

Attachment “C”

Anchor QEA Supplement to Personal Services Agreement -- Enhancement Scope of Work

ENHANCEMENT SCOPE OF WORK

1. Chehalis River Mainstem and Tributaries Comprehensive Salmon Habitat Enhancement Plan Development

As the second largest river system in the State of Washington, the Chehalis River supports numerous species and runs of salmon. Current conditions in the watershed limit fisheries production. Limiting factors for salmon include blocked habitat from fish passage blockages (e.g., impassable culverts); floodplain conditions (e.g., incised channels, drainage and filling of wetlands); streambed substrate (e.g., mass wasting, low large woody debris levels); riparian conditions (e.g., tree canopy loss); water quality (e.g., high water temperature, low dissolved oxygen); and water quantity (e.g., low summer baseflows) in the mainstem Chehalis River.

This scope of work is for the preparation of the Comprehensive Salmon Habitat Enhancement Plan for the upper mainstem Chehalis River (river miles [RMs] 33 to 118) and associated tributaries (Water Resource Inventory Area [WRIA] 23) that would identify potential opportunities to improve habitat conditions. The scope of work will be completed in two tasks. In Task 1, steps will be completed to compile reports containing relevant information for developing the Salmon Habitat Enhancement Plan, collect new data for identifying potential opportunities, and identify potential habitat enhancement opportunities. Task 2 will develop and apply criteria to prioritize the identified habitat enhancement opportunities and prepare the Comprehensive Salmon Habitat Enhancement Plan. The work will build off of the Chehalis River Basin Fish Study currently underway for the Chehalis River Basin Flood Control Authority. This scope of work describes the tasks, schedule, and budget for both tasks.

Task 1: Data Compilation, Off-Channel Delineation, and Preliminary Identification of Opportunities

To identify salmon habitat enhancement opportunities in the Chehalis River watershed, existing reports and databases will be compiled. These reports will include the WRIA 22 and 23 salmon and steelhead limiting factors report (Smith and Wegner 2001), the Chehalis Basin Salmon Habitat Restoration and Preservation Strategy for WRIs 22 and 23 (Chehalis Basin Partnership, updated 2010), Lewis County Conservation District Culvert Survey, and other recent relevant reports. Identification of available habitat data and potential enhancement opportunities will also include phone interviews/meetings with local planners and biologists. These will include any available inventories from the Weyerhaeuser Corporation, the Confederated Tribes of the Chehalis Reservation, Quinault Indian Nation, state and federal fisheries agencies, conservation districts, counties, and other sources. Existing geographic information system (GIS) layers of fish habitat and limiting factors will be compiled.

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This task will include the delineation of side channel and off-channel habitats in the Chehalis Basin. Restoration of side channel, wetland, and off-channel habitats can address salmon limiting factors including floodplain conditions and water quantity (e.g., increased summer flows due to slow release of runoff to the mainstem from wetlands, off-channel areas, and groundwater seeps). The distribution of side channels and existing and potential off-channel habitats will be delineated using recent and historic aerial topography and LIDAR. The photo interpretation will be conducted for the mainstem Chehalis River, the South Fork Chehalis River, the Newaukum River, the Skookumchuck River, and other major tributaries where those habitats were identified as a limiting factor. Limited ground-truthing will be conducted to verify the photo-interpretation results. The interpreted results will be prepared using GIS and compiled with other GIS layers. The side channel GIS layer that is created will include metadata describing the methods and other details of the dataset.

A workshop will be organized and convened in order for Anchor QEA to present the projects identified in Task 1 to the Flood Authority, basin fisheries biologists, and other interested stakeholders. Comments on the projects will be received with the intent to improve and further develop the projects.

Deliverables

- Memorandum summarizing enhancement opportunity review efforts, which will include a list and summary of currently identified projects and location of existing and potential off-channel habitat along the Chehalis River
- Organization and summary of workshop to review and further develop enhancement projects including compilation of comments from basin fish biologists and stakeholders on the projects

Assumptions

- Readily available aerial imagery, LiDAR, culvert inventories, and other data sets regarding enhancement projects will be compiled and used in this task

Task 2: Enhancement Opportunity Planning and Prioritization

The goal of this task is to develop specific projects or actions that comprehensively address the habitat limiting factors. This task will start by developing the potential project opportunities identified in Task 1 to a point where their relative benefits to addressing limiting factors can be assessed. The projects identified in Task 1 and reviewed in the Task 1 workshop will be revised in accordance with comments received and then analyzed to characterize the habitat limiting factor(s) addressed and the relative magnitude of potential benefits provided for each project.

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Anchor QEA will develop criteria and apply those to prioritize the salmon enhancement opportunities. The prioritization criteria will include physical habitat criteria, anticipated enhancement benefits relative to habitat limiting factors, and project feasibility. Possible physical habitat criteria that may be used include: extent of habitat opened to access through removal of barriers, water temperature reduction, and rearing/holding/spawning habitat created. For mainstem Chehalis River opportunities, the Shiraz modeling results of the Fish Study can be used to predict to magnitude of benefits to salmon that potential opportunities can provide. Feasibility criteria that may be used include: estimated cost, land ownership, and regulatory factors.

Anchor QEA will apply these criteria as part of this scope and identify projects, both singular and in combination, that will best fit the criteria and provide the most restoration benefit under current conditions and under future climate change conditions. A ranking by limiting factor and an overall ranking will be provided for each project or combination of projects. Estimates of implementation costs will be provided, as well as potential implementation issues for each project.

This task also includes communications and coordination with the Chehalis River Basin Flood Authority. Monthly updates will be prepared to describe the ongoing work and will include brief descriptions of important preliminary findings. In addition, team coordination, invoicing, and client meetings will be completed in this task.

The Comprehensive Salmon Habitat Enhancement Plan will report on the findings of the analysis and prioritization. The plan will present the following:

- Descriptions of potential enhancement projects, including general costs, implementation issues, and enhancement benefit
- Description of criteria used in evaluation of projects
- Ranking of projects and combinations of projects to provide the most enhancement
- Conclusions regarding overall robustness of the plan to limit effects of climate change

All new data, report figures, and GIS layers will be provided to the client in electronic format and provided in the report. The report will contain any new data created from the aerial topography and photography interpretation

Deliverables

- Work plan or scope for any field efforts
- Monthly updates describing ongoing work, bimonthly attendance at Flood Authority meetings

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- The Draft Salmon Habitat Enhancement Plan will be delivered electronically
- The Final Comprehensive Salmon Habitat Enhancement Plan will be delivered electronically and with 25 printed copies

Budget/Compensation

The table below shows a budget based on time and materials not to exceed the maximum without written consent.

Task	Budget
Task 1: Data Compilation, Off-Channel Delineation, and Preliminary Identification of Opportunities	\$ 76,597
Task 2: Enhancement Opportunity Planning and Prioritization	\$ 112,643
Total Budget	\$ 189,240

Compensation for work under the above section 1 shall be consistent with this budget as shown.

2. Supplemental Analyses to Support the Chehalis River Fish Study

The schedule extension for the completion of the Chehalis River Fish Study provides the opportunity to improve the study by filling data gaps and running additional analyses. This scope of work describes data collection activities to improve data inputs to the SHIRAZ model and modeling analyses to improve the interpretation of model outputs.

Task 1: Additional Sediment Analysis

The draft analysis of the effects of the potential flood control structure on the sediment transport, geomorphology, fish habitat, and large woody debris in the Chehalis River showed that there is the potential for fairly major changes to substrate composition in the river between the impoundment and the confluence with the South Fork Chehalis River. The draft analysis was based on existing landslide and cross sectional data; the results could be refined by collection of data to reflect current sediment input/storage conditions in the river upstream of the confluence with the South Fork. Recommended additional tasks include the following:

- A more detailed analysis of aerial photographs following the 2007 storm to estimate sediment delivery rates from the slides and track gravel bar growth in the river. One

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day of field work will be conducted to measure slide depths (to more accurately determine volumes) and grain size distribution of soils in the slide areas.

- Collection of historic channel cross sections at bridge crossings from as-built bridge drawings. These cross sections will be re-surveyed during low water to determine changes in channel configuration under recent sediment input/flow conditions. Historic and current cross section data from the U.S. Geological Survey (USGS) stream gages will be obtained from the USGS to allow analysis of the long-term trends in channel form. River cross-sections from other agencies such as FEMA and the COE will also be obtained.
- The updated sediment input and cross section data will be used to refine the HEC-RAS modeling of sediment transport under current conditions and the flood control and multi-purpose scenarios between the proposed impoundment and the confluence with the South Fork.
- The results of the analysis will provide a better understanding of the effects of the structures on the channel and substrate within and downstream of the impoundment.

Deliverable

- Revised sediment analysis in Fish Study Report

Assumptions

- Historic and current cross-section data from USGS stream gages will be available from USGS, FEMA and the U.S. Army Corps of Engineers.

Task 2: Flood Authority and Fish Subcommittee Meetings; Project Management

Anchor QEA will meet every other month with the Flood Authority and one time per month with the Flood Authority’s Fish Subcommittee. The Flood Authority meetings will be to provide updates on the fish study efforts. Every other month (i.e., August, October, and December) Anchor QEA will attend the regularly scheduled Flood Authority meetings held the third Thursday of the month. The Fish Subcommittee meetings will be convened to discuss data inputs regarding the salmon populations and habitat, as well as modeling assumptions and outputs of the SHIRAZ fish population model.

Deliverable

- Minutes from the Fish Subcommittee meetings will be prepared for review and acceptance among meeting participants.

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Assumptions

- Fish Subcommittee meetings will include non-subcommittee members who may be able to provide data or constructive input to the meeting topics.
- Anchor QEA will handle meeting logistics for the Fish Subcommittee meeting.

Budget/Compensation

Table 1 shows a budget based on time and materials, not to exceed the maximum without written consent.

**Table 1
Estimated Costs**

Task	Description	Budget
1	Additional Sediment Analysis	\$37,504
2	Flood Authority and Fish Subcommittee Meetings; Project Management	\$12,471
Total Budget		\$49,775

Compensation for work under the above section 2 shall be consistent with this budget as shown.