Chehalis River Basin Strategy
Scope and Budget for the 2015-2017 Biennium

Updated November 20, 2014

Developed for the State of Washington and

Chehalis Basin Work Group

Acknowledgements

This Revised Project Planning Document is the result of a collaborative effort between Washington State Departments of Fish and Wildlife and Ecology and consultants assisting the Chehalis Basin Work Group. Project management was provided by Jim Kramer for the Ruckelshaus Center.

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1 Introduction

1.1 Purpose

This Project Planning Document was developed for Washington State and the Chehalis Basin Work Group to help inform budgetary decision making for the Washington State 2015-2017 biennium. The studies and actions identified in this document for the biennium are needed to continue engineering and environmental studies of a flood retention structure on the upper Chehalis River as well as to advance habitat restoration for aquatic species and other strategies to reduce flood damage such as floodproofing and implementation of small flood reduction projects.

1.2 Organization

This Project Planning Document provides study scopes, schedules, and estimated budget ranges for the 2015-2017 biennium. The project began in July 2013 and the studies funded in that biennium are largely complete, with the exception of geotechnical explorations that will finish in June 2015.

Section 2 is organized by the following program elements of the Chehalis Basin Strategy:

1. Engineering (Section 2.1)
2. Aquatic Species Restoration and Environmental (Section 2.2)
3. Permitting and Regulatory Compliance (Section 2.3)
4. Economics (Section 2.4)

Section 3 is organized by the following project elements of the Chehalis Basin Strategy:

1. Small Projects (Section 3.1)
2. Floodproofing (Section 3.2)
3. Farm Pads (Section 3.3)
4. Priority Culverts (Section 3.4)
5. Restoration Design and Construction (Section 3.5)
6. Projects that Improve Water Quality and Fish Habitat (Section 3.6)
7. Landowner Compensation (Section 3.7)

Each program element describes the information needed to advance the Chehalis Basin Strategy and the estimated cost of the required studies. Some of the program elements overlap and care has been taken to ensure costs are not duplicated in multiple elements.

Project elements are early action construction projects needed to advance the Chehalis Basin Strategy and will provide immediate flood damage reduction and aquatic species benefits while providing a foundation for future implementation actions.

A listing of program costs to administer the project and involve state agencies, tribes, and the public is provided in Section 4.

2 Scope and Budget for Program Elements 2015-2017 Biennium

2.1 Engineering

The second biennium of the study period (July 2015 through June 2017) will include studies needed to refine the conceptual designs prepared in the first phase of the study period. Once a dam type and overall configuration (Flood Retention Only [FRO] vs. Multi-purpose [MP] alternatives) is identified, concepts for the dam and fish passage systems will be brought up to a preliminary design level and will move the project concept toward finalizing a "preferred alternative" designation needed for completing the permitting process in the final design phase. Questions studied may include the following:

- How could climate change impact FRO and MP project configurations?
- What is the size and configuration of the spillway and outlet works including tunnel for each dam configuration?
- If an MP dam alternative is selected, should the preliminary operations be further evaluated to determine if they can be improved for aquatic species?
- Depending on the fish passage alternative selected, how should the fish facilities and flood retention facility be designed/modeled to optimize existing conditions and hydraulic characteristics both upstream and downstream of the dam to maximize the effectiveness of the fish passage facilities?
- What are the appropriate design and operation requirements for floods (with climate change), debris management, and landslide prevention/mitigation?
- What materials are available for dam construction?
- Based on preliminary designs, what are the appropriate funding level estimates for dam and fish passage costs, including final design and construction contingencies?
- Based upon recent data collected at the dam site, what flow and meteorological conditions are expected at the dam site?
- If storage is available, how should the storage be used to best improve water quality downstream of the dam for fish and aquatic species? What is the effect of flow augmentation downstream?

The studies below describe in greater detail what would be required to bring the selected project to the final design phase.

2.1.1 Engineering Tasks for Dam and Fish Passage

The engineering tasks will start by completing analyses needed by the Work Group make a decision on what type of dam is desired (FRO vs. MP) and for what volume the reservoir should be designed. The current configuration of the MP dam would impound 130,000 acre-feet. Based on additional analysis conducted in this phase of the project, it may be possible to reduce the storage allocated to summer instream flow, and thereby reduce the overall dam size and cost. Conversely, an increase in storage may be desired to account for future climate change which could increase the storage volume and costs for both reservoir alternatives. Concurrent engineering studies of the dam, fish passage facilities, tunnels, spillway and other required facilities will be conducted within the biennium and support the development of a preliminary design. The engineering tasks for this biennium are described in the following sections.

2.1.1.1 Site Characterization/Geotechnical Design

Site characterization work for projects involving a major dam and reservoir are typically completed in a progressive manner in order to advance the designs in a proven step wise process, consistent with the need for decisions and documentation. Several phases of site characterization work are proposed as follows:

Phase 1: Feasibility/Conceptual Design. Includes additional geologic mapping and site characterization along with drilling, geophysical, in situ testing, and laboratory testing of the dam site and potential construction material sources (both on site and off site) to verify feasibility, and to refine the FRO and MP roller compacted concrete (RCC) dam conceptual design, and other alternatives as appropriate. This phase is starting in 2014 and will be complete in June 2015. At the completion of this phase, a determination of whether to proceed with a RCC dam type will be made. If it is determined a RCC dam is not feasible at the site, Phase 2 geotechnical services will be focused on the rockfill dam type alternative.

Phase 2: Preliminary design. Includes additional drilling, geophysical, in situ testing, and laboratory testing to support preparation of preliminary designs, cost estimates and construction schedules. The investigations will be used to update and refine the design concepts for the dam, spillway and outlet works (including tunnel[s]), and to evaluate updated construction materials including an initial mix design study if RCC dam configurations are confirmed. The investigations will further evaluate local dam site and reservoir landslide and geologic hazards (as defined in the geotechnical studies) and mitigation designs. The investigations are scoped at the level of detail needed to prepare cost estimates for project funding and cost risk evaluations (cost fragility).

The development of construction materials such as RCC aggregate and transition/filter/drain materials in close proximity to the site will significantly influence project costs and impacts associated with dam construction. A more detailed evaluation of construction materials along with a preliminary mix design and production placement schedule for the RCC dam is included in Phase 2.

Significant landslide, debris, and sediment hazards have been identified that will significantly influence design and operation of a dam at this site. Preliminary design work will include additional assessment of these hazards and concerns and incorporation of specific design elements into the planning documents and cost estimates to address these hazards.

Phase 3: Final Design. These investigations are typically targeted at specific site issues in order to address key construction risks, cost uncertainties, and to complete the final design documents. This work will be performed starting in the following biennium if the project proceeds.

Estimated Costs for 2015-2017 biennium: $3,500,000

2.1.1.2 Design Development

For this task, the following dam and fish passage design requirements would be finalized:

1. Finalize storage volume and dam size estimates for current conditions and with climate change and identify input to conceptual and preliminary design requirements
2. Select desired reservoir volume based upon type of dam (FRO or MP) and desired volume to account for future climate change
3. Seismic hazards analysis including probabilistic seismic hazard assessment (PSHA) and representative ground motions for engineering evaluations

4. Develop inflow hydrology for the construction diversion, reservoir operation criteria, and emergency spillway design
5. Finalize design guidance, criteria, and methods
6. Finalize reservoir operation plan including sediment and debris management
7. Develop a hydrologic model of basin tributaries to reservoir

An updated hydrology study for reservoir routing analysis is needed to update the conceptual design and for the preliminary design of the emergency spillway and for construction diversion using the flood control outlet works. Construction flood routing requirements would be confirmed based on construction risk evaluation methods such as those used by the U.S. Bureau of Reclamation. Subsequent risk evaluations may indicate that a separate construction diversion tunnel is required, which would have to be plugged before operation of the project could begin. Design of fish passage facilities will require accurate, site-specific flow data across a wide range of flows, and sizing of the project spillway will require analysis of extreme flood events. These analyses necessitate hydrologic modeling of the watershed upstream of the dam. The probable model for this analysis is HEC-HMS, the U.S. Army Corps of Engineers' (USACE's) software for hydrologic (rainfall/runoff) modeling, although this assumption will need to be confirmed in consultation with agencies and stakeholder groups.

A hydrologic model would be developed for the basin area tributaries to the proposed retention dam. The model would be extended downstream as far as the Doty gage to allow calibration to data from that gage. Additional data for model calibration may also be available for the Chehalis River below Thrash Creek from the current Flood Authority Early Flood Warning System project.

The hydrologic model would be calibrated to available flow data and then used to simulate long-term conditions (flood frequency events and seasonal flows) as necessary for design of the project. At a minimum, it is anticipated that the 2-, 10-, 25-, 100-, and 500-year floods would be simulated. In addition, the model would be used to re-evaluate estimates of low flow hydrology at the dam site and, if necessary, continuous hydrologic modeling would be conducted to improve low flow analyses.

In addition to the work described previously, the hydrologic model will be used to evaluate effects of projected climate change on future hydrologic conditions. This information can then be used in the development of a dam operations plan improving resiliency of the plan.

A project design criteria document would be developed to establish the basis of design of each project feature. This document would incorporate the results of the previous tasks.

Estimated Costs for 2015-2017 biennium: $750,000

2.1.1.3 Hydrologic Data Collection and Studies

Additional hydrologic data collection and analysis are needed to fill gaps in hydrologic data and to improve assessment of future climate conditions. For this task, a hydrologic model will be extended to cover the Chehalis River Basin down to the Grand Mound gage. The hydrologic model may use the same modeling platform as the model prepared for the basin tributary to the reservoir, or may involve performing a better calibration of the VIC model used by the Climate Impacts Group at University of Washington. The various models available for this work will be evaluated and compared to ensure the model selected can address the hydrologic questions needed to be addressed. The larger basin model has been requested by the Washington State Department of Ecology (Ecology) to review the effect of different storm patterns on flood flows in the Chehalis River and overall impacts of climate change on flood flows. Downscaled climate change projections from the University of Washington will be used in

the model to provide a better prediction of expected future flood flow peaks and the impact on flood flows in the Chehalis River from changed climate conditions in tributaries.

Flow gaging gap analysis has shown a significant portion of the basin remains ungaged requiring estimates of flow for large portions of the basin. Two years of additional flow information from six tributaries currently ungaged will be collected by Ecology and would support better analysis of retention and restoration projects. This work would support fish habitat and total maximum daily load (TMDL) implementation, flood management, and hydrologic modeling.

Estimated Costs for 2015-2017 biennium: $743,600

2.1.1.4 Complete Engineering Evaluations for Feasibility, Concept Design, Confirmation of Preferred Project Configuration, and Preliminary Design

The following studies and engineering analyses will be required to complete the feasibility evaluation, confirm the dam conceptual design configuration, support the identification of preferred project configuration, and perform a preliminary design for both flood retention only and multi-purpose configurations:

1. Foundation excavation objective and configuration
2. Foundation and abutment seepage and stability
3. Foundation treatment including grouting
4. Dam stability for normal, unusual, and extreme loading conditions
5. Seismic response of dam and foundation for operation basis earthquake (OBE), design basis earthquake (DBE) criteria
6. Routing of alternative construction floods, construction flood risk analyses and identification of flood routing provisions of the design configurations (cofferdams, tunnels, staging, etc.)
7. Reservoir flood routing and spillway component hydraulic evaluations to refine spillway configuration and structure requirements
8. Fish Passage hydraulics, structural and hydromechanical evaluations and analyses
9. Flood control outlet works hydraulic, geotechnical, structural, and hydromechanical evaluations and analyses
10. Sediment and debris management systems analyses and evaluations
11. Landslide characterization and mitigation design
12. Update of concept design drawings
13. Update of concept design cost estimates
14. Preparation of design technical memorandum

Estimated Costs for 2015-2017 biennium: $2,000,000

2.1.1.5 Fish Passage System Hydraulic Model

Depending on the complexity of the selected fish passage facilities, advanced hydraulic modeling using Computational Fluid Dynamics (CFD) or physical modeling systems may be required. In general, these models would be used to optimize the hydraulic conditions for fish approaching a fish passage facility, particularly for downstream passage facilities. For upstream passage where unique hydraulic conditions might occur such as fish barriers or passage through conduits, a hydraulic model study would be used to confirm the hydraulic conditions to ensure effective passage conditions are maintained throughout the facility and range of design flows.

Estimated Costs for 2015-2017 biennium: $700,000

2.1.1.6 Fish Passage Preliminary Design

With the completion of the hydraulic modeling and refined design layouts, the fish passage facility design would be advanced to a preliminary level of completion. The design effort would be conducted in concert with the dam structure design to ensure effective integration between the two structures physically as well as operationally. The preliminary design package would then be used to support the environmental and permitting work efforts. Updated cost estimates, construction reviews, value engineering studies, and constructability review would be completed at this stage of the design completion.

Estimated Costs for 2015-2017 biennium: $750,000

2.1.1.7 Washington Department of Fish and Wildlife Fish Passage Technical Assistance

Washington Department of Fish and Wildlife (WDFW) fish passage engineers will provide technical engineering assistance for designing the water retention structure fish passage facilities and aquatic species habitat restoration projects. This will ensure fish passage design meets State policy, and that restoratoin designs adhere to State Policy on Hydraulic Projects. This also enables WDFW engineers to provide the full range of technical assistance support needed when designing fish passage facilities associated with a water retention structure and restoration projects.

Estimated Costs for 2015-2017 biennium: $49,400

2.1.1.8 Flood Retention Dam Preliminary Design

This task would use the information developed from the engineering evaluations and analyses to prepare preliminary layouts and drawings of the principal structures. Dam preliminary design would include the following elements:

- Foundation excavation and preparation
- Dam cross-sections, profiles, and details
- Construction diversion
- Fish passage tunnels and dam related provisions
- Flood control outlet works
- Spillway
- Water quality outlet works
- Ancillary facilities: roads and bridges, sediment and debris management, landslide mitigation, site facilities

Estimated Costs for 2015-2017 biennium: $750,000

2.1.1.9 Flood Retention Structure Literature Review

Three comprehensive literature reviews will conducted by WDFW to adequately evaluate the impact of flood retention structures. This task will encompass three comprehensive literature reviews that will provide the science needed for evaluating project impacts on aquatic species.

Estimated Costs for 2015-2017 biennium: $211,850

2.1.1.10 Refinement of Operations Plan for Flood Retention Structure

This objective of this task is to review and refine the Operations Plan developed during the Conceptual Design phase. Information gained during the first 2 years of study will be used to update the dam operations plan. The existing HEC-ResSIM operations model will be updated and used to review these

potential alternative operational concepts to determine which conditions would optimize benefits of the dam. Hydrologic data from the U.S. Geological Survey gage at the dam site or data from the proposed hydrologic model will be used as input to the HEC-ResSIM model. Additional review of operations for debris management and landslide prevention will be performed. Changing requirements for the multi-purpose pool or changes in reservoir volume to accommodate climate change will be analyzed. Proposed operations will be summarized in an operations plan, which will inform the design and cost estimate of spillways, outlet structures, and fish passage facilities at the dam. This work will be closely coordinated with the environmental review tasks to reduce potential impacts of the project.

Estimated Costs for 2015-2017 biennium: $50,000

2.1.1.11 Floodplain Mapping

The purpose of this task is to assist in developing more accurate floodplain maps using the results of the hydraulic modeling performed for this project. The accurate maps will assist local jurisdictions with floodplain management by providing the most accurate assessment of flood hazards.

Estimated Costs for 2015-2017 biennium: $200,000

2.1.2 Summary of Estimated Costs for Engineering

The total cost of the engineering studies is summarized in Table 1.

Table 1
Summary of Engineering Costs for 2015-2017 Biennium

ENGINEERING TASK	COST
Site Characterization/Geotechnical Design	$3,500,000
Design Development	$750,000
Hydrologic Data Collection and Studies	$743,600
Complete Engineering Evaluations for Feasibility, Concept Design, Confirmation of Preferred Project Configuration, and Preliminary Design	$2,000,000
Fish Passage System Hydraulic Model	$700,000
Fish Passage Preliminary Design	$750,000
WDFW Fish Passage Technical Assistance	$49,400
Flood Retention Dam Preliminary Design	$750,000
WDFW Literature Review of Flood Retention Structures	$211,850
Refinement of Operations Plan for Flood Retention Structure	$50,000
Floodplain Mapping	$200,000
Total	**$9,704,850**

2.2 Aquatic Species Restoration and Environmental

The environmental tasks for this biennium focus on continued data collection on Fish and Non-fish use of key habitats, refinement of the effects of flood reduction alternatives, climate, and habitat restoration on aquatic species in the basin, as well as the initial implementation of habitat restoration strategies that will benefit aquatic resources. In addition, studies scoped by the agencies, such as additional water quality studies, sediment studies, and wetland and riparian studies will be completed. The proposed environmental studies for this biennium can be grouped into the categories that are described in Sections 2.2.1 to 2.2.10.

2.2.1 Adult Salmon and Steelhead Monitoring and Evaluation

Adult spring-run Chinook salmon (*Oncorhynchus tshawytscha*) holding and spawning locations in relationship to river temperature profiles will be determined by WDFW. This information is needed to confirm or adjust Ecosystem Diagnosis & Treatment (EDT) model assumptions about the impacts of cool water releases from the MP dam alternative on spring-run Chinook salmon and accurately predict effects of a dam and/or habitat restoration on spring-run Chinook salmon.

WDFW will assess Chinook salmon and steelhead (*Oncorhynchus mykiss*) population structure to help determine the magnitude of the effects of dam alternatives and/or habitat restoration on Chinook salmon and steelhead. This work will also address whether dam impacts/restoration benefits to Chinook salmon and steelhead should be modeled assuming there is one, or more than one, population for the various species. It will also validate spawner escapement distinctions for spring- vs. fall-run Chinook salmon, which is needed to more accurately assess the magnitude of effects of dam alternatives and habitat restoration on salmon and steelhead.

WDFW would also continue the salmon and steelhead spawner surveys in and above dam footprint that were initiated in 2013 to 2015. This information needs to be gathered over a number of years to account for inter-annual variability in adult returns to accurately estimate the potential effects of dam alternatives and habitat restoration on salmon and steelhead.

Information on chum salmon (*Oncorhynchus keta*) abundance and distribution is needed to accurately incorporate chum salmon into the EDT model and be able to analyze effects of habitat restoration actions on this important salmon species. Chum distribution and abundance is currently the most poorly understood among salmonids in the basin. This work will be conducted by WDFW and is required to effectively select restoration sites for chum salmon and aquatic species which benefit from marine derived nutrients provided by chum salmon.

Estimated Costs for 2015-2017 biennium: $907,000

2.2.2 In-stream Fish and Non-fish Monitoring and Evaluation

2.2.2.1 Validation on Model Inputs and Non-salmonid Fish Distribution

This task will be conducted by WDFW. Validation of Habitat Suitability Index (HSI) model assumptions for key species (largescale sucker [*Catostomus macrocheilus*], speckled dace [*Rhinichthys osculus*], Pacific lamprey [*Entosphenus tridentatus*]) is needed to determine suitable habitat of key fish species in the mainstem Chehalis (inputs to PHABSIM model). This is also required to assess in-channel habitat and impacts of FRO and MP structures on in-stream fish species.

This task would also determine the presence and distribution of in-stream fishes (the other fish species analyzed in the Aquatic Species Enhancement Plan [ASEP] completed in the 2013-2015 biennium) and

MP and FRO impacts on other fish species in the dam footprint area. This data is required to understand which in-stream fish species will be directly affected by FRO and MP structures.

This task would also extend PHABSIM measurements into the lower Chehalis and would integrate temperature into models. Validating the HSI model assumptions will enable the PHABSIM modeling to cover the balance of the mainstem river and incorporate temperature, because temperature is likely limiting and was not part of the original modeling. This will expand the reach of the modeling downstream and integrate temperature into the overall effort. The latter is important because the Chehalis is temperature-limited and potential exists that the results of previous modeling under all scenarios will change.

This task will also identify the distribution of in-channel and off-channel toad breeding habitat, along with the fish species assemblage that is associated with this habitat. The information will help characterize effects of dam alternatives and climate change on in-stream habitat and these species. This task will identify the relative importance of toad breeding habitat and co-occurring fish assemblage in the proposed reservoir footprint area in comparison to the rest of the Chehalis mainstem. This information is needed to evaluate mitigation for species-specific losses of habitat within the reservoir footprint.

Estimated Costs for 2015-2017 biennium: $772,000

2.2.2.2 Juvenile Salmonid Distribution, Diversity, and Habitat

This task is a continuation of WDFW's 2013-2015 Riverscape study that was conducted at the basin-wide scale. The purpose is to identify and relate fish distributions to key physical parameters such as water temperature and habitat characteristics. This data will also be used to verify and adjust EDT model assumptions about how habitat conditions (habitat type and temperature) influence juvenile salmon rearing locations and help guide recommendations on areas for restoration actions that target summer rearing. This work will also inform restoration site selection decisions to benefit juvenile salmonids.

This data will determine how long juvenile Chinook salmon rear in the river, whether they rear for 1 year or less than 1 year, and whether juveniles that reside more than 1 year in freshwater (yearlings) contribute to the adult population returning as spawners. The data will improve the current understanding of the role of subyearling and yearling life histories for spring-run Chinook salmon, and determine Chinook salmon rearing requirements that will be incorporated into restoration plans and designs.

Estimated Costs for 2015-2017 biennium: $460,000

2.2.3 Off-Channel Habitat

2.2.3.1 Off-Channel Habitat for Other Fish and Non-fish Species

This task will be conducted by WDFW and will provide information on off-channel habitats and their biota, for which data are almost entirely lacking, including seasonal and floodplain extensive data on off-channel habitats, their dynamics, and their biota. This data is needed to inform how dam alternatives and climate change may effect off channel habitats and species inhabiting these area, guide restoration actions, and better inform watershed plan development for off-channel habitats.

Estimated Costs for 2015-2017 biennium: $1,940,550

2.2.3.2 Waterfowl Surveys

This task will be conducted by WDFW and will provide information on how waterfowl use in-stream and off-channel habitats. This is needed to inform dam and climate change effects, guide restoration actions, and watershed plan development for off-channel habitats. This work will provides floodplain data on waterfowl useful for description impacts and guiding restoration actions.

Estimated Costs for 2015-2017 biennium: $215,000

2.2.3.3 Floodplain Conditions Mapping

This task will be conducted by WDFW and will provide current and historical mapping of Chehalis floodplain conditions which is needed to evaluate how dam alternatives and climate change may effect these habitats and waterfowl, guide restoration actions, and watershed plan development. This work will enable current and historical floodplain mapping to be assessed based on analyzing a diverse suite of species that depend on aquatic habitats in the basin.

Estimated Costs for 2015-2017 biennium: $356,250

2.2.3.4 Collect Data on Fish Use in Reservoir Area and Mainstem Chehalis River

In addition to the floodplain conditions mapping, field studies will be conducted that support the mapping effort. These are needed to resolve mapping uncertainties, such as verifying off channel habitat, water surface elevations, and quantifying floodplain areas under tree canopies. The field studies will be conducted by the consultant team in close coordination with WDFW.

Estimated Costs for 2015-2017 biennium: $75,000

2.2.4 Effects of Flood Reduction and Climate on Aquatic Species

2.2.4.1 Changes in Physical Processes

Several key data gaps were identified during the studies that were completed in the 2013 to 2015 biennium that need to be addressed to support more detailed analyses of the effects of climate and flood reduction alternatives on aquatic species. While WDFW is primarily focused on collecting field data, the consultant team is primarily focused on estimating changes in physical conditions and processes. The consultant team would conduct the following studies:

- Identify how long off-channel habitat is inundated at different flood stages
- Work with the Climate Impacts Group to calibrate predicted hydrology at Grand Mound with observed data
- Calibrate the Chehalis River HEC-RAS for use in analysis of low flow conditions
- Evaluate increased water temperatures associated with the FRO alternative based on the riparian buffer in the footprint area being removed and increased heat inputs to the system

Estimated Costs for 2015-2017 biennium: $255,000

2.2.4.2 Sediment Transport and Geomorphology

Additional studies are needed to better understand how habitat formation processes may change with flood retention structures, the effects of climate on flood frequencies and magnitude and off-channel and in-channel habitat forming processes, and developing a large wood budget for system. This may include preparing a sediment transport model of the Chehalis River. The information collected and produced will improve the estimates of the effects of flood retention structures and climate change on

habitat formation for aquatic species and be used in the Environmental Impact Statement (EIS) for the project as needed. These studies will be conducted by the consultant team.

Estimated Costs for 2015-2017 biennium: $450,000

2.2.4.3 Climate Change Research

Climate change research is needed to evaluate the impact of climate change, and inform how restoration and watershed planning should consider climate change. This research will be conducted by WDFW and will provide guidance needed for robust climate change modeling.

Estimated Costs for 2015-2017 biennium: $57,000

2.2.5 Refinement and Application of the Chehalis Basin Ecosystem Diagnosis & Treatment Model

The EDT model should be updated with the latest field data collected (the second year of Riverscape Survey data and spawner survey data for example), and expanded to include chum salmon and Grays Harbor and the tributaries that flow into Grays Harbor. The model should then be used to refine the assessments of water retention structures and operations, habitat restoration, and climate change on salmon. This task would include the following activities:

- Facilitate continued review and refinement of data used in the model by WDFW personnel.
- Incorporate new information and results from WDFW field studies and literature reviews.
- Refine adult and juvenile fish movement in the model based on results of telemetry studies.
- Refine adult spawn timing based on results of field studies.
- Refine how juvenile salmon use the MP dam reservoir based on comparative studies and a review of literature by WDFW.
- Refine data on tributary habitat and fish movement based on on-going monitoring.
- Update the EDT model with latest tributary temperature data and CE-QUAL-W2 model outputs
- Incorporate new operations and design features of the proposed flood retention alternatives and fish passage facilities, such as updated fish passage effectiveness and survival values.
- Incorporate chum salmon into the Chehalis EDT model and model habitat restoration strategies for this species of salmon.
- Work with agencies and stakeholders to refine and focus restoration and mitigation actions throughout the basin based on additional analysis using the EDT model.
- Refine the characterization of future climate change and its effects on Chehalis fish resources.
- Develop refined estimates of environmental effects of flood retention actions.

Estimated Costs for 2015-2017 biennium: $625,000

2.2.6 Habitat Restoration

2.2.6.1 Refining Habitat Restoration Strategies

In the next phase of study, the broad restoration strategies that were modeled during the 2013 to 2015 biennium will be refined. This effort by the consultant team will involve three tasks: 1) refining the EDT model assumptions on restoration effectiveness, 2) refining the restoration strategies to reflect the latest restoration science and management goals for the basin's aquatic resources, and 3) initiating the habitat restoration plan. This task will include the following activities:

- Verifying EDT model parameter assumptions.

- Organize, lead, and participate in regional workshops to incorporate the latest restoration science and management goals for the basin into the EDT model; estimate benefits to salmon and steelhead and develop implementation plans for habitat restoration.
- Organize, lead, and participate in regional workshops to translate restoration strategies and implementation plans (previous bullet) to the stakeholders in the basin and restoration practitioners. Develop a process for initiating habitat restoration through public meetings and meetings with landowners.
- Assist with the compilation of existing Conservation District, the Washington State Department of Transportation (WSDOT) and WDFW databases on barriers to fish passage.
- Assist with the identifying high priority barriers where passage information is lacking, and prioritizing culverts that should be removed to meet WDFW and WSDOT criteria and basin-wide salmon restoration goals.
- Assist with implementing habitat restoration actions, including barrier removal, land purchases, conservation easements, and in-channel, off-channel, and riparian buffer restoration.

Estimated Costs for 2015-2017 biennium: $625,000

2.2.6.2 Develop Restoration Scenarios

This task will be conducted by WDFW and will encompass additional analysis of EDT model assumptions about riparian restoration benefits (e.g., responses to changes to channel structure and temperature) to salmonid abundance and evaluate the sensitivity of EDT model results to these assumptions. This is needed to accurately assess the basin's restoration potential, as well as the effects and outcomes of proposed restoration activities.

This task will also further evaluate culvert restoration scenarios, verify EDT model assumptions about benefits of culvert restoration to salmonid abundance, and evaluate the sensitivity of the EDT model results to these assumptions. This is needed to accurately assess the basin's restoration potential, as well as the effects of proposed restoration activities.

Estimated Costs for 2015-2017 biennium: $410,000

2.2.6.3 Field Work and Analysis by Conservation Districts

This task will involve assistance by the SCCs with habitat restoration project design and installation, overseeing monitoring requirements, and participation in workshops and processes to develop habitat restoration implementation plans for in-channel and streamside habitat restoration work (buffers and riparian improvements).

Estimated Costs for 2015-2017 biennium: $480,000

2.2.6.4 Culvert Research, Fieldwork, Analysis by Conservation Districts

The SCC District's in conjunction with WDFW will Inventory culverts in the basin, compile databases, and prioritize culvert replacement. This effort is needed to support the integration of barrier databases, field surveys for barriers where information is currently missing to rate their passage effectiveness, and studies to identify the highest priority barriers to remove that meet management goals for restoring aquatic resources in the basin.

Estimated Costs for 2015-2017 biennium: $750,000

2.2.7 Bank Erosion Strategy

A strategy to address significant bank erosion problems and to ensure bank stabilization projects implemented by local agencies will be consistent with restoration strategies developed for this project will be prepared.

Estimated Costs for 2015-2017 biennium: $200,000

2.2.8 Wetland and Riparian Studies

In the first year of the biennium, wetland habitats will be inventoried by the consultant team to establish a baseline of the extent and quality of these wetlands. In the second year of the biennium analyses will be conducted to predict the indirect impact to these wetlands resulting from anticipated flow changes. The study area would be from the reservoir downstream to approximately the City of Centralia, where the hydrologic effect of the proposed reservoir may diminish to the point of not having much potential effect on wetlands.

The work is proposed to be performed using aerial inventory with color infrared photography which can be combined with existing Light Detection and Ranging (LiDAR) and high-resolution aerial photos to identify wetlands in the study area (similar to the Year 1-2 study of the reservoir and dam site). The study area will need to be negotiated with agencies, and field verification would be performed to refine the wetland mapping. Wetland mapping would include vegetation and hydrogeomorphic classification of the wetland (Cowardin and HGM Class) of potentially affected wetlands. At key wetlands that may potentially be affected by the change in Chehalis River flow regime, monitoring will be performed. Piezometers will be installed and transects established through the wetland to document existing conditions. The piezometers will be monitored for at least 1 year. Water levels recorded will be compared to river water surface elevations.

Estimated Costs for 2015-2017 biennium: $400,000

2.2.9 Water Quality

2.2.9.1 Reservoir Temperature Model

For the next biennium, the consultant team will develop and use a temperature and dissolved oxygen (DO) model of the proposed reservoir to evaluate temperature conditions in the reservoir if a multi-purpose reservoir continues to be evaluated. This model will be coordinated with Ecology's work to prepare a new temperature and DO model of the Chehalis River. Both will be prepared using CE-QUAL-W2 or similar software accepted by Ecology. The river and reservoir temperature models will be used in conjunction with the hydrologic models to help the design team optimize the operations of the MP reservoir. The temperature and DO models will be used to characterize the benefits and impacts of the selected reservoir alternative. The analyses will be performed to meet Ecology 401 certification requirements and will be used in the EIS and permit applications for the project as needed. Assistance in permitting will be provided. In addition, climate change impacts will be analyzed with the reservoir model using results from climate change hydrologic modeling performed in the Engineering task or by using hydrologic models developed by the Climate Impacts Group at the University of Washington. The climate change impacts analyses will be used to evaluate the long-term impact from climate change on water quality and provide information to assist biologists evaluate the long-term impact on aquatic species and restoration to water quality and aquatic species. Water quality impacts from construction of the FRO reservoir from tree removal in the reservoir will also be addressed.

Estimated Costs for 2015-2017 biennium: $350,000

2.2.9.2 Chehalis River Water Quality Model Development

Ecology will develop and calibrate a water quality model of the Chehalis River from the proposed reservoir site to the U.S. Geological Survey gage at Porter, based on 2013-14 surveys and the CE-QUAL-W2 platform. Target parameters include temperature, dissolved oxygen, and sediment/turbidity. This effort supports the technical analysis of habitat restoration projects and TMDL implementation.

Estimated Costs for 2015-2017 biennium: $120,000

2.2.9.3 Water Quality Modeling

Ecology will conduct continuous monitoring of water temperatures in key tributaries supporting salmon habitat. Obtaining the data supports salmon habitat restoration planning and TMDL implementation.

Estimated Costs for 2015-2017 biennium: $100,000

2.2.10 Summary of Estimated Costs for Environmental Studies

The total cost of the environmental studies is summarized in Table 2.

Table 2
Summary of Environmental Costs for 2016-2017 Biennium

ENVIRONMENTAL TASK	COST
Adult Salmon And Steelhead Monitoring And Evaluation	$907,000
In-Stream Fish And Non-Fish Monitoring And Evaluation - Validation of Model Inputs and Non-salmonid Fish Distribution	$772,000
Juvenile Salmonid Distribution, Diversity, And Habitat	$460,000
Off-Channel Habitat For Other Fish And Non-Fish Species	$1,940,550
Waterfowl Surveys	$215,000
Floodplain Conditions Mapping	$356,250
Collect Data On Fish Use In Reservoir Area And Mainstem Chehalis River	$75,000
Effects Of Flood Reduction, Climate, And Habitat Restoration On Aquatic Species – Changes in Physical Processes	$255,000
Sediment Transport and Geomorphology	$450,000
Climate Change Research	$57,000
Refinement and Application of the Chehalis Basin Ecosystem Diagnosis & Treatment Model	$625,000
Habitat Restoration – Refining Habitat Restoration Strategies	$625,000
Develop Restoration Scenarios	$410,000
Field Work And Analysis by Conservation Districts	$480,000
Culvert Research, Fieldwork, Analysis by Conservation Districts	$750,000
Bank Erosion Strategy	$200,000
Wetland and Riparian Studies	$400,000
Water Quality – Reservoir Temperature Model	$350,000
Chehalis River Water Quality Model Development	$120,000
Water Quality Modeling in Tributaries	$100,000
Totals	**$9,547,800**

2.3 Permitting and Regulatory Compliance

2.3.1 Permitting

Once the preferred alternative is chosen, preparations will need to begin on coordinating the studies and consultations with the agencies. It should be noted that it is difficult to estimate permit requirements when the project design and operation have not been determined yet or what the agencies will require once an application is submitted. Below are descriptions of what would be anticipated for the next biennium in terms of permitting based on our understanding of the proposed alternatives and current regulations. As stated, permitting would begin once the preferred alternative is identified; therefore, the permitting would be initiated in the next biennium, but the majority of the permitting effort would be completed in the following biennium (2017 to 2019).

It is possible that some agencies may require a permit be submitted to initiate the National Environmental Policy Act (NEPA) or Washington State Environmental Policy Act (SEPA) process. However, those permits would be primarily procedural to engage the agency, and would not require a substantial level of effort.

The permits currently identified for the two options being evaluated are identified in Table 3. The timelines for the individual permits vary and should be verified with the regulatory agencies early in the process. Once verified, a detailed schedule outlining the sequence of permits and any required public reviews should be prepared to verify sequence and permit timelines.

Table 3
Permits Required for the Flood Retention Facilities

PERMITS	ALTERNATIVES	
	FLOOD RETENTION ONLY	MULTI-PURPOSE[1]
Federal Permits		
U.S. Army Corps of Engineers Clean Water Act Section 404 Permit	✓	✓
Section 7 Endangered Species Act Consultation	✓	✓
Magnuson Stevens Act	✓	✓
Section 106 National Historic Preservation Act Consultation	✓	✓
Fish and Wildlife Coordination Act	✓	✓
Federal Emergency Management Agency Flood Rise Analysis	✓	✓
State Permits		
Ecology CWA Section 401 Water Quality Certification	✓	✓
Ecology Water Rights/Reservoir Permit		✓
Ecology Dam Construction Permit	✓	✓
Ecology NPDES Construction Stormwater Permit	✓	✓
Ecology Sand and Gravel Permit	✓	✓
Ecology Air Quality Land Clearing Burn Permit	✓	✓
WDFW Hydraulic Project Approval	✓	✓
WDNR Aquatic Use Authorization	✓	✓
Local Permits		
Lewis County Shoreline Conditional Use Permit	✓	✓
Lewis County Floodplain Development Permit	✓	✓
Lewis County Critical Areas Ordinance	✓	✓
Lewis County Grading Permit	✓	✓
Lewis County Building Permit	✓	✓

Note: 1. It is assumed that hydroelectric power generation will not be included in the multi-purpose facility.
CWA = Clean Water Act
NPDES = National Pollutant Discharge Elimination System
WDNR = Washington State Department of Natural Resources
WDFW = Washington State Department of Fish and Wildlife

Many of the studies that were previously prepared will support the permitting processes, and some of those studies will continue. However, there are additional studies that will need to be initiated once the project is further refined and the permitting process initiated.

Estimated Costs for 2015-2017 biennium:

Federal Permitting: $100,000, State Permitting: $60,000, Local Permitting: $40,000

Total: $200,000

2.3.2 National Environmental Policy Act/Washington State Environmental Policy Act

2.3.2.1 Programmatic Environmental Impact Statement

At this time, it is anticipated that a programmatic NEPA/SEPA EIS will be prepared to link any upfront restoration efforts with the overall project and allow early restoration actions to be included as project mitigation. It is also anticipated that the NEPA and SEPA processes will be initiated through scoping shortly after agency roles are agreed upon shortly after the start of the biennium.

It is assumed that the lead NEPA and SEPA agencies will be identified at the beginning of the biennium and roles of all agencies will be identified and agreed upon. It is likely that USACE will be the NEPA lead and as such, will require a third party contractor be identified and engaged by the NEPA lead agency to assemble the NEPA Programmatic EIS. For SEPA, it is likely Ecology will be the lead agency. The majority of the technical studies in support of the NEPA and SEPA EIS will be prepared under the direction of the project proponent. As such, USACE will provide direction through the third party contractor to ensure all necessary technical studies are completed as required for NEPA. At this time, it is anticipated that the programmatic NEPA/SEPA EIS will be completed in an 18-month time frame.

A project level EIS which describes the environmental impacts from specific projects (such as dam) would be required after completion of the Programmatic EIS.

Estimated Costs for 2015-2017 biennium: NEPA/SEPA Programmatic EIS: $1,000,000, includes third-party contractor costs

Washington State Department of Ecology Costs to Support Programmatic EIS

Ecology will provide direction and participate as the State Lead Agency for the preparation of the Programmatic SEPA/NEPA document.

Estimated Costs for 2015-2017 biennium: $200,000

2.3.2.2 Project Level Environmental Impact Statement

It is assumed that USACE will also be the NEPA lead for the project level EIS and as such, will require that a third-party contractor be identified and engaged to assemble the NEPA EIS. The majority of the additional technical studies in support of the project specific NEPA and SEPA EISs will be prepared under the direction of the project proponent. As such, USACE will provide direction through the third-party contractor to ensure all necessary technical studies are completed as required for NEPA.

The SEPA lead could be Ecology or a local project sponsor. The project-specific NEPA/SEPA EIS would be initiated upon completion of the programmatic NEPA/SEPA EIS and would be completed in 2 years, including scoping. It is anticipated the project-level EIS would be started in this next biennium and completed in the following biennium.

Estimated Costs for 2015-2017 biennium: NEPA/SEPA project specific EIS: $500,000 in this biennium.

2.3.3 Summary of Estimated Costs for Permitting and Compliance

The total cost of the environmental studies is summarized in Table 4.

Table 4
Summary of Permitting and Regulatory Costs for 2015 to 2017 Biennium

PERMITTING AND REGULATORY TASK	COST
Permitting	$200,000
NEPA/SEPA Programmatic EIS	$1,000,000
Ecology Support as SEPA Lead	$200,000
NEPA/SEPA Project Level EIS	$500,000
Total	**$1,900,000**

2.4 Economics

2.4.1 Environmental Economics Analysis

The environmental economics analysis in the next biennium will include updates from the other study disciplines gathered on fish or non-fish impacts of project alternatives. The environmental economics task will apply the same methodology as established in the current study to determine the potential impact of project alternatives.

Estimated Costs for 2015-2017 biennium: $100,000

2.4.2 Benefit/Cost Study Update

The Benefit/Cost study in the next biennium will include any updates from the other study disciplines during that period including updated construction cost estimates, fish and wildlife mitigation, hydraulic modeling, and environmental effects (if appropriate). This benefit/cost study will follow the same methodology employed during the first two years of the 8-year study period. Costs and benefits will be updated as they are developed in preliminary design or identified with additional study such as improved hydraulic modeling. Results will be presented in an updated report and presentation.

Estimated Costs for 2015-2017 biennium: $150,000

2.4.3 Scenario Analysis

In addition to the development of the base case benefit/cost analysis, the decision makers may request additional scenarios to be modeled. In particular, climate change scenarios may be of interest.

Estimated Costs for 2015-2017 biennium: $150,000

The cost estimate has a wide range due to the uncertainty in participation. The low cost estimate assumes the same methodology used in previous studies with updated data only and minimal participation in project meetings for the first 2 years. The high cost estimate assumes additional analysis and research is required as well as continued monitoring of the project to ensure results will be comparable with the economic analysis.

2.4.4 Summary of Estimated Costs for Economics

The total cost of the economics studies is summarized in Table 5.

Table 5
Summary of Economics Costs for 2015-2017 Biennium

ECONOMICS TASK	COST
Environmental Economics Analysis	$100,000
Benefit/Cost Study Update	$150,000
Scenario Analysis	$150,000
Totals	**$400,000**

3 Scope and Budget for Project Elements for 2015-2017 Biennium

3.1 Small Projects

For the next biennium, a series of smaller local projects across the Basin will be constructed focused on protecting key infrastructure, controlling shoreline erosion, and improving water conveyance and drainage at key points in the Basin. The Flood Authority project committee reviewed a series of proposed small projects developed during the 2013 to 2015 biennium, and created a prioritized list of projects to recommend for construction during the 2015 to 2017 biennium.

Final Design and Permitting: Before construction begins, there is a need to collect additional design information, perform additional hydraulic modeling, feasibility studies, and finalize project design. After designs are finalized, local project sponsors would begin the permitting process.

Construction: After design and permitting, construction of a set of small projects would begin.

Estimated Small Project Costs for 2015-2017 biennium: $12,000,000

3.2 Floodproofing

During the next biennium, a basin-wide floodproofing effort will be developed and implementation will begin. The floodproofing effort will involve raising residential homes within the 100-year floodplain that would not be fully protected through the construction of a water retention structure or local small flood control project. With this effort, all damage-prone parts of the residential structure are elevated above the flood protection level on a foundation intended to resist flood damage. With construction of a dam, the estimated cost to floodproof all inundated structures in the 100-year floodplain is $44 million; the goal for the 2015 to 2017 biennium is to floodproof 8 to 12% of those structures, with continued implementation of the program in the 2017 to 2019 biennium.

Refine Floodproofing Program: Before beginning implementation of the floodproofing program, a number of activities are required:

- Local communities will prepare a repetitive loss area analysis for each of their jurisdictions. The analysis would be done by the community in accordance with Community Rating System (CRS) criteria.
- Technical assistance will be provided to communities interested in mitigating their repetitive losses. The assistance would include various products for local staff and residents and on-call response.
- The Flood Authority will prepare floodproofing criteria and a prioritization process for participation in the program.
- Additional survey work will refine flood damage estimates for structures identified to participate in the program.

Implement Floodproofing Program: Implementation of the floodproofing program will require the following:

- Informing residents, based on the prioritized list, of the financial assistance available for floodproofing.

- Hiring contractors to begin floodproofing residences of willing landowners.

Estimated Cost of Refining and Implementing Program for 2015-2017 Biennium: $5,000,000

3.3 Farm Pads

The SCC Districts will be funded to install farm pads and construct evacuation routes to protect livestock, equipment, and other farm supplies and products from flooding.

Estimated Costs for 2015-2017 biennium: $500,000

3.4 Priority Culverts

For the next biennium, a set of priority culverts that block fish passage will be replaced. A list of priority culverts exists and will be updated in the Environmental element of this project. Projects will be selected from that list based upon their overall benefit to fisheries.

Before construction begins, there is a need to collect additional design information, perform surveys, hydraulic modeling, obtain permits and finalize project design. After designs are finalized, local project sponsors would implement the projects.

Estimated Priority Culverts Costs for 2015-2017 biennium: $5,000,000

3.5 Restoration Design and Construction

For the next biennium, one or a couple restoration projects will be designed and constructed. The projects will be selected based upon the aquatic species restoration plan, their benefit to fisheries, implementation costs and ability to implement within the biennium.

Before construction begins, there is a need to collect additional design information, perform additional hydraulic modeling, feasibility studies, and finalize project design. After designs are finalized, local project sponsors would begin the permitting process.

Estimated Restoration Design and Construction Costs for 2015-2017 biennium: $1,000,000

3.6 Projects that Improve Water Quality and Fish Habitat

A total of 119 eroding banks in the upper basin and 20 in the lower basin have been identified where that would benefit water quality and fish habitat. These sites are being prioritized and the SCCs are working with the landowners and the Natural Resources Conservation Service (NRCS) to determine where and how to proceed with these projects. These projects would be engineered to allow increased flow through bank shaping with bioengineered stream bank protection to reduce sedimentation and benefit fish habitat.

Estimated Costs for 2015-2017 biennium: $500,000

3.7 Landowner Compensation Costs

To initiate restoration actions, a landowner compensation program would be started to acquire property or easements. This will start after completion of the restoration strategy described in Section 2.

Estimated Costs for 2015-2017 biennium: $2,000,000

4 Total Costs for 2015-2017 Biennium

Table 8 summarizes the estimated costs for the 2015-2017 biennium. In addition to the program elements described in Section 2, additional costs are added for project implementation and costs related to public involvement, general agency participation and management, and project management.

Table 8
Total Costs for 2015-2017 Biennium

ELEMENT OF CHEHALIS BASIN STRATEGY	COST
PROGRAM ELEMENTS	
Engineering	
Site Characterization/Geotechnical Design	$3,500,000
Design Development	$750,000
Hydrologic Data Collection and Studies	$743,600
Complete Engineering Evaluations for Feasibility, Concept Design, Confirmation of Preferred Project Configuration, and Preliminary Design	$2,000,000
Fish Passage System Hydraulic Model	$700,000
Fish Passage Preliminary Design	$750,000
WDFW Fish Passage Technical Assistance	$49,400
Flood Retention Dam Preliminary Design	$750,000
WDFW Literature Review of Flood Retention Structures	$211,850
Refinement of Operations Plan for Flood Retention Structure	$50,000
Floodplain Mapping	$200,000
Environmental	
Adult Salmon And Steelhead Monitoring And Evaluation	$907,000
In-Stream Fish And Non-Fish Monitoring And Evaluation - Validation of Model Inputs and Non-salmonid Fish Distribution	$772,000
Juvenile Salmonid Distribution, Diversity, And Habitat	$460,000
Off-Channel Habitat For Other Fish And Non-Fish Species	$1,940,550
Waterfowl Surveys	$215,000
Floodplain Conditions Mapping	$356,250
Collect Data On Fish Use In Reservoir Area And Mainstem Chehalis River	$75,000
Effects Of Flood Reduction, Climate, And Habitat Restoration On Aquatic Species – Changes in Physical Processes	$255,000
Sediment Transport and Geomorphology	$450,000
Climate Change Research	$57,000
Refinement and Application of the Chehalis Basin Ecosystem Diagnosis & Treatment Model	$625,000
Habitat Restoration – Refining Habitat Restoration Strategies	$625,000
Develop Restoration Scenarios	$410,000
Field Work And Analysis by Conservation Districts	$480,000
Culvert Research, Fieldwork, Analysis by Conservation Districts	$750,000
Bank Erosion Strategy	$200,000
Wetland and Riparian Studies	$400,000
Water Quality – Reservoir Temperature Model	$350,000
Chehalis River Water Quality Model Development	$120,000

ELEMENT OF CHEHALIS BASIN STRATEGY	COST
Water Quality Modeling in Tributaries	$100,000
Permitting and Regulatory Compliance	
Permitting	$200,000
NEPA/SEPA Programmatic EIS	$1,000,000
NEPA/SEPA Project Level EIS	$500,000
Ecology Support as SEPA Lead	$200,000
Economics	
Environmental	$100,000
Benefit/Cost Study Update	$150,000
Scenario Analysis	$150,000
Subtotal of Program Element Costs	$21,552,650
PROJECT ELEMENTS	
Small Projects	$12,000,000
Floodproofing	$5,000,000
Farm Pads	$500,000
Priority Culverts	$5,000,000
Restoration Design and Construction	$1,000,000
Projects that Enhance Water Quality and Fish Habitat	$500,000
Landowner Compensation	$2,000,000
Subtotal of Project Element Costs	$26,000,000
PROJECT MANAGEMENT AND PARTICIPATION COSTS	
Public Involvement	$200,000
Independent Science Review	$200,000
Flood Authority General Participation	$570,000
WSDOT General Participation	$400,000
DNR General Participation	$157,600
Chehalis Tribe General Participation	$200,000
Quinault Indian Nation General Participation	$200,000
Environmental Community Participation	$200,000
Ecology General Participation	$320,000
WDFW General Participation	$483,395
Conservation District Habitat Plan General Participation	$82,000
Project Management[1]	$2,300,000
Total	$52,865,645

Notes:

1. This is approximately 10% of all program element and general participation costs.

DNR = Washington Department of Natural Resources
Ecology = Washington State Department of Ecology
NEPA = National Environmental Policy Act
SEPA = Washington State Environmental Policy Act
WDFW = Washington State Department of Fish and Wildlife
WSDOT = Washington State Department of Transportation