12e. Fish Passage: Barrier Evaluation Form

Location Information

GPS Location: In decimal degrees using 9 decimal places. State Plane South, WGS84	Latitude: **46.153129300**	Longitude: **121.035683200**

¼ Section: **NE**	Section: **27**	Township: **8N**	Range: **14E** East
County: **Yakima**		Parcel: **n/a**	
Stream Name: **E.F. Tepee Creek (175 Rd crossing)**		WRIA#: **30**	
Tributary To: **Tepee Creek**		Stream #:	

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 (advance notice and special entry permits required).**

Landowner Information

Landowner Name: **Confederated Tribes and Bands of the Yakama Nation**			Landowner Agent: **Mel Sampson**		
Mailing Address: **P.O. Box 151**			Mailing Address: **same**		
City: **Toppenish**	State: **WA**	Zip: **98948**	City:	State:	Zip:
Phone: **509-865-6262**	Fax: **509-865-6293**		Phone:	Fax:	
Cell:	Email:		Cell:	Email:	

Investigator

Investigator Name: **Will Conley**		Affiliation: **Yakama Nation Fisheries Program**	
Mailing Address: **P.O. Box 215**			
City: **Klickitat**		State: **WA**	Zip: **98628**
Phone: **509-369-3183**	Fax: **509-369-3194**	Cell:	Email: **willfish@gorge.net**

Barrier Measurements (in meters)

Is the stream fish bearing? X Yes ☐ No ☐ Unknown Species, if known ___*O. mykiss*_____
Is this culvert a fish passage barrier? X Yes ☐ No ☐ Unknown ☐ Level B needed

Level A analysis completed: **X** Yes No If yes, attach. If no, complete below:

Shape: **Circular**	Material: **CM**	Span/Diam: **1.8**	Rise: **1.8**	Water depth in culvert: **0.13**	Length: **20.4**

Streambed material throughout culvert: Yes **X** No Unk	Toe width (outside of culvert influence): **4.3**
Outfall drop: **0.18**	Culvert slope(%): **1.4**
How did you calculate culvert slope? **X** Handheld laser level Transit Other (describe)	
Road width: **11.4**	Road fill height over top of culvert (D.S. end): **1.1**

Velocity: **not measured**	Apron: **X** None Upstream Downstream Both
Problem with culvert: **Slope**	Percent Passability: 0% **X** 33% 67% 100%
Comments: **original survey completed by YNFP technicians in July 2000; passable to most anadromous adults under most flows; not passable to most juveniles under most flows**	
Attachments	
Photos Level A Assessment Site Map Other Additional Comments	

Instructions for Developing the Barrier Evaluation Form

Purpose of Form: Barrier Evaluation Form
Provides the basic information for identifying the location, landowner, evaluator contact information, and the barrier measurements. The three key pieces of information are: 1) Is the stream fish bearing (anadromous or resident) 2) Is the structure a fish passage barrier (determined by the Washington State fish passage criteria) and 3) Landowner identification. The evaluator should have professional training to determine if the structure is a barrier and if the stream is fish bearing.

How to fill out this form
Following are definitions, descriptions, and standards for information to be included in the Barrier Evaluation Form. This form has five sections, which describe location, landowner, investigator, barrier measurements, and attachments.

General Location Information
This section describes the barrier location including GPS coordinates in decimal degrees using state plane coordinates, Washington South NAD27, stream name, and detailed driving directions to the site.

Landowner Information
This section provides landowner contact information. If the landowner is working through a private consultant or other representative, please provide this contact information.

Investigator Information
Include the contact information of the person preparing the evaluation and making the initial barrier determination.

Barrier Measurements
Level A Analysis – This refers to the Washington State Department of Fish & Wildlife protocol described in ***Fish Passage Barrier and Surface Water Diversion Screening and Assessment and Prioritization Manual***, WDFW, August 2000.

Culvert Shape – Describe culvert shape (circular, rectangular, arch, elliptical, bottomless, or other).

Culvert Material – Describe culvert material (corrugated metal, concrete, smooth plastic or metal).

Culvert Size -

- Diameter: indicate diameter for circular culverts.
- Rise: indicate the dimension from culvert invert to crown of non-circular culverts.
- Span: indicate the maximum width of culvert for non-circular culverts.

Culvert Length - Indicate culvert length including aprons, if present.

Outfall Drop – Measured water surface to water surface.

Culvert Slope - Use standard survey methods to determine the horizontal length of the culvert including aprons, and the difference between its invert elevations expressed in a percent slope. If slope varies within culvert, provide the maximum reading. Describe the slope from the surveyed profile. Attach profile if available. Indicate which tool was used in determining culvert slope (Laser level, transit, other). To calculate % slope of the culvert use the following formula: (Upstream Invert Elevation – Downstream Invert Elevation / Culvert Length) * 100.

Stream Bed Material Within Culvert - Indicate whether streambed material is present inside the culvert.

Toe Width – The average width of the streambed (toe width). Measured outside the influence of the culvert. Used in conjunction with the culvert span to calculate Culvert Span to Streambed Width Ratio.

Road Width – Measurement should include shoulders.

Road Fill - Measure height of material from top of culvert to top of fill at downstream end.

Velocity – Field estimate of water velocity through the culvert in meters per second. Use flow meter or three-chip method. Informational. Optional.

Percent Passability – Based on professional judgment. Please discuss details in comments if a partial barrier.

Attachments. To aid in the evaluation and understanding of the barrier, please attach labeled photographs of the culvert site, including the culvert outfall and any other representative locations, with scale provided. Also attach a 1:12,000 topographic map of the project site, and the Level A assessment, and culvert survey profile, if available.

Comments: Provide any additional information that should be considered such as: culvert condition, fish use/observation, and site conditions.

12f. Fish Passage: Expanded Barrier Evaluation Form

Project Name: **Tepee Creek Fish Passage Restoration** Sponsor: **Yakama Nation**

Part 1. Background Data Assessment

Attachments:

Barrier Evaluation Form for project site

Map – Basin area map showing fish use, other known barriers, gradient and basin area. (WDFW generated)

Surrogate PI #_____ (attach) PI# _____ (attach if available)

Watershed Information

Basin area: _____ Amount of habitat which would be made available upstream: _____(m)

Has a barrier inventory been conducted in the watershed? Yes **X** No If yes, list source and date completed:

The pipe proposed crossing is the only one that has been surveyed in the E.F. Tepee Cr. watershed.

Are there downstream barriers? Yes **X** No If yes, describe. List source; use separate sheet if necessary.

Are there upstream barriers? **X** Yes No If yes, describe. List source; use separate sheet if necessary.

A crossing 1.1 miles upstream is likely a partial barrier, but has not been surveyed.

Has the stream been walked? **X** Yes No If yes, information source:

Walked by Will Conley in 2002 from 1.1 miles upstream to 0.2 miles downstream.

Fish Species/Use

Mapped Species: bull trout/Dolly pink Chinook **X** resident trout chum sockeye coho **?** cutthroat steelhead

Information source: **YNFP spawning and habitat surveys and personal observation.**

Current fish use downstream and upstream from barrier (include source of information):

YNFP spawning and habitat surveys. Juvenile and resident *O. mykiss* are present upstream and downstream of culvert. Adult steelhead have not been observed upstream of the crossing, but use of upstream reaches by steelhead and their progeny is assumed.

What species and life history stages might use the habitat made accessible by the project?:

juvenile *O. mykiss.*

Provide a qualitative description of habitat that will be made available by barrier correction, if available. Include source of information:

Upstream habitat is unconfined, low gradient (<1.5%), gravel-bed, with excellent LWD frequency (>500 pieces over 10cm diameter per mile). Riparian cover is good and is primarily shrub-dominated. Floodplain connectivity is good and the channel is horizontally and vertically stable. Streamflow is perennial. Baseflows are a product of headwater wetlands and seepflow. Pool frequency is good, though pool quality is marginal. Fine sediment is excessive.

Part 2. Site Visit Documentation & Correction Alternatives

Site Information

Date of visit: **8/01, 5/02, 11/03, 4/04**	Recent precipitation: **none (except 11/03 – recent snow)**

Photographs attached of barrier inlet and outfall, upstream habitat, downstream habitat, and road.

Bankfull width (outside of influence from the culvert): **3.9 m**

Stream flow: **X** Perennial Intermittent Unknown Source of information: **personal observation**

Flow conditions: low **X** moderate high	Utilities crossing: Yes **X** No Unknown

Road description/condition (county road, private driveway, access road):

The 175 Road is a connector for two arterials. The surface is composed of native materials, grades are gentle, and it tends to follow valley bottoms. It is occasionally graded, though rutting is locally present.

Fish observed on site: **yes, fry and 1+ aged *O. mykiss*.**

Upstream Habitat/Channel

Approximate channel slope: _____**1.6**__% (outside of culvert influence)

Dominant substrate: sand (<.20") **X** gravel (.20"–3") cobble (3"-12") boulder (>12") bedrock

Additional upstream information, habitat description, other site conditions or concerns:

There is a water-withdrawal site (for road dust abatement) roughly 40' upstream of inlet.

Downstream Habitat/Channel

Approximate channel slope:_____**2.8**__% (outside of culvert influence)

Additional downstream information, habitat description, other site conditions or concerns:

Confined; gravel/cobble substrate; LWD-controlled. The outlet pool control has clearly been constructed, is over-steepened, and probably impedes juvenile passage as well.

Correction Alternatives

Alternatives to consider – *Using your best professional judgment provide one, two, or even three alternatives to consider. Please recognize landowner desires or concerns, potential sponsor and their capabilities, and state fish passage requirements. See example on the following pages.*

Alternative 1 – **Abandonment is not an option since the 175 Road is a major connector in Cedar Valley.**

Alternative 2 – **Build downstream grade control to backwater existing pipes in situ. Because the crossing is already undersized, decreasing slope through the crossing would further decrease conveyance and probably cause upstream stability problems. The profile survey indicates that the existing outlet pool control is already elevated 2' above projected grade of downstream tailouts/steps. Further increasing the elevation would increase the control as a passage impediment.**

Alternative 3 – **Replace crossing using no-slope option. Crossing occurs at a natural geomorphic grade-break. Would result in over-building the crossing and unnecessary expense.**

Alternative 4 – **Replace crossing using stream-simulation option. Install pipe-arch, countersunk, at downstream grade. Use downstream bed composition plus safety factor to provide stability and reduce risk of triggering upstream incision.**

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General recommendation *– Provide a one or two paragraph recommendation for this site. Note any special concerns discovered during the site visit. In some situations a preliminary design may have already been completed or design concepts generated. If this is the case please include this information.*

The E.F. Tepee Creek appears to have stable morphology. Wetlands and comparatively low relief of the contributing watershed as well as high LWD-loading likely moderate flows. Grade controls have been constructed upstream and downstream of the crossing to facilitate pumping for dust abatement and will need to be re-worked.

Preliminary survey data indicates that the crossing occurs at a geomorphic break is profile gradient. This will require some basic modeling and an iterative design process to ensure that fish passage, conveyance, and stability objectives are maintained. Existing alignment and position should be adequate.

Rough cost estimate* - The purpose of the rough cost estimate is to provide a project specific estimate to establish a funding level.

Culvert Replacement – Alternative #_4__

Permitting/Oversight:	$ 1,800
Engineering:	$ 4,500
Materials:	$ 35,670
Construction:	$ 26,950
Total	**$ 68,920**

* This estimate is provided as a rough approximation of project costs; actual costs will vary depending on specifications identified during project design.

Notes: