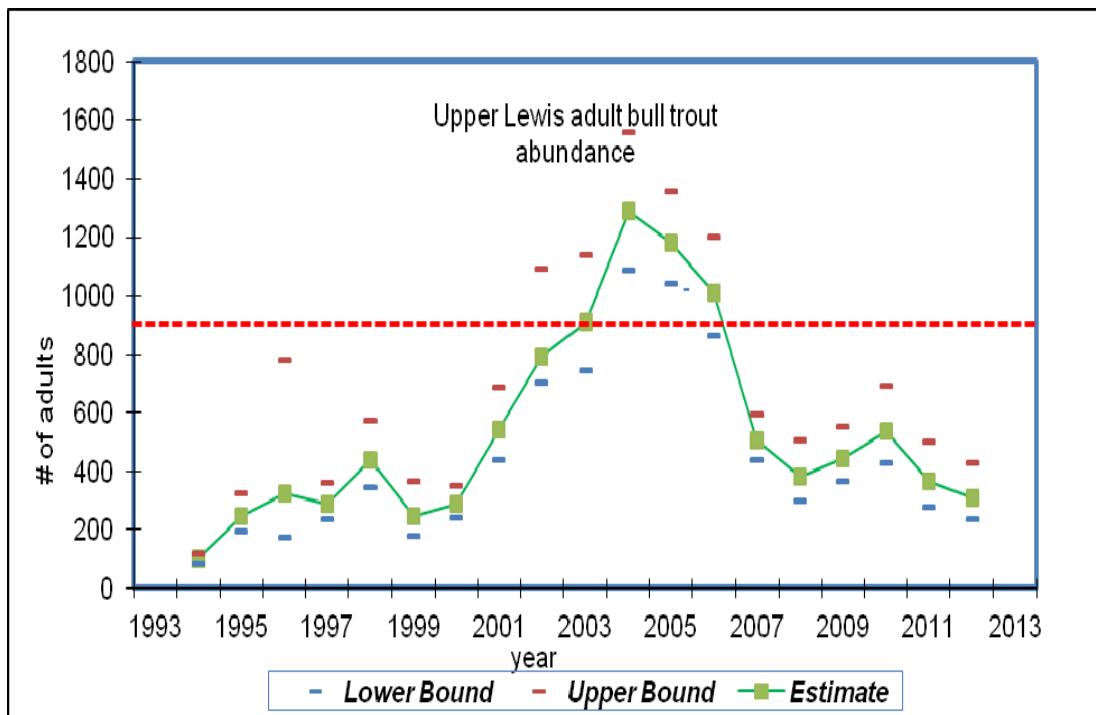


**PROPOSAL FORM -  
*Lewis River Aquatic Fund***

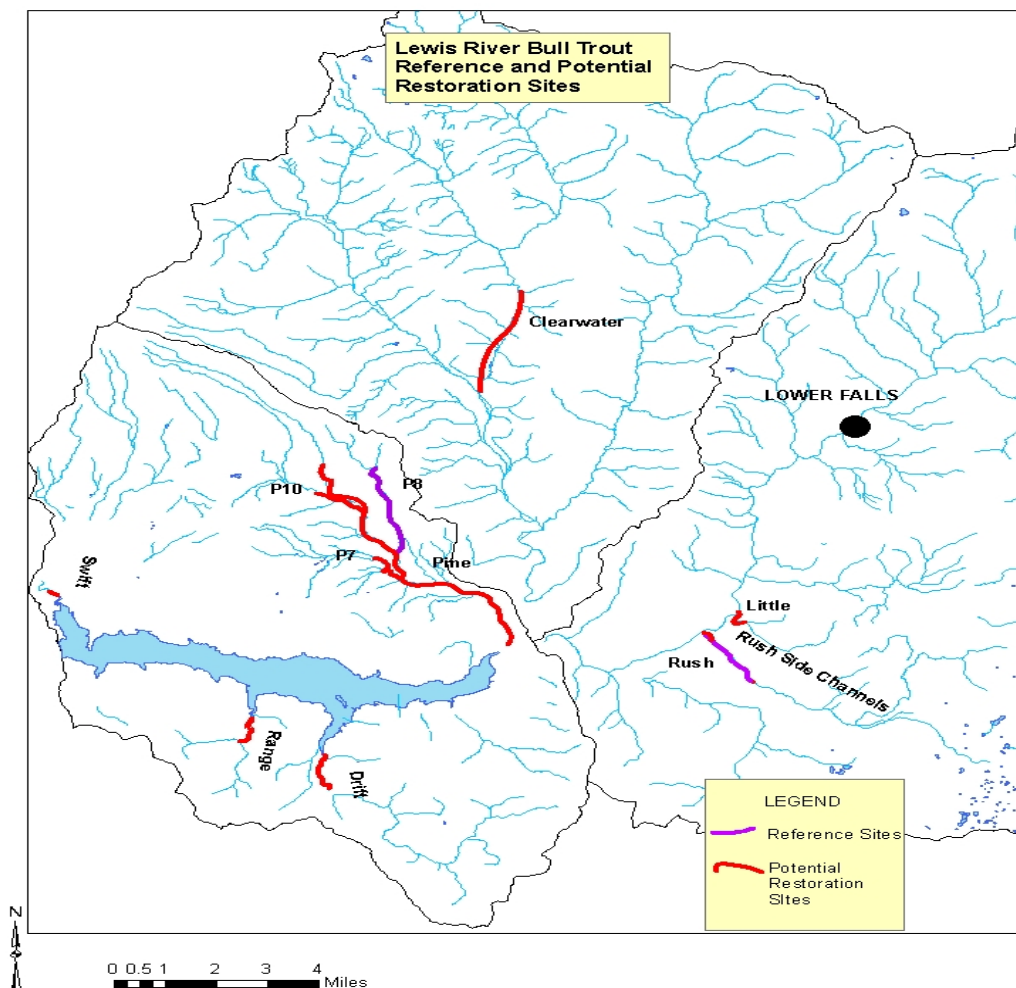
1. Project Title  
Bull Trout Habitat Restoration Project Identification Assessment
2. Project Manager  
Adam Haspiel USFS  
Abi Groskopf Mount S. Helens Institute (MSHI)
3. Identification of problem or opportunity to be addressed

Bull trout adult abundance in the upper North Fork Lewis River Basin has been estimated annually since 1994. Based on annual abundance estimates of migratory adults the population has exhibited 3 distinct patterns of abundance; with lower abundance levels during 1994-2000 and 2007-present being separated by a period when abundance increased to and decreased from a peak of 1,300 migratory adults. The US Fish and Wildlife Service identified a minimum population target of 900 individuals to maintain population viability and this target has been exceeded only four times since 1994 (19 years). Recent population estimates (2005-2012) range from 250-500 migratory adults, which is 20%-40% of the peak abundance observed in 2004 and 25%-56% of the minimum population target (see figure below). While numerous factors are likely affecting the overall abundance estimates, many interested parties (e.g., WDFW, USFS, LCFRB, CIT, and MSHI) believe that spawning and/or rearing habitat could be limiting thus inhibiting the recovery and long-term stability of the bull trout population.



As part of the Lewis River Hydroelectric Projects Settlement Agreement (Settlement Agreement), PacifiCorp provides a dedicated source of funding for bull trout habitat restoration projects. This funding is stewarded by the Aquatics Coordinating Committee (ACC), members of which have been reluctant to recommend projects for funding in recent years because project scoping and prioritization has been impossible with existing bull trout habitat knowledge. Despite past and ongoing studies regarding bull trout spawning and rearing in the upper Lewis Basin, habitat characteristics that will direct successful restoration projects for the local subpopulations remains largely unknown.

This partner-driven project team proposes to fill the project scoping and prioritization void by initially using results of past or ongoing data collection efforts to characterize bull trout spawning and rearing habitat in Pine, P8, Rush, and Cougar Creeks. Subsequent portions of this project would conduct additional spawning and habitat surveys to collect habitat parameter data that would be used to site and scope specific restoration projects for future bull trout funding rounds (See Map Below for initial potential survey locations). The ultimate goal of this project is to develop concept scoping design of habitat restoration projects in areas outside of existing spawning and rearing locations to expand the range of available bull trout spawning and rearing habitat. The expected outcome of this project is improved long term stability of the bull trout population in the upper Lewis Basin.



#### 4. Background

Bull trout are confined to waters with exceptionally cool (<9° C for spawning and rearing through age 1+; <16° C for rearing age 2+ and older) water. In the upper Lewis watershed, bull trout routinely use the upper mainstem, Pine (especially P8), Rush, and Cougar Creeks for spawning and early rearing. Suitable bull trout spawning and rearing locations can be effectively predicted by water temperature in multiple basins, but other habitat conditions may limit bull trout usage of these locations. Based on information presented in Figure 1 status of the bull trout population in the upper Lewis Basin can be described as stable, but depressed. Current spawning habitat and/or juvenile rearing habitat may be limiting population productivity; however, habitat conditions limiting productivity have not been identified due to a lack of targeted studies concerning habitat quantity and quality. Recent studies have primarily focused on collecting data in areas currently being used by bull trout for spawning and/or rearing, as follows:

USFWS has completed a patch analysis of likely bull trout habitats in the Lewis watershed based largely on water temperature. This analysis will be used to help focus this project on streams that exhibit habitat conditions that could potentially support bull trout spawning and/or rearing, but bull trout usage has not been confirmed based on recent study results.

WDFW has conducted spawning surveys in several areas of the watershed, including lower Rush Creek, Pine, and P8. WDFW will continue to operate a PIT tag detector located in Rush Creek.

USFS has conducted Level II habitat surveys in some of the drainages including Rush Creek in 2004, and Pine Creek, P8, and P7 in 2005.

PacifiCorp will fund bull trout monitoring activities in the upper Lewis Basin. Activities funded include redd surveys in selected streams (i.e. P8 and Pine Creek) plus PIT tagging activities (i.e. annual netting) and subsequent snorkeling efforts to determine migratory adult bull trout abundance. PacifiCorp will operate PIT tag detectors in selected streams in the upper Lewis Basin.

Consistent with the purpose of this project – improve bull trout population status by expanding the quantity and quality of spawning and rearing habitat available for bull trout in the upper Lewis Basin - this proposal will focus on stream reaches that are known to be used by bull trout, but where physical habitat has been significantly degraded through natural (e.g., Mt. St. Helens' 1980 eruption) or anthropogenic (e.g. riparian logging) factors. This project will build on the existing knowledge base (see descriptions below) by synthesizing existing spawning, tagging, and trapping data. Patch analysis completed by USFWS will also be critical for providing direction with regard where to implement habitat improvement projects in the upper Lewis Basin, and what habitat deficiencies should be addressed. However, existing information and plans have significant gaps that limit the direction provided with respect to on-the-ground projects that will result in improved population status for bull trout in the upper Lewis Basin. This project will implement additional spawning and physical habitat surveys to fill in the gaps not covered by existing efforts. Additionally, this project will take the next critical step by connecting habitat survey data with juvenile and adult presence/absence data to make recommendations for site-specific habitat improvements that will ultimately improve the status of the bull trout population in the upper Lewis Basin.

5. Project Objective(s)

The primary objective of this project is to develop a prioritized list of habitat restoration opportunities that will increase the stability and viability of the Lewis River bull trout population.

The prioritized list of habitat restoration projects will enable project sponsors to propose successful project proposals to access the bull trout fund for the purpose of implementing on-the-ground improvements to bull trout habitat. The project partners expect that the biological benefits of implemented projects will include improved spawning and rearing habitat for bull trout in suitable bull trout areas.

6. Tasks

Task 1: Collect and synthesize existing bull trout data

Time Frame: Summer-Fall 2013

Lead: MSHI

Contributing Partners: USFS and WDFW

Description: Bull trout population, survey, and tagging data exist in several organizations' databases and files. The Mt. St. Helens Institute and WDFW will work together to collect and synthesize existing data to highlight perennial high-use areas. The Forest Service (and potentially others) has existing Level II habitat survey information for many of the stream reaches. These data sets will be compared and analyzed for major gaps while preparing the final survey methodology.

Task 2 Collect temperature data and collect habitat parameter data in selected streams in the upper Lewis Basin

Time Frame: Summer-Fall 2013

Lead: USFS

Contributing Partner(s): MSHI

Description: MSHI will deploy temperature data loggers in suspected cold water streams from summer through October to capture peak temperatures and spawning temperatures. As part of their annual habitat survey efforts, the USFS will conduct Level II habitat surveys in key streams in the upper Lewis Basin.

Task 3: Conduct spawning surveys

Time Frame: Fall 2013

Lead: USFS

Contributing Partner(s): MSHI, CIT & WDFW

Description: MSHI survey teams trained by USFS and WDFW staff will conduct spawning surveys in streams that exhibit habitat conditions (primarily temperature) that are suitable for bull trout spawning but have not been recently surveyed. Presence/absence data obtained through these surveys will be used to assist in focusing habitat parameter surveys. Additional assistance in training staff will be provided by PacifiCorp staff and other experts in the region.

Task 4: Finalize field data collection study design

Time Frame: Fall 2013-Winter 2014

Lead: WDFW

Contributing Partner(s): USFWS, USFS & MSHI

Description: WDFW, USFWS, USFS, and MSHI will collaboratively finalize survey method selection and refinement. The team will use past bull trout study designs and other habitat data collection protocols (see methods section) to guide development of the study design for this project. The team will refine existing protocols to include parameters that are specific to successful bull trout habitats in the upper Lewis Basin. The protocols will be detailed enough to form habitat suitability criteria that will apply to habitat project design in other reaches. Team members will establish quantitative analysis tools to measure redd and juvenile densities and correlate these densities to measured habitat parameters. Information collected from spawning surveys collected in Task 3 will be used to assist in determination of stream reaches to be surveyed to collect habitat parameter data.

Task 5: Conduct habitat parameter surveys

Time Frame: Summer-Fall 2014

Lead: MSHI

Contributing Partner(s): USFS & WDFW

Description: MSHI survey teams will measure habitat parameters in successful bull trout habitats to develop a habitat characterization specific to the Lewis River. Two or three two-person survey crews will walk stream reaches to collect data regarding habitat parameters. Survey locations will include stream reaches that are known to be utilized by bull trout to identify habitat conditions that constitute productive bull trout spawning and rearing habitat. Additional survey locations will include stream reaches that support little to no use by bull trout to identify habitat conditions that need to be improved to support bull trout spawning and/or rearing.

Task 6: Data summarization and analyses

Time Frame: Fall 2014-Winter 2015

Lead: WDFW

Contributing Partner(s): USFWS, USFS & MSHI

Data collected during spawning and habitat surveys will be summarized. Habitat parameters will be correlated the adult spawning and juvenile rearing usage data to determine key habitat conditions that support adult spawning or juvenile rearing. Results of these analyses will be used to direct locations to conduct habitat restoration projects and habitat conditions to be improved by restoration actions. Data analyses will be based on past similar studies (see methods section). MSHI and WDFW staff will develop a formalized habitat suitability matrix for Lewis River bull trout and habitat use maps as part of this task.

Task 7: Develop conceptual project scoping designs

Time Frame: Winter-Spring 2015

Lead: WDFW

Contributing Partner(s): USFWS, USFS & MSHI Description: MSHI, WDFW, CIT, and USFS personnel will develop a list of site-specific project conceptual scoping designs that could be implemented to improve bull trout habitat in lesser-used areas. The projects would be prioritized based on the likely benefit to bull trout, ease of access, certainty of achieving long-term habitat gains, and cost. The draft report will be presented to the ACC for review and comment for incorporation into the final draft. Conceptual scoping designs will identify habitat conditions to be targeted, but will not identify specific actions to address these habitat conditions. Subsequent project proposals will describe how the project will benefit the habitat conditions in that specific location.

## 7. Methods

This project relies heavily on the work previously completed by PacifiCorp, WDFW, and USFWS to direct field investigations. These data will be useful identifying suitable for spawning and early rearing habitat conditions for bull trout in the upper Lewis Basin. Study design and data analyses conducted as part of this proposal will rely on other similar studies conducted in other locations in the Pacific Northwest. Additionally, the USFWS 1998 document titled *A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale* provides excellent guidance with respect to habitat elements and criteria to be assessed. This document, in conjunction with other documents listed below, will be used to develop study design and guide data analyses.

### USFS Level II Stream Survey:

The level II stream survey methodology is the USFS standard used for stream inventory and monitoring. This protocol has been developed by USFS fish biologists and hydrologists over a 23 year time period so it is an excellent starting point to base our methodology on.

Refinements need to be made to the protocol to adapt it for this project; these modifications may include refined inventory design and reach length. The Stream Inventory Handbook/Manual is approximately 125 pages in length. The following link will take you to the latest version of the Stream Inventory Handbook. .

[http://www.fs.usda.gov/detailfull/r6/landmanagement/resourcemanagement/?cid=fsbdev2\\_026966&width=full](http://www.fs.usda.gov/detailfull/r6/landmanagement/resourcemanagement/?cid=fsbdev2_026966&width=full)

### EPA Environmental Monitoring and Assessment Program (EMAP) physical habitat assessment protocols:

This quantitative assessment identifies seven general physical habitat attributes: stream size (channel dimensions), channel gradient, substrate size and type, habitat complexity and cover, riparian vegetation cover and structure, anthropogenic alterations and channel-riparian interactions. Sample reach length is determined as 40 times low flow wetted width and is divided into 11 transects for channel dimension, substrate and riparian areas. Other attributes are measured throughout the reach length. Modifications to sampling design to target determinations of Task 2. Data analysis can be complex without the use of SAS. Protocol is available for wadable and non-wadable streams and can be found at the following link:

[http://water.epa.gov/type/rsl/monitoring/riverssurvey/upload/NRSA\\_Field\\_Manual\\_4\\_21\\_09.pdf](http://water.epa.gov/type/rsl/monitoring/riverssurvey/upload/NRSA_Field_Manual_4_21_09.pdf)

### Inventory and Monitoring of Salmon Habitat in the Pacific Northwest:

This document reflects an effort to establish a consistent format for the collection of salmonid habitat data across the Pacific Northwest. More specifically, our objectives were to: 1) provide a synthesis of the salmon habitat protocols applicable to the Pacific Northwest, 2) recommend a subset of these protocols for use by volunteers and management/research personnel across the region, 3) link these protocols with specific types of habitat projects, 4) establish a Quality Assurance/Quality Control framework for the data derived from the use of these protocols, and 5) to the degree possible, identify the format and destination where the data is routinely sent.

Following a detailed review of the protocols, we used selection criteria combined with a scientific peer-review process to recommend a subset of protocols for use across the Pacific Northwest. Protocols were evaluated in terms of: 1) a review of the protocol elements; 2) the accessibility and practicability to workers with diverse training; 3) applicability across the different environments of the region, so that data and analysis are comparable; 4) listing of tools and implements needed; and 5) kinds of data generated. We were not able to assess

implementation costs, as budgetary information was seldom included in the protocols. We ultimately identified 68 protocols for use by volunteers, and 93 protocols for use by management/research personnel across the Pacific Northwest.

The following link will take you the website containing this document:

<http://wdfw.wa.gov/publications/00650/>

Using a Spatially Explicit Approach to Evaluate Bull Trout Spawning Habitat Selection  
Master of Science Doctorate Thesis by James S. Lamperth, Jr.

Understanding the relationship between habitat and fish populations is essential to recovering imperiled species such as bull trout *Salvelinus confluentus*. Most bull trout research has focused on juvenile or sub-adult rearing habitat leaving gaps in knowledge concerning bull trout spawning habitat. In this study, I used a resource selection function in the form of logistic regression to model the probability of bull trout redd occurrence in 100 m stream reaches. Aquatic habitat structure (23 predictors) and bull trout redd distribution data were collected from approximately 17 km in two headwater streams of the Yakima River basin, WA using spatially continuous surveys. I fit the logistic regression models to each stream separately and to the pooled data set (3 data sets total), ranked the models using Akaike's information criterion, and assessed model predictive performance and accuracy. Bull trout redds were non-uniformly distributed and present in approximately 58% of the reaches in each stream. The best logistic regression models for each stream contained different combinations of predictors possibly suggesting differences in habitat selection between streams. However, due to predictor selection methods, the same predictors were not used to fit the models of each stream making between-stream comparisons difficult. The best model fit with the pooled data set showed that redd occurrence was positively related to pool density and area of potential spawning patches. The range of habitat measures selected by bull trout differed between streams which caused relatively poor predictive ability; however, the predictive ability increased and was relatively good when the models were fit with standardized (mean = 0, SD = 1) habitat measures. This suggests bull trout were selecting spawning locations relative to stream-specific habitat availability. In a separate analysis, I evaluated patterns between bull trout redd distribution and the thermal environment using data collected from spatially-fixed temperature data loggers, and longitudinal thermal profile surveys. Both streams displayed thermal heterogeneity; however, there were only weak associations between bull trout redd distribution and reaches that were coldest during spawning and warmest during egg incubation. This is the first study to model bull trout spawning habitat and demonstrate that typical measures of aquatic physical habitat can be used to predict the occurrence of bull trout redds. These results increase our knowledge of bull trout – spawning habitat relationships and can be used to help restore imperiled populations.

Additional similar type studies that will help guide the completion of the final study plan are listed below. The list below is not an exhaustive list but does provide some examples of other similar effort to connect fish abundance and habitat characteristics

A Review of Bull Trout Habitat Associations and Exploratory Analyses of Patterns across the Interior Columbia River Basin

Geomorphology, hyporheic exchange, and selection of spawning habitat by bull trout (*Salvelinus confluentus*)

Influences of Temperature and Environmental Variables on the Distribution of Bull Trout within Streams at the Southern Margin of Its Range

Patch-based Models to Predict Species Occurrence: Lessons from Salmonid Fishes in Streams

Chinook Salmon use of Spawning Patches; Relative Roles of Habitat Quality, Size and connectivity

Seasonal Movement and Habitat Use by Subadult Bull Trout in the Upper Flathead River System, Montana

Utility and Validation of Day and Night Snorkel Counts for Estimating Bull Trout Abundance in First- to Third-Order Streams

#### 8. Specific Work Products

The team will deliver a final report highlighting a prioritized list of conceptual project scoping designs for habitat restoration projects that will benefit bull trout in the upper Lewis watershed. This list will form the foundation of a restoration short term action plan for future ACC and other bull trout funding streams. The report will also include the data and analyses used to support the decisions on restoration priorities. These data and analyses will constitute a compendium of available information on Lewis River bull trout to date.

This project will also support a long term restoration strategy to be developed through the implementation of the USFWS bull trout recovery plan. It is expected that additional studies and restoration activities will occur as part of the recovery plan implementation. Data and projects implemented through this project will assist in future efforts to implement the recovery plan and improve the status of bull trout in the upper Lewis Basin

#### 9. Project Duration

This project will commence upon contract with PacifiCorp, expected in late summer 2013 (if funded). Literature review and collection of existing data will be completed by fall 2013. Field work will be completed during summer and fall 2014, and the prioritized list of restoration actions and the supporting report will be complete in summer 2015.

#### 10. Permits

No ground-disturbing activities are included as part of this work. Planned survey techniques will not require permits. If the team elects to use survey techniques that have the potential to take bull trout (e.g. electro-fishing), the MSHI will acquire a scientific collection permit and incidental take permit for bull trout.

#### 11. Matching Funds and In-kind Contributions

Several project partners have agreed to provide in-kind assistance to this effort, as follows:

The Washington Department of Fish and Wildlife (WDFW) will commit two months of Biologist staff time, including salary and benefits, to assist in training survey crews, participate in project planning, developing study design, completing data analyses and prioritizing habitat restoration actions.



The U.S. Forest Service (USFS) will commit one month combined time from of a Fish Biologist and a Fisheries Technician to assist in project development, project implementation and prioritization of habitat restoration actions.

The Cowlitz Indian Tribe (CIT) will contribute staff time, including fringe benefits, to participate in project identification/scoping, report writing, and group coordination.

The Mount St. Helens Institute (MSHI) will contribute staff time, including overhead, to conduct literature reviews, compile existing data, manage field crews and provide survey equipment.

The U.S Fish and Wildlife Service (USFWS) will contribute staff time to assist in developing study design, data collection protocol and data analyses methodologies.

The Lower Columbia Fish Recovery Board (LCFRB) will contributes staff time, including administrative staff and overhead, to prioritize habitat restoration actions, develop project conceptual scoping designs and assist in project development and implementation.

Details of funds committed though commitments of in-kind activities are presented in the budget section of this proposal.

## 12. Peer Review of Proposed Project

This proposal is the collaborative work of multiple personnel from six organizations interested in bull trout recovery in the Lewis River. All parties agree that this is a critical step in implementing on-the-ground recovery actions for bull trout.

13. Budget

Provide a **detailed** budget for the project stages (Final design, Permitting, Construction, Monitoring/Reporting) by work task. Include:

Personnel costs

Labor and estimated hours for each project employee

Operating expenses

Supplies and materials

Mileage

Administrative overhead

Budget: Personnel Costs				
Partner	In Kind	In Kind Task	Requested ACC Funds	Requested ACC Funds Task
LCFRB	\$55,215.50	Recovery Plan Implementation and Project Oversight Habitat Restoration Project Development and Prioritization	\$0	
USFS	\$5,000	ACC Project Lead and Oversight, Field Survey Project Lead and Development/Training of Field Staff	\$7,000	Field Training, Restoration Project Development, Project Oversight and Coordination
WDFW	\$16,156	Train field Staff, Participate in Field Investigations, , Project Implementation and Study Design and Statistical Analyses	\$19,406	Study Design and Statistical Analyses Research Scientist (2 mos.)
MSHI	\$1000	ACC Project lead and Existing Data Collection and Gap Analysis	\$10,000 \$14,000 \$4,000	Conduct spawning and habitat surveys Field Leader (2 mos.) Field Assistant (8 mos.) Spawning Assistants (2 mos.)
USFWS	\$1,000	Study Design and Statistical Analysis		
CIT	\$1,000	Field Survey Assistance and Restoration Project Development and Prioritization.		
Budget: Operating Expenses				
MSHI	\$3000 \$1000	Mileage Supplies and materials	\$0 \$2000	Dry suits, Temp. data loggers
<b>SUBTOTAL</b>			\$56,406	
<b>TOTAL</b>	\$83,371.50		\$59,226	Includes Grant Administration (5%)

If in-kind contributions have been acquired, please note contributions according to project stage within the budget.

14. Photo Documentation (Per National Marine Fisheries Service's Biological Opinion for Relicensing of the Lewis River Hydroelectric Projects):

Since this project will not directly result in on-the-ground habitat improvements, photo documentation of the project is infeasible. Instead, photographs of high-use bull trout habitats and sites for proposed habitat restoration projects will be included as part of the prioritized project list.

## Attachment 1

### ACC Comments and Questions on Pre-Proposals

#### **USDA Forest Service - Lewis River Side Channel Near Little Creek, Muddy River Tributary near Hoo Hoo Bridge, Little Creek Fish Habitat Restoration and Survey of Bull Trout stream habitat features to develop future habitat restoration projects**

*Note: Questions that follow are directly from emails and/or discussions by the ACC.*

All projects: Proposals should demonstrate that the project is scientifically supported, has a clear nexus to the Lewis River hydroelectric projects, and clearly supports the Aquatic Fund objectives. Please prepare the document with the assumption that the reader is not familiar with the Lewis River basin, its issues, or its resources.

#### **Survey of Bull Trout stream habitat features to develop future habitat restoration projects**

WDFW: Final proposal needs to have a clear plan that identifies specific spawning and rearing habitats. What are the areas in Rush Cr. Pine Cr. and P-8 that BT actually use. What are the specific attributes: depth, channel width, substrate, tree canopy, gradient, etc. WDFW supports this effort in having a more strategic planning effort with multiple partners that can provide information to the Bull Trout Technical Work Group.

LCFRB: A final proposal for this study needs to provide a clear plan to: 1) Identify and prioritize stream reaches; 2) Define Habitat Suitability Criteria; 3) Define the methodologies and protocols to be used in conducting the habitat surveys; and 4) Implement the survey and habitat strategy development, including identification of tasks, a schedule, management structure and partner responsibilities, needed skills and qualifications, and a detailed budget. The final proposal should provide additional information on which streams are being surveyed and what criteria was used to select these streams. Additionally, it will be important to describe how people conducting this work will be trained to collect the data necessary to guide future habitat restoration projects.

USFS: Please describe proposed inventory methodology...should incorporate a methodology for all habitat parameters.

**All above questions were all addressed during development of the final proposal and are encompassed in the body of the document.**