat incised channel downstream.
- Constructed riffles consist of imported gravel produced of a size that will not be mobile at <Q1.3 and has sufficient fine content to control

- porosity.
- Floodplain roughness elements (LWD) were placed to prevent avulsion around edges of the imported material or across smooth floodplain surfaces.
  - Well data collected in 2013 indicates that groundwater in areas treated in 2012 has risen

## AMENDMENTS

#	Type	Applied Date	Description
1	Time Extension	01/22/2013	The project period of 12/10/2009 to 03/31/2013 is extended to allow the contracting party until 03/01/2014 to complete the project.

## OVERALL PROJECT COSTS

Funding Formula:		Requested		Original		Final		
Salmon Federal Projects:		\$0.00	(0%)	\$382,610.00	(82%)	\$366,072.86	(82%)	
Salmon State Projects:		\$382,610.00	(82%)	\$0.00	(0%)	\$0.00	(0%)	
Sponsor Match:		\$85,800.00	(18%)	\$85,800.00	(18%)	\$82,091.56	(18%)	
Total:		\$468,410.00	(100%)	\$468,410.00	(100%)	\$448,164.42	(100%)	
Paid To Date:		\$366,072.86		Last Released Billing: 02/21/2014				
Remaining RCO Funds:		\$0.00		Pending Billing: No				
Advance Balance:		\$0.00		Match Bank:	\$20,245.58	Number of Billings: 3		
Admin Limit:		\$0.00		Admin Spent:	\$0.00			
A&E Limit:		\$81,575.86	22.25%	A&E Spent:	\$38,283.77	8.54%		
Billed Cost Summary:		Original Agreement		Expended		Non-Reimbursable		Total Billed
Restoration								
	Construction	\$383,149.00		\$366,072.86		\$99,759.06		\$465,831.92
	A&E	\$85,261.00				\$38,283.77		\$38,283.77
	Restoration Total	\$468,410.00		\$366,072.86		\$138,042.83		\$504,115.69
Total		\$468,410.00		\$366,072.86		\$138,042.83		\$504,115.69

<b>Project Cost Metrics:</b>	<b>Original Agreement</b>	<b>Final</b>
PCSRF Federal Funds:		\$366,072.86
State Funds:		
Other Federal Funding:		
Pending Billing - RCO Share Approved:		
Retainage - RCO amount retained:		\$0.00
Amount of other monetary funding:	\$85,800.00	\$39,629.00
Project identifier for the other monetary funding:	Unknown	1997-056-00
Source of other monetary funding:	Yakama Indian Nation	Project matching funds from the BPA sponsored Klickitat Watershed Enhancement Project (1997-056-00).
Value of Donated Unpaid Labor (Volunteers):	\$0.00	\$0.00
Source of Donated Un-paid labor contributions:	In-kind contributions from the Yakama Nation will come primarily in the form of professional services. The Klickitat Watershed Enhancement Project (KWEP) will provide planning, design, construction oversight, administration, and a portion of materia	All donated labor was paid skilled/professional.
Number of hours volunteers contributed to the project:		0
Describe how the value of the volunteers was determined:		N/A
Value of Donated Paid Labor:	\$80,000.00	\$75,766.00
Source of Donated Paid Contributions:		Paid professionals are employees of the Yakama Nation Fisheries Program funded through the BPA sponsored Klickitat Watershed Enhancement Project or paid subcontractors who provide construction oversight (1997-056-00).
Value of Other In-Kind Contributions:	\$0.00	\$22,648.00
Source of Other In-Kind Contributions:		The source of other in-kind contributions was the Yakama Nation sponsored and BPA funded Klickitat Watershed Enhancement Project (1997-056-00).
Description of other In-Kind contributions:	design work, admin, portion of the materials	GSA vehicle rental, Native plant seed mix, weed-free straw mulch, tractor, and survey equipment.

## PROJECT METRICS

	<b>Original Agreement</b>	<b>Final</b>
<b>Completion Date</b>		
Projected date of completion:	03/31/2013	11/07/2013
<b>Project Goals</b>		
Goals, purpose, and expected benefits:		The goal of the project is to improve instream morphology and habitat in Tepee Creek from RM 4.5-5.3. The objective of the project is to increase instream cover, spawning, and resting areas.

**WORKSITE #1: RM 4.5-5.3**

**Worksite Description:** Tepee Creek is highly incised through the project reach. This reach was formerly a wet meadow, though there has been considerable encroachment by ponderosa pine over the last 40 years. Banks are mostly unvegetated (or vegetated by mesic, shallow-rooted species) and eroding. The incision restricts floodplain access and has resulted in a higher-energy stream environment in which bed and bank erosion are common and habitat conditions are poor. Bed armoring is particularly evident at the upper and lower ends of the project reach where bed materials typically consists of a packed lag of cobbles and boulders. These clasts have an angularity that suggests they are weathering in place and are rarely, if ever, transported. The middle portion of the reach has some free-formed riffles composed of smaller alluvial gravels (modeling of similar particle sizes and hydraulic geometry of the TepeeXL reach indicated movement at flows less than the average annual flood). Site investigation suggests that the middle portion of the reach avulsed into its present alignment. A partially buried and undersized timber bridge exists near the head of the historic channel alignment suggesting that a valley bottom road captured the stream. Based on field observations, the avulsed subreach is incised 3 to 5 feet within its former flood prone surface. The downstream subreach is incised 1.5' to 2' while incision of the upstream subreach diminishes from 4' to 5' at the diversion point to about 1.5' at the upstream end.

Perennial pools have been observed in one year (2006), though the mean residual pool depth is only 0.39' with a maximum of 0.93' (n=19). In most years this reach dries up from July through October or November. Historic aerial photos suggest the presence of late-summer water.

**Driving Directions:** From State Highway 14 at Lyle, travel 16 miles NE on State Highway 142 to Wahkiacus. Turn right onto Horseshoe Bend Rd. Cross Klickitat River bridge, then turn left into driveway to YN Fisheries Klickitat Field Office. Proceed into Closed Area of reservation with YN Fisheries staff (at least 1 week advance notice and special entry permits required).

**Coordinates for Worksite Directions - Latitude:** 0.00 **Longitude:** 0.00

**Sponsor Clarifications:**

Sponsor verified the above information is correct and complete.

**WORKSITE #1 COSTS**

Worksite Billed Cost:	Estimated	Expended	Non-Reimbursable	Total Billed
A&E	\$85,261.00		\$38,283.77	\$38,283.77
Construction		\$366,072.86	\$99,759.06	\$465,831.92
Worksite Total	\$85,261.00	\$366,072.86	\$138,042.83	\$504,115.69

Worksite Costs by Category:	Original Agreement	Final
Fish Passage Funding:	\$0.00	
Instream Habitat Funding:	\$468,410.00	\$449,497.00
Riparian Habitat Funding:	\$6,000.00	\$13,670.00
Permits Funding:		\$2,665.00
Architectural & Engineering Funding:		\$38,284.00

**WORKSITE #1 METRICS**

	Original Agreement	Final
Targeted salmonid ESU/DPS:	Steelhead-Middle Columbia River DPS	Chinook Salmon-Middle Columbia River spring-run ESU, Steelhead-Middle Columbia River DPS
Targeted species (non-ESU species):		Rainbow
Miles Of Stream Treated/Protected:	0.80	0.70
Project Identified In a Plan or Watershed Assessment:	Salmon Recovery Strategy for the Klickitat Lead Entity, Northwest Power and Conservation Council's Subbasin Plan for the Klickitat River.	Salmon Recovery Strategy for the Klickitat Lead Entity, Northwest Power and Conservation Council's Subbasin Plan for the Klickitat River.
Type Of Monitoring:	Implementation Monitoring	Implementation Monitoring
Monitoring Location:	Onsite	Onsite
<b>Fish Passage Improvement</b>		
Type Of Barrier:	Ford	
Miles Of Stream Made Accessible:	0.00	
Square Miles Of streambed made accessible:	0.0	
<b>Fish passage blockages removed or altered</b>		
Total cost for Fish passage blockages removed or altered:		

Number of Blockages/Impediments/Barriers Removed/Altered:	0	
Average stream width, in feet, upstream of barrier:	0	
Change in water flow (fish passage project)(cu feet):		
<b>Instream Habitat Project</b>		
Total Miles Of Instream Habitat Treated:	0.80	0.70
<b>Channel reconfiguration and connectivity</b>		
Total cost for Channel reconfiguration and connectivity:		
Type of change to channel configuration and connectivity:	Channel Bed Restored, Creation of Instream Pools	Channel Bed Restored, Creation of Instream Pools
Miles of Stream Treated for channel reconfiguration and connectivity:	0.80	0.70
Miles of Off-Channel Stream Created:	0.00	0.03
Acres Of Channel/Off-Channel Connected Or Added:	0.0	1.0
Instream Pools Created/Added:	15	26
		<i>Pools existed pre-project but were primarily of low quality (very shallow residual pool depths and had little to no cover). Project elements enhanced these existing pools by adding cover and roughness elements to generate scour and maintain depth through time.</i>
<b>Channel structure placement</b>		
Total cost for Channel structure placement:		
Material Used For Channel Structure:	Individual Logs (Anchored), Logs Fastened Together (Logjam), Rocks/Boulders (Unanchored), Stumps With Roots Attached (Rootwads)	Individual Logs (Anchored)
Miles of Stream Treated for channel structure placement:	0.80	0.70
Acres Of Streambed Treated for channel structure placement:	0.3	0.4
Pools Created through channel structure placement:	15	26
		<i>Pools existed pre-project but were primarily of low quality (very shallow residual pool depths and had little to no cover). Project elements enhanced these existing pools by adding cover and roughness elements to generate scour and maintain depth through time.</i>
Yards Of Average Stream-Width At Mid-Point Of Worksite:	25	6
Number of structures placed in channel:	15	26
		<i>Pools existed pre-project but were primarily of low quality (very shallow residual pool depths and had little to no cover). Project elements (LWD jams and single pieces) enhanced these existing pools by adding cover and roughness elements to generate scour and maintain depth through time.</i>
<b>Plant removal/control</b>		
Total cost for Plant removal/control:		
Miles of Stream Treated for plant removal/control:	1.00	1.00
Acres of Streambed Treated for plant removal/control:	0.0	0.0

Species Of Plants Removed/Controlled:	Noxious weeds	Noxious weeds - primarily knapweed and non-native thistle
<b>Streambank stabilization</b>		
Total cost for Streambank stabilization :		
Material Used For Streambank Stabilization:	Logs	Logs
Miles of Streambank Stabilized:	0.80	0.70
<b>Riparian Habitat Project</b>		
Total Riparian Miles Streambank Treated:	0.80	0.70
Total Riparian Acres Treated:	1.0	1.2
<b>Riparian exclusion</b>		
Total cost for Livestock exclusion:		
Miles of Streambank Protected from livestock (other than fencing):	1.60	1.40
Acres of Riparian Area That Had Livestock Removed:	4.0	13.0
<b>General restoration activities</b>		
<b>Other restoration activities</b>		
Total cost for Other restoration activities:		
Describe the other restoration activities:	unknown	
<b>Permits</b>		
<b>Obtain permits</b>		
Total cost for Obtain permits:		
Number of permits required for implementation of project:		3
<b>Architectural &amp; Engineering</b>		
<b>Architectural &amp; Engineering (A&amp;E)</b>		
Did A&E costs exceed billed amount (Yes/No):		No

## PROPERTY DESCRIPTION (Tepee Creek)

**Activity:** Restoration

### Control & Tenure:

**Instrument Type:** Sponsor owned property

**Timing:** Existing

**Term Length:** Perpetuity **# yrs:**

**Expiration Date:**

**Landowner Type:** Tribal

**Note:**

### Sponsor Clarifications:

Sponsor verified the above information is correct and complete.

### Sponsor Clarifications:

## SPONSOR CERTIFICATION

☒ I certify that this project has been completed in accordance with the project agreement.

☒ I certify that, to the best of my knowledge, the information in the Final Report is true and correct.

Submitted by David Lindley on 02/19/2014