14. Evaluation Proposal
In-Stream Habitat

Applicants must respond to the following items. The local citizen and technical advisory groups will use the evaluation proposal to evaluate your project. Applicants should contact their lead entity for additional information that may be required.

Up to eight pages may be submitted for each project evaluation proposal.

(SUBMIT INFORMATION VIA PRISM ATTACHMENT PROCESS OR ON PAPER)

I. BACKGROUND

Describe the fish resources, the current habitat conditions, and other current and historic factors important to understanding this project. Be specific—avoid general statements. When possible, document your sources of information by citing specific studies and reports.

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 likely the most important spawning and rearing tributary watershed within the Klickitat subbasin. In recent years, the White Creek watershed has accounted for up to 40% of the observed steelhead spawning in the entire Klickitat subbasin. 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% (Sampson and Evenson 2003, YN Fisheries Program 2002-2004 spawner survey data).

The White Creek watershed is 138 square miles in area. Elevations range from 1140 to 5100 ft.; most of the watershed lies between 2500 and 3300 ft. in elevation. Average annual precipitation is between 20 and 29 in., with roughly half falling as snow. Current habitat conditions in Tepee Creek and White Creek reflect past riparian timber harvest and road construction throughout the watershed; instream large woody debris (LWD) levels are low in some reaches and base flows are very low to non-existent in many reaches. Changes in channel morphology are related to livestock grazing, road interactions, and in some locations, historic removal of LWD. Road inventory and analysis of watershed hydrology in the upper Tepee Creek watershed indicated a 7.3% increase in peak discharge for a 2.5-year storm and a 4.8% increase for a 100-year storm (nhc 2003). Phase 1 of road maintenance and modifications to restore drainage patterns is anticipated to occur this fall (2005).

Currently, most of the incised reaches in the White Creek watershed (including the project reach) dry up from July through October. Anecdotal accounts from the 1960s suggest that at least some of these reaches were historically perennial. Many of the same reaches showing signs of bed armoring are also characterized by a simplified morphology with low pool frequencies, rectangular, canal-like cross sections, and an absence of large

woody debris (LWD). Impacts from grazing (in the form of altered riparian vegetation, bank erosion, and channel incision) are also evident in several meadow reaches within the watershed. Anecdotal evidence, along with watershed size, elevation, and precipitation, suggest that more reaches had perennial flow historically.

The watershed lies within the Yakama Reservation forest; commercial timber harvest has occurred since the 1950's in this area. Current and future land uses also include timber harvest, although riparian management areas (as laid out in the Yakama Nation/Bureau of Indian Affairs Forest Management Plan) will limit timber harvest in streamside areas.

Because of the very low to nonexistent base flow conditions at many spawning areas, post-emergence movement by steelhead fry and juveniles to summer refugia is critical to their survival. Summer refugia (in the form of perennially-flowing stream reaches or remnant pools in otherwise dry reaches) is highly limited in Tepee Creek and is necessary for successful rearing within this watershed. Upper Tepee Creek and East Fork Tepee Creek, due to groundwater inputs or intact wetlands that act as reservoirs, provide some of this necessary perennial habitat. Where perennial pool habitat is present, survival appears to be good, particularly for 0+ and 1+ aged fish. Currently, fry observed migrating as a result of summer freshets are often stranded in areas that dry up. Additional refugia is critical for increased survival.

Several road culverts in the watershed act as partial fish barriers (primarily to juvenile and small resident salmonids). Because of the very low to nonexistent base flow conditions at many spawning areas, post-emergence movement by steelhead fry and juveniles is critical to their survival. Funding to replace all three crossings was received (Tepee Creek Fish Passage Restoration) during the Fifth Round (2004) SRFB process. The project reach of the current proposal is immediately downstream of the "Tepee Cr./IXL Crossing Rd. culvert" site funded in the Fifth Round. Sequencing will be coordinated so that the proposed stream/meadow restoration occurs prior to culvert replacement to avoid upstream migration of incision.

II. PROBLEM STATEMENT

State the nature, source, and extent of the problem that this project will address and help solve. Address the primary causes of the problem, not just the symptoms. When possible, document your sources of information by citing specific studies and reports.

Tepee Creek is highly incised through the project reach with high, unvegetated, eroding banks. 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 through 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.

Aerial photo interpretation suggests that the channel has incised within a historic channel alignment. Based on stage discharge relationships identified using a HEC-RAS model of the estimated 2-year return flow, Tepee Creek is entrenched 3 to 4 feet within its former flood prone surface. Indeed, the modeled 5-year flood is contained within the channel margins and disconnected from the floodplain throughout the study area; and upstream of station 6+00, even the 10-year flood is within banks.

A pebble count taken from a bar within the active channel had a D50 particle size of 0.6 inches and a D96 particle size of 1.5 inches. These gravels become fairly mobile when channel shear exceeds 0.55 pound per square foot (psf). Bed shear occurring during a 2-year flood is greater than 0.55 psf at several locations along the study reach. In fact, these gravels become actively mobile at relatively small discharges within the study area. Incipient motion for the D50 and D95 occurs at discharges of 14 and 28 cfs respectively, which are substantially smaller than the estimated 2-year return interval discharge of 112.8 cfs. The shear stress numbers calculated from the hydraulic model show that channel sediment transport characteristics and channel geometry are substantially uncorrelated. That is to say that one would expect sediment to become mobile near or slightly less than bankfull or effective flow conditions. However, this does not seem to be the case since the existing sampled sediment would be mobile at relatively small flood events.

III. PROJECT OBJECTIVES

List the project's objectives. Objectives are statements of specific outcomes that typically can be measured or quantified over time. Objectives are more specific than goals (visions of the desired future condition) and less specific than tasks (the specific steps that would be taken to accomplish each of the objectives). For example, the objectives of an in-stream habitat project might be to increase channel complexity, to provide cover, to capture sediment, to reduce erosion, to create pools, and to reconnect side-channels or floodplain. Explain how achieving the objectives will address and help solve the problem identified in II above.

The overall project goal is to restore floodplain connectivity and channel planform for a 1700' reach immediately downstream of the IXL road crossing (site 1110026, Figure 9). This would have the effect of increasing floodplain storage, reducing severity of active channel hydraulic conditions during high flows, and potentially restoring low flows to this and downstream reaches. The preferred conceptual approach is to restore channel grade and elevation using planform adjustments and natural bedforms.

IV. PROJECT APPROACH

- Briefly describe the geographic setting of the project (marine nearshore, estuary, main stem, tributary, etc) and the life cycle stage(s) affected.

The project location is on Tepee Creek and its main tributary (East Fork Tepee Creek) in the upper portion of the White Creek watershed, a tributary to the Klickitat River. Tepee Creek provides critical spawning and rearing habitat for ESA-listed Middle Columbia River steelhead. The study area comprises a 1750-foot long reach of Tepee Creek through a meadow immediately downstream of the IXL Road crossing, at stream mile 6.2. The project area exhibits channel incision, limited riparian vegetation, and very low base flows (frequent seasonal drying). The study area is located at 2960' elevation and has a contributing drainage area of 8.5 mi^2 which is forested (predominantly dominated by ponderosa pine) with scattered meadows in valley bottoms. The study reach was identified as an assessment priority by YNFP specialists based on observed steelhead use, departure from historic condition, and perceived feasibility.

During portions of the year with continuous surface flow, high numbers of adult Mid-Columbia River steelhead are regularly observed in the vicinity of the project, with some spawning occurring upstream of the project sites. Juvenile and adult steelhead and resident rainbow trout will be the primary beneficiaries of this project, as it will improve spawning and rearing habitat.

- List the individuals and methods used to identify the project and its location.

The project reach was identified by YNFP specialists in 2002. Monitoring conducted from 2003-2005 have indicated the importance of the area to mid-Columbia Steelhead. The presence of perennial refugia (within an unincised reach) less than ¼ mile upstream of the project reach indicate that a restoration of bed elevation and overbank frequency could likely extend the flow duration.

During September 2004, InterFluve was contracted by the YNFP to perform a topographic survey of existing conditions and geometry of the study reach. Information from the survey was used in conjunction with flood magnitude estimates provided by regional regression equations to develop a HEC-RAS hydraulic model. The hydraulic model is instrumental in identifying areas of high stream power, determining the level of channel incision, and creating a base to develop site remedies.

- Describe the consequences of not conducting this project at this time. For acquisition projects, also describe the current level and imminence of risk to habitat.

The primary consequence of not conducting the project at this time will be persistence of a lack of summer refugia. Surface flow duration will continue to be truncated and pool quantity and quality will remain poor.

In many areas, exposed bedrock or large colluvium appears to be refusing further incision, so the rate of vertical degradation may decline in the lower two thirds of the reach (station 3+50 to 12+50) where the average bedslope is a mild 0.0065 ft/ft. However, the slope between stations 12+50 and 15+00

is 0.014 ft/ft. This localized steepness may indicate a headcut, so further incision is expected headward of station 12+50.

Throughout the study area, the streambed has degraded to a depth well below the rooting zone of the native vegetation, so the banks and bed are mostly devoid of perennial vegetation. As the soil particles composing the existing banks are silt and clay, cohesion appears to be the dominant soil-stabilizing factor. It is expected that physical processes like wet/dry and freeze/thaw cycles in concert with abrasion will lead to long-term lateral erosion of banks. Biological factors such as cattle grazing can greatly accelerate the lateral expansion rates. Therefore, even if vertical degradation decelerates, the banks at the study site are expected to continue to laterally erode and eventually develop a new floodprone surface at an elevation 3 to 4 feet lower than the pre-disturbance surface.

- If project includes an acquisition element, then briefly describe the extent to which habitat to be acquired is currently fully functioning and/or needs restoration; the timeframe in which responses or improvements in habitat functioning are expected; and the continuity of the proposed acquisition with other protected or functioning habitat in the reach

n/a

- Describe the project design and how it will be implemented.

The strategy to improve conditions at Tepee Creek would raise or fill the channel to the same elevation that existed before disturbance and incision. This strategy provides a greater potential benefit than other alternatives as it creates conditions that would store water and increase hydroperiods over the valley width compared to a relatively narrow segment within any excavation project (see other alternatives section, below). A project that fills the existing 1700 feet of Tepee Creek 3 to 4 feet to restore floodplain connectivity was determined to be feasible. Project design templates will be configured such that the channel will convey the existing sediment supply, while mitigating the tendency to degrade. To restore former flood prone areas and still have a natural stream channel, treatment would comprise filling the existing channel in combination with channel cross-sectional area adjustments and possible planform modifications. The primary design goal will be to configure the channel such that more frequent out-of-bank flooding will occur, which will improve conditions for fish while promoting better wetland habitats and water storage later in the year. Planform modifications will be based on design slope and hydraulic geometry. Hydraulic geometry, which includes bankfull width, will be determined following a more complete analysis of upstream analog cross-sections and slopes, regional hydraulic geometry relationships, and the existing hydraulic model used in this analysis.

Transitions between the imported gravel and existing valley bottom surfaces

will be constructed primarily using large wood. Channel edges (banks) constructed with wood will be less expensive and more erosion resistant than if fabric were used. If cost efficiencies can be achieved elsewhere in the budget, soil protected by biodegradable erosion control fabric may also be incorporated into the project. Use of fabric-encapsulated banks will facilitate bank deformability and result in greater habitat diversity through the reach.

- Explain how the project's cost estimates were determined.

Assumes the use of a Hitachi 200 LC excavator or similar. Seeding assumes the use of native seed at a cost of $50 per 1000 square feet of coverage. Gravel fill volume estimates were based on average of surveyed cross sections extrapolated through the site area. Channel work assumes using either one D4 or D5 bulldozer and excavator @ a combined cost of $250/Hour. Assumes a 10 hour machine work day. Wood volume estimates are based on 35 logs per log truck load. Each log truck carries approximately 5000 Board Feet. Assumes 35 logs between 8" and 20" dbh per log truck. Average Cost delivered and decked is estimated at $600 per 1000 board feet. Channel work production of 100 feet per day is an estimate based on field observations of the site location, cross section data and internal discussions with InterFluve staff. Assumes that imported gravel will come from an existing pit within 10-miles of the project site.

- Describe other approaches and opportunities that were considered to achieve the project's objectives.

Other alternatives considered include:
1) raise or fill the channel to the same elevation that existed before disturbance and incision with fabric lift boundaries. This strategy is similar to the proposed alternative but depends on geotextile fabric along the channel boundaries. Like the proposed alternative it provides a greater potential benefit than alternatives 2 and 3, and is feasible; however, it is the most expensive.

2) excavating a new valley bottom floodprone area at an elevation 3 to 4 feet below existing top of bank with LWD channel boundaries. Although much narrower, the excavated area would function in a similar way the historic Tepee Creek valley bottom did before incision. The amount of valley bottom wetland habitat and storage would be less but an improvement over existing conditions. Some modification to the longitudinal profile may be needed. Channel boundaries would be constructed after the banks are pulled back approximately 30 feet along the 1700-foot project reach. This was the least expensive alternative.

3) excavating a new valley bottom floodprone area at an elevation 3 to 4 feet below existing top of bank with fabric lift boundaries. Similar to alternative #2 but channel margins are constructed primarily with geotextile fabric. This alternative is more expensive than both the proposed alternative and alternative # 2.

Costs could be reduced for any of the alternatives if only the riffles are filled leaving over-sized pools that would fill in over time. This approach is not desirable because of the bedload-limited nature of Tepee Creek. If it were implemented, reaches downstream of the project reach would likely be even more starved of bedload-sized alluvium until pools within the reach filled in and reached equilibrium.

- List project partners. When appropriate, include a letter from each participating partner briefly outlining its role and contribution to the project. (See Section 15 for a sample format.)

There will not be any project partners *per se*. Other YN Programs will be consulted via the Interdisciplinary Team process. Matching contributions will come in the form of materials donated in-kind by the Yakama Nation. Services provided in-kind by the YN Fisheries Program will be funded by the Bonneville Power Administration.

- List all landowner names. Include a signed form from each landowner acknowledging their property is proposed for SRFB funding consideration. (See Section 16 for a sample format.)

The Confederated Tribes and Bands of the Yakama Nation.

- Describe the long-term stewardship and maintenance obligations of the project. Projects should be consistent with habitat forming processes in the watershed, requiring reduced up-keep and long-term maintenance over time.

Fish use, channel conditions, and vegetation survival will be monitored by the Yakama Nation Fisheries Program, which has an active and ongoing monitoring and habitat enhancement program. Grazing-related monitoring will be coordinated with the BIA Range program.

- When known, identify the staff, consultants, and subcontractors that will be designing and implementing the project, including their names, qualifications, roles and responsibilities. If not yet known, describe the selection process.

Will Conley, Watershed Restoration Specialist, will be responsible for project design oversight, implementation, and administration. Will has been assessing, designing, and supervising restoration projects for the YN Fisheries Program in the Klickitat subbasin for 5 years. He has a M.S. in Water Resources (Soil Science minor), a B.S. in Wildlife Ecology, and 9 years of prior field experience.

InterFluve, Inc. conducted the feasibility study and is currently on contract to develop a 30% design. Inter-Fluve specializes in the design, construction, and restoration of rivers, streams, lakes, ponds and wetlands. Since 1983, they have been integrating natural science and engineering to provide environmentally sound solutions to river restoration. As a result of their experience and designs that emphasize minimal disturbance and rapid recovery of aesthetics, geomorphic function and ecologic complexity, InterFluve has won a number of national awards.

Construction sub-contracts will be put out for bid either on a lump-sum or hourly basis and awarded based on experience and price.

V. TASKS AND TIME SCHEDULE

List and describe the major tasks and time schedule you will use to complete the project. Describe your experience managing this type of project.

Tasks	Date
30% design complete	**October 2005**
Submit permit applications	**December 2005**
Permits received	**April 2005**
Bid and award crushing sub-contract	**April 2006**
Crushing started and completed	**June 2006**
Bid and award construction sub-contract	**June 2006**
Start construction	**July 2006**
Complete construction	**August 2006**
Monitor re-vegetation success	**September 2006-November 2007**
Re-plant (if necessary)	**April 2007**

VI. CONSTRAINTS AND UNCERTAINTIES

State any known constraints or uncertainties that may hinder successful completion of the project. Identify any possible problems, delays, or unanticipated expenses associated with project implementation. Explain how you will address these constraints.

Based on the feasibility assessment, design concerns revolve more around degradational risk than sediment conveyance risk. Some hydrologic discrepancies exist and will be resolved during design work when developing a new threshold channel. A design hydrology that is as close to actual conditions as possible will be chosen before hydraulic geometry work is accomplished. Once this is completed the proposed channel components will be designed to allow some threshold movement and deformation. Floodplain prescriptions will be applied to prevent avulsing around edges of the imported material or across smoother floodplain surfaces.