

2012 Project Proposal for Planning Project: 12-1306 Gold Creek Habitat Assessment + Conceptual Design

1. Project Overview

A. Describe the primary goal and objectives of this project.

Primary Goal: Investigate the causes of seasonal dewatering in Gold Creek and the associated impacts to aquatic species, including spatial constraints and habitat degradation. Produce conceptual designs for restoration actions that employ natural fluvial processes to improve spawning, rearing and migratory conditions for the Gold Creek bull trout population.

Objectives:

- Synthesize historic and current habitat studies' data and conclusions into a reach scale assessment of existing conditions in Gold Creek.
- Develop a conceptual model to explain physical processes affecting dewatering and related habitat concerns for bull trout.
- Produce initial designs for habitat restoration actions that employ the natural geomorphic and hydrological processes available in the project reach.

B. Describe the location of the project in the watershed, including the name of the water body, upper and lower extent of the project, and whether the project occurs in the near-shore, estuary, main stem, tributary

The project location is in the Gold Creek basin, a head waters tributary to the upper Yakima River. Gold Creek originates in the Alpine Lakes Wilderness and then flows into Lake Keechelus near Snoqualmie Pass in northern Kittitas County (WRIA 39). The habitat assessment study area extends from the confluence of Gold Creek and the lake at low pool (late summer) to the barrier falls, approximately 6.8 miles upstream. .

C. Provide an overview of current project site conditions and the nature, source, and extent of the salmon recovery problem(s) or gap in knowledge that the project will address. Include current and historic factors important to understanding the need for this project.

Gold Creek is a source of cold, clean well oxygenated water in the headwaters of the Yakima River Basin. Natural conditions in the watershed have been altered by anthropogenic activities such as mining, timber harvest, road building, and construction of Keechelus Dam. The dam, constructed from 1913 to 1917, blocked anadromous fish passage into the Lake Keechelus watershed and isolated an adfluvial population of bull trout (*Salvelinus confluentus*) in the Gold Creek basin. Bull trout were listed as threatened under the Endangered Species Act in 1998. A series of borrow pits (Gold Creek pond) created during construction of I-90 occupies a large portion of the floodplain approximately 1 mile upstream of the lake. Seasonal dewatering of Gold Creek occurs as flow recedes and becomes subsurface upstream of the pond during the low flow period in late summer. Dewatering imposes spatial constraints that increase bull trout mortality in a population already at risk due to its genetic isolation (Wissmar and Craig, 1997).

D. Provide a detailed description of the proposed project and how it will address the problem described in question 1C.

The implementation strategy for the Gold Creek assessment has three primary stages:

- ❖ Compile and summarize existing information about the geomorphology, hydrology and habitat values of Gold Creek study area;
- ❖ Identify habitat disturbances, both natural and man-made, the resultant channel changes, and the presumed implications for bull trout productivity;
- ❖ Determine what potential restoration actions would address limiting habitat conditions (e.g., dewatered reaches, simplified channels, degradation of riparian areas, elevated temperature areas).

The specific tasks (and cost estimate) proposed for the Gold Creek assessment are:

- Data Inventory and Data Gap Analysis (\$8,000) - Gain an improved understanding of previously completed technical studies and available data relevant to the project. An ftp site will be set up to create a central location to compile existing information and make data available to interested stakeholders. A brief memorandum will be drafted to inventory the sources of information compiled by the project team and to identify data gaps to be addressed in the technical assessment. The data inventory and data gap analysis will ensure that data collection tasks do not duplicate previously completed studies.
- Hydrologic Monitoring and Data Collection (\$19,000) - A network of hydrologic monitoring instruments will be deployed to collect measurements of water surface elevation in the channel and in shallow groundwater monitoring wells (piezometers) distributed along the approx. 2.0 mile reach of previously observed channel dewatering. The monitoring network will include a sufficient number of individual stations (~10) distributed in an array to enable meaningful analysis of the hydraulic gradient. This task includes time for data processing to compile water level observations, develop preliminary time series plots of observations, and document the data collection methods.
- Digital Elevation Modeling (LIDAR) (\$15,000) - Topographic data are needed to characterize river channel morphology and to generate a basemap of existing conditions for the technical assessment and conceptual design tasks. LIDAR data are a cost effective resource for mapping topography over large areas, such as along a river channel. LIDAR data collection and processing will be subcontracted to specialists in airborne remote sensing.
- Field Data Collection (\$10,000) – A survey crew will collect observations of stream corridor conditions to support the technical assessment and conceptual design tasks. The crew will survey topographic profiles to supplement the LIDAR DEM in characterizing channel morphology. Bed material will be sampled to characterize surface and subsurface grain size distributions. Large woody material will be characterized with a tally and functional characterization of wood accumulations observed. Habitat characterization will note the frequency and residual depth of pools, general distributions of habitat types, and riparian conditions. Observations will be supported with GPS locations and photographic documentation.
- Reach Scale Assessment of Existing Conditions (\$32,000) - Develop a conceptual model

to explain physical processes affecting dewatering and related habitat concerns and produce a technical assessment describing hydrologic, geomorphic, and ecologic conditions of Gold Creek.

The information gained from these tasks will address key questions related to designing restoration actions:

What is the impact of the Gold Creek Ponds on hyporheic exchange between surface water and groundwater systems?

How do human activities (current and historic) in the watershed and within the stream corridor affect hydrologic conditions?

What is the spatial extent and duration of channel dewatering?

How have historical channel changes affected habitat characteristics for bull trout?

- Conceptual Design Report with Exhibits (\$22,000) - The conceptual model of existing physical processes will be utilized to develop conceptual restoration design alternatives that will enhance aquatic habitat conditions and ecologic functions in Gold Creek with an emphasis on habitat preferences and life history requirements for bull trout.
- Project Management and Administration (\$9,000)

E. Clearly list and describe all products that will be produced.

- Data Inventory- Inventory memorandum, GIS database, project base map
- Hydrologic Monitoring- Database of water level observations, time series plots
- Digital Elevation Model- LIDAR DEM (1-foot) in ArcGIS GRID of Gold Creek basin
- Field Data- Stream channel profiles, instream and physical habitat survey, photographs
- Reach Scale Assessment- Existing conditions base map, quantitative analysis of hydrologic and geomorphic conditions, comprehensive technical report and presentation
- Conceptual Design- Presentation of at least three location specific preliminary design alternatives with plan view drawings and instream details.

F. If the project will occur in phases or is part of a larger recovery strategy, describe the goal of the overall strategy, explain individual sequencing steps and which steps are included in this application.

The project is part of a larger recovery strategy that includes restoration of anadromous fish populations into the three upper Yakima reservoirs (Cle Elum, Kachess, and Keechelus) and their corresponding tributary watersheds. The assessment and conceptual design phase is expected to be the foundation for a subsequent habitat restoration implementation phase. Ecosystem improvements and habitat benefits for bull trout will also be available for anadromous fish. Gold Creek provides 7 of the 14 miles of stream habitat in the Lake Keechelus tributary system that is available to resident and anadromous salmonids. The feasibility of restoring anadromous fish passage into Keechelus and Gold Creek was first examined by Reclamation's Yakima Dams Fish Passage Phase-I Assessment Report (2003, 2005). Passage into Keechelus is currently part of the Integrated Water Resources Management Plan (Reclamation 2011) and is second in priority only to passage at Cle Elum where implementation is underway.

The reintroduction of anadromous fish into upper Yakima areas of extirpation is also part of the project's overall recovery strategy. The anadromous fish species proposed for reintroduction above the storage dams include sockeye salmon (*Onchorynchus nerka*), coho salmon (*O. kisutch*), spring chinook salmon (*O. tshawytscha*), summer steelhead (*O. mykiss*), and Pacific lamprey (*Lampetra tridentata*). An additional objective is to provide

two-way passage for resident bull trout to restore genetic connectivity between landlocked adfluvial populations in the storage reservoirs and fluvial (riverine) bull trout that reside downstream of the dams (BOR, WDFW, YN 2005).

G. Has any part of this project previously been reviewed by the SRFB?

No part of this project has been previously reviewed or funded by SRFB.

H. If your proposal includes an assessment or inventory-

- i. Describe any previous or ongoing assessment or inventory work in your project's geographic area.

WDFW habitat biologists conduct an annual inventory of bull trout redds in the lower seven miles of Gold Creek as part of on-going population baseline monitoring.

William Meyer researched and presented a Master's thesis, "THE EFFECTS OF SEASONAL STREAM DE-WATERING ON THREE AGE CLASSES OF BULL TROUT, *SALVELINUS CONFLUENTUS*" (2002) about Gold Creek de-watering.

WA Dept. of Transportation and the Federal Highway Administration performed an extensive wetland mitigation site assessment in the Gold Creek project area during their environmental review for the Interstate-90 Snoqualmie Pass East construction project (2000 – 2008). The mitigation sites in the lower Gold Creek basin provide 9 acres of wetland restoration and 27 acres of wetland preservation. Stream mitigation actions provided 2 acres of stream channel and riparian zone restoration within the footprint of the I-90 right of way where it bridges over the mouth of Gold Creek.

- ii. Describe how the assessment or inventory addresses the stages and elements in *Guidance on Watershed Assessment for Salmon*

The Guidance presents three Stages of understanding and addressing the limiting factors of salmonid habitat in the study area:

I. Habitat Conditions- Basic understanding using existing information to make limited decisions about salmonid habitat improvement projects

II. Causes of Conditions- Understanding of habitat forming processes using new information for analysis and modeling that informs complex project decisions

III. Salmon Response to Conditions- Clear understanding of linkage between habitat and salmonid production using extensive information to make decisions about durable projects

This project starts with a biological reality- the Gold Creek Bull Trout population is declining as a result of habitat disturbances and deficiencies. The assessment proposes to discover the causes of species mortality and describe remedies with engineering solutions that employ site available natural processes. The Gold Creek assessment methodology closely follows the Guidance as it progresses through acquiring increasingly complex levels of information leading to an increasingly comprehensive level of understanding resulting in making informed decisions that produce a conceptual design with a high probability of success.

I. If your proposal includes developing a design:

- i. Will the project design be developed by a licensed professional engineer?

Project design will be developed by a licensed professional engineer.

- ii. For final design projects, if you do not intend to apply for permits as part of this project's scope of work, please explain why and when permit applications will be submitted.

This project will produce Conceptual Design deliverables (Manual 18, Appendix D-1)

2. Salmon Recovery Context

- A. Describe the fish resources present at the site and targeted by this project.

Species	Life History Present (egg, juvenile, adult)	Current Population Trend (decline, stable, rising)	ESA Coverage (Y/N)	Life History Target (egg, juvenile, adult)
Bull Trout	Egg, juvenile, adult	Decline	Yes (1998)	Egg, juvenile, adult
Kokanee	Egg, juvenile, adult	Stable	No	Egg, juvenile, adult
Sockeye	Not present	Passage blocked at Keechelus Dam	No	Egg, juvenile, adult
Coho	Not present	Passage blocked at Keechelus Dam	No	Egg, juvenile, adult
Steelhead	Not present	Passage blocked at Keechelus Dam	Yes	Egg, juvenile, adult
Spring Chinook	Not present	Passage blocked at Keechelus Dam	No	Egg, juvenile, adult

- B. Describe how this project fits within your regional recovery plan or local lead entity strategy to restore or protect salmonid habitat in the watershed (i.e., Does the assessment fill a data gap identified as a priority in the lead entity's strategy or regional recovery plan? Does the project address a priority action, occur in a priority area, or target priority fish species?).

At this time, there is no final USFWS recovery plan for bull trout. However, there is a locally developed action plan, written by biologists from the Yakima Basin Fish and Wildlife Recovery Board, WDFW, and USFWS. This project is specifically described in the Yakima Bull Trout Action Plan (<http://www.ybfwr.org/bull-trout-action-plan/>) as a high priority action for species recovery in the Yakima system, as described in the following excerpt:

Threats – Gold Creek

One of the highest severity threats to this population is dewatering within the spawning reach that results in direct mortality and limits access to spawning habitat upstream during some years. Other high severity threats include low population abundance and the passage barrier at Keechelus Dam. Other threats include illegal poaching in Keechelus Lake (angling), development in the lower reaches of Gold Creek, entrainment at Keechelus Dam, lack of marine derived nutrients, and documented introgression with brook trout.

Actions – Gold Creek

Strategy

This population has been identified as a high priority “Action” population. The highest priority action for this population is a hydrologic assessment and subsequent restoration project to connect dewatered sections in the stream, which strand fish and prevent access to spawning grounds.

Recommended Actions

Population Scale

- Gold #1: Conduct complex hydro-geomorphic evaluation in lower Gold Creek to determine the causal mechanisms (and possible solutions) for annual dewatering.

Population Monitoring

- Multiple Pops #2: Continue redd surveys within established index areas to monitor long term trends in abundance.

Implementation Monitoring of Completed and Recommended Actions

- If in-stream work is completed to address the dewatering issues, monitoring of flows post-treatment will be critical.

- C. Explain why it is important to do this project now instead of at a later date. Consider its sequence relative to other needs in the watershed and the current level and imminence of risk to habitat in your discussion.

Bull trout (*Salvelinus confluentus*) were listed as Threatened under the Endangered Species Act in 1998. In the original listing (USFWS 1998), the Yakima basin was part of the Columbia River Distinct Population Segment (DPS), and was one of 22 “Recovery Units” within that DPS. A Draft Bull Trout Recovery Plan released in 2002 was never formally adopted (USFWS 2002). In 2010, the USFWS reinitiated the recovery planning process, with new geographic delineations. In this current planning process, the Yakima basin is one of 34 Core Areas within the larger Middle Columbia Recovery Unit, and all recovery units are part of the range-wide DPS listing (Yakima Bull Trout Action Plan, 2012). The Gold Creek population continues to struggle with habitat adversities that threaten its ability to sustain genetic viability.

3. Project Development

- A. Describe other approaches and design alternatives that were considered to achieve the project’s objectives and why the proposed alternative was selected.

The project was originally designed with a smaller scope of hydrologic and geomorphic investigation. Feedback from the Yakima bull trout action group emphasized the need for a more comprehensive habitat analysis that included ground and surface water interactions and a larger geographical project area. Development of a conceptual restoration design

component was added so as to move the project from exclusively assessment into the preliminary restoration project framework.

- B. Explain how the project's cost estimates were determined. Please include a detailed project cost estimate and attach in PRISM. Clearly label the attachment in PRISM "Cost Estimate."

An environmental consulting firm (CARDNO-ENTRIX) was engaged to attend a meeting of the Yakima Basin Bull Trout stakeholders, become informed about several theories for the causes of the decline in the Gold Creek Bull Trout population, and draft a scope of work for this assessment. Cost estimates are based on the proposed scope budget developed by CARDNO, then further refined using feedback from bull trout action team and other project sponsor personnel in the Yakima Basin. However, for implementation of the assessment, proposals from all qualified and interested consulting/engineering firms will be considered.

- C. Include a Partner Contribution Form ([Appendix J](#)), when required, from each partner outlining the partner's role and contribution to the project.

U.S. Fish and Wildlife Service- "USFWS has committed \$10K to assist with the assessment of Gold Creek, due its potential to help reduce bull trout mortality in the long run."

Cle Elum Ranger District, Okanogan-Wenatchee National Forest- Topographical survey of significant portions of the project site (\$12,000 value).

- D. List all landowner names. If the proposed project occurs on land not owned by the grant applicant, include a signed Landowner Acknowledgement Form ([Appendix K](#)) when applicable.

United States of America: Okanogan/Wenatchee National Forest co-managed with Mt. Baker/ Snoqualmie National Forest (1,259 acres)
Washington State Department of Transportation (303 acres)
Cascade Lands Conservancy (221 acres), Michael L. Darland (77 acres)
Ski Tur Valley Maintenance Assoc. (45 acres), Jeff Robertson (9 acres)

No on the ground actions are proposed for this planning project. Stream data will be gathered primarily below the ordinary high water mark. Conceptual designs are intended to guide stakeholders into subsequent habitat restoration phases.

- E. Describe your experience managing this type of project.

Kittitas Conservation Trust has successfully sponsored several SRFB projects in the upper Yakima Basin including restoration, passage, planning and design:

06-2141 Cle Elum River Instream Habitat (completed)
07-1551 Taneum Creek Fish Passage (completed)
07-1634 Nelson Creek Fish Passage (completed)
11-1564 Cle Elum River PH-2 Instream Habitat Design (in progress)

4. Tasks and Schedule. List and describe the major tasks and schedule you will use to complete the project. Non-capital projects should be completed within two

years of funding approval.

January – March, 2013	SRFB contract, Request for Proposals to Consultants, Planning meetings with Gold Creek stakeholders
April - May, 2013	Environmental consultants' proposals evaluated and contractor selected
June, 2013	Study design and scope of work completed, existing literature organized and reviewed
June – October, 2013	Habitat data collection, LIDAR acquired, groundwater devices installed, topographical survey
November, 2013 – February, 2014	Organize and integrate data, develop modeling and preliminary report about existing habitat conditions, produce maps and exhibits for stakeholders
March - May, 2014	Preliminary conceptual restoration designs & report. Identify data gaps, create plan for 2 nd year field work.
June – October, 2014	Collect 2 nd year field data, refine and ground truth restoration conceptual designs and locations.
November – December, 2014	Final reports and deliverables submitted to stakeholders

5. Constraints and Uncertainties. Each project should include an adaptive management approach that provides for contingency planning. State any constraints, uncertainties, possible problems, delays, or unanticipated expenses that may hinder completion of the project. Explain how you will address these issues as they arise and their likely impact on the project.

The project hinges on acquiring sufficient data to comprehensively inform the restoration design process. Funding to support an environmental consultant contract may fall short of expectations. Or the responses to the proposed scope of work may produce sticker shock. Other sources of funding may be required. SRFB support is requested to be characterized as State Funds so that federal matching funds can be sought (USFWS is the ESA listing agency).

De-watering of bull trout habitat in Gold Creek is suspected to be an interaction between surface flow and ground water systems. Each water year has peculiarities. If 2013 is a statistically atypical year then restoration design conclusions may be difficult to make. The project will rely on the depth of historical information found in the literature that will be used for the synthesis of existing conditions, reports and hydrological modeling.