

# THE CHEHALIS BASIN STRATEGY

## Reducing Flood Damage and Enhancing Aquatic Species

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*Strategy and Actions, July 2013–June 2015*

*November 12, 2013*

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*Strategy and Actions July 2013–June 2015*

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### Introduction

The Governor's Chehalis Work Group has been asked by Governor Jay Inslee to recommend the next steps for reducing flood damage and enhancing aquatic species in the Chehalis River Basin in southwest Washington State. In developing their recommendations, the Work Group, with the support of the Chehalis Basin Flood Authority, is advising the Washington State Office of Financial Management (OFM) on the implementation of \$28 million in capital investments to build projects that have immediate flood damage reduction and/or aquatic habitat benefits, fill data gaps, evaluate the feasibility of flood damage reduction actions, and enhance aquatic species in the Basin. Recommendations are due to Governor Inslee and the Legislature in November 2014. The Work Group members are: The Honorable David Burnett, Chairman of the Chehalis Tribe; Honorable Vickie Raines, Mayor of Cosmopolis and Chair of the Flood Authority; Karen Valenzuela, Thurston County Commissioner and Vice Chair of the Flood Authority; J. Vander Stoep, private attorney and Pe Ell Alternate to the Flood Authority; Jay Gordon, dairy farmer and President of the Washington State Dairy Federation; Sandi Triggs, Capital Budget Advisor to the Governor; and Keith Phillips, Governor's Energy and Environment Advisor. The OFM has contracted with the William D. Ruckelshaus Center (a joint effort of the University of Washington and Washington State University that fosters collaborative public policy) to provide facilitation and project management. Jim Kramer, a private consultant, is the project manager for the Center and facilitator of the Work Group.

### Background

Over the last century, major floods have occurred about twice per decade in the Chehalis Basin causing loss of human life, loss of livestock, and damage to homes, businesses, farms, roads, and railways. The worst floods on record have happened recently – in 1990, 1996, 2007 and 2009. The economic damages of the 2007 flood alone were estimated at over \$900 million, with a third of that damage coming from disruption and damage to the transportation system, Interstate 5, state highways, and rail lines. These recent floods prompted governments and residents of the Basin to re-commit to the task of flood damage reduction. There is broad agreement in the Basin that more can and should be done to reduce damages from large floods.

In recognition of real need to take action to reduce the risk of damage from flooding in the Chehalis Basin, the 2011 Legislature required the Office of Financial Management (OFM) to prepare a report addressing a series of technical questions and — in coordination with tribal governments, local governments, state and federal agencies — to recommend priority flood damage reduction projects for the Chehalis Basin. OFM retained the

Ruckelshaus Center to coordinate the development of the report using technical information provided by other agencies and organizations, and to conduct a situation assessment of flood alternatives, and perspectives and relationships between decision makers, residents, and other stakeholders. The draft report – the Chehalis Basin Flood Mitigation Alternatives Report -- was made available for public review in July 2012, and finalized in December 2012.

In August 2012—as a follow up to the draft report, and in recognition that a time for decision-making had come—then Governor Christine Gregoire convened the Work Group mentioned above and tasked them to develop recommendations for flood damage reduction projects. The Governor asked Jim Kramer working with the Ruckelshaus Center to facilitate and coordinate the Work Group.

Working with other Basin leaders and their respective constituents, the Governor’s Work Group developed a set of recommendations that garnered broad support across the Basin. Governor Gregoire included \$28M in her proposed 2013-15 capital budget to the Legislature to implement the Work Group’s recommendations. Governor Inslee subsequently endorsed this investment in the Chehalis Basin, as did the Legislature. The capital budget includes the full \$28.2M requested for work in the Chehalis Basin.

At Governor Inslee’s request, the Work Group is now providing oversight to implementation of the Chehalis program, which is administered by OFM. The Work Group also is providing the Governor and Legislature with recommendations for next steps for water retention, flood reduction alternatives for Interstate 5, other flood damage reduction projects, and a strategy and projects to enhance aquatic species. Work Group recommendations will include a proposed budget for the 2015-17 biennium. All the recommendations are due to the Governor by November 2014.

## Objectives for the 2013–15 Work

The core of the Work Group’s approach is a commitment to a Basin-wide approach to flood damage reduction. A Basin-wide approach needs to significantly reduce flood damage for people and communities throughout the Basin by maximizing benefits and avoiding or minimizing adverse human and environmental impacts. It needs to ensure public safety, protect key community infrastructure and maintain public services during emergencies. A Basin-wide approach can’t solve one community’s flooding problems by making another community’s problems worse.

An equally-critical element of the approach is that the harvestable fisheries resources and the aquatic habitat quality and productivity of the Basin be increased. Aquatic species in the Basin are significantly diminished from their historic level. Spring Chinook salmon are estimated to be less than 15% of their historic numbers. Other species, like Oregon Spotted Frog, could soon be listed under the Endangered Species Act. Investment in flood damage reduction must go hand-in-hand with improvements to the environmental health and resiliency of the Basin. Flood damage reduction projects must avoid or fully mitigate environmental impacts; but more than mitigation is needed to enhance the viability and abundance of aquatic species in the Basin. A long-term strategy with goals for key species and a specific set of actions to achieve these goals is needed. The Chehalis funding includes resources for managers to develop such a strategy --- the first ever for the Basin.

Finally, the Work Group acknowledges that flooding is a natural occurrence and will continue to occur. Communities need to be as prepared as possible with flood warning and emergency response systems. Future development in the Basin should not put more people or development in harm’s way, and should not increase damages or costs to people already living in and using the floodplain. By planning ahead, respecting what the River can do, and managing floodplains smartly, the Basin can reduce the risks from future floods.

A combination of actions is needed to significantly reduce damages from major floods. The emphasis is on substantial damage reduction from flood events like those in 1996, 2007 and 2009, although many of the projects contemplated also would reduce damages from more frequent, less severe flooding. Actions needed include: (1) large-scale capital projects affecting a broad geographic area like a water retention structure, and/or improvements to protect Interstate 5; (2) smaller-scale capital projects with more localized benefits; (3) aquatic species enhancement plan and environmental projects to enhance overall conditions, aquatic habitat, and abundance of aquatic species in the Basin; (4) land use management to help people already in the floodplain and reduce the potential that new development will increase flood damage; and (5) an effective system of flood warning and emergency response. No single project or set of projects will completely protect the Basin from all damage during major floods. There are significant differences amongst leaders in the Basin about the right balance for investment in each of the five categories of action, but there is broad agreement that some investment is needed in each category to reduce flood damage substantially. There also is agreement that action can be taken now with certainty to implement some actions; other actions, including large-scale capital projects, need more feasibility analysis before decisions can be made about the best way to proceed.

## Work Plan

Over the next two years, work will be carried out in the areas of water retention, hydrology and hydraulics, environmental characterization and assessment, Interstate 5 protection, flood risk management and survey of floodplain structures, comparison of potential flood hazard reduction actions, aquatic species enhancement, and implementation of smaller flood risk reduction and environmental enhancement projects. The outcomes of this work will inform interested parties and the public, and provide input to the Work Group as it develops recommendations for the next steps to reduce flood damage and enhance aquatic species. Ultimately work carried out under this program, along with the Work Group recommendations, will enable decisions to be made about the best mix of additional large and small-scale projects to significantly reduce flood damages in the future and the strategy to enhance aquatic species.

### A. WATER RETENTION

A number of large and small water retention alternatives have been investigated over the last two decades. Based on these investigations, the only known potentially feasible water retention project that could significantly reduce peak flood elevations (and thereby reduce flood damages) for both upstream and downstream communities during major flooding is a large upstream water retention structure on the mainstem of the Chehalis River above the town of Pe Ell. Such a structure could hold back storm flows when the mainstem of the Chehalis is the principal source of major flooding, and it could hold back mainstem flows when tributaries like the Skookumchuck and Newaukum are flooding.

Preliminary feasibility studies on a large upstream water retention structure have been done; however, at this time, it is not yet known whether this type of water retention structure is actually feasible. The next steps are to refine the engineering designs, further analyze dam safety, and identify more specifically the implications for water quality, quantity, upland and aquatic species. When this additional information is available, the assessment of the economic benefits weighed against the cost of large upstream water retention can be further refined, and, ultimately, decisions about whether or not to pursue water retention in the Basin can be made.

Evaluation of the feasibility of water retention will focus on dam design and fish passage. The Dam Design Study will answer the following question: What type of water retention structure provides the optimum benefits and least adverse impacts? The work will include research on the latest approaches to design and operation of dams throughout the world to achieve flood control and other benefits while minimizing negative impacts. One or two

designs will be chosen in the winter of 2013/2014 for additional engineering and design work and to evaluate their benefits and impacts using various models.

The objective of the fish passage analysis is to confirm project fish passage objectives and how they could be met. There will be a review of applicable fish passage technologies in the Northwest and globally. The considerations for fish passage at the potential dam site will be determined. A number of fish passage options will be evaluated in concert with the two structural flood mitigation alternatives, and detailed design concepts will be developed for alternatives that appear to meet the fish passage objectives and design considerations for this project. These alternatives will then be incorporated into the overall flood mitigation structure alternatives and quantitatively evaluated as part of other tasks.

## B. HYDROLOGY AND HYDRAULICS

Hydrologic and hydraulic analysis will better define baseline conditions and support evaluation of alternative designs and dam operations as well as other actions in the Basin to reduce flood damage. Precise hydrologic data is needed to quantify the potential impacts and benefits of potential water retention structures and define an optimal operations plan for the potential dam. The hydrologic and hydraulic studies also are key to evaluation of other flood damage reduction projects and programs including the alternatives for I-5 with and without a dam, and the potential benefits from a suite of smaller projects. This work will involve review and analysis of hydrology data from the Chehalis River flow measurement gage at Doty, Washington, and updates to the existing Chehalis Basin hydraulic model to provide more accurate flood inundation information for use in the economic benefit-cost study and environmental assessment.

## C. ENVIRONMENTAL ASSESSMENT

It is known from previous research that there will be environmental impacts associated with any water retention project. There also is the potential for environmental benefits from a large upstream water retention structure. It is important to determine if the optimum structure is one that would remain open to the river (and to the passage of out migrating salmon) except during flooding, or if the optimum structure would be one holding a permanent reservoir allowing the release of water during summer months, potentially improving water quality downstream. It is critical to better understand how and where aquatic species currently use the River, to know what it will take to fully offset risks to aquatic species and water quality from water retention, and to understand how best to significantly improve the conditions for aquatic species in the Basin.

The environmental assessment work focuses on collecting data on aquatic and terrestrial species, water quality, and sediment transport to evaluate the potential effects of a dam and other potential flood mitigation projects, and development of an aquatic species enhancement plan. Habitat and wildlife research has begun and will continue to be carried out to determine a baseline of species presence and abundance in and around the potential reservoir area. This work will:

- Determine the composition, distribution, and abundance of fish, other aquatic species, and species of concern as identified by the Washington Department of Fish and Wildlife (WDFW) and other stakeholders in the potential inundated reach as well as select reaches up and downstream of the potential Dam site. Fish surveys will be conducted using various methods such as netting, electrofishing, and snorkeling. The research objectives are to determine fish presence, distribution, and abundance to inform the assessment of potential impacts of water retention.
- Assess juvenile salmon outmigrant age distribution, abundance and timing, through use of a juvenile rotary screw trap which was installed in January 2013 on the mainstem Chehalis River near the location of the proposed dam. This information is needed to characterize smolt timing and abundance over time to: (1) capture how migration timing and magnitude varies with flow and environmental conditions; (2)

gather information on species of interest to tribal nations and other interested parties, including species for which no data exists currently (summer steelhead, coastal cutthroat, and lamprey); and (3) inform design of fish passage facilities to successfully pass adult and juvenile fish (location, type, and size of the facilities) and meet mitigation requirements.

- Assess adult salmon and steelhead spawning timing, distribution, and abundance through snorkel, boat, and aerial surveys, including summer steelhead and coastal cutthroat trout. Beginning in fall 2013, WDFW staff will begin intense monitoring in the upper Chehalis River (above river mile 108) to better estimate total escapement for salmon and steelhead. The objective is to conduct a census survey of all potential spawning habitat (approximately 33 linear miles) for spring and fall Chinook, coho, and winter steelhead. Total estimates of spawner abundances will be calculated after it is determined that the spawning period for each species is complete. The estimates of spawner abundance and distribution will be provided to biologists working with population and habitat models.
- Determine the amount of off-channel habitat and other floodplain habitats used by aquatic species and other species of concern.
- Collect historic and current local knowledge from fishers and other people who use the River and its resources.

#### D. INTERSTATE 5 ALTERNATIVES

Even with an upstream water retention structure, Interstate 5 may still require flood protection investments in Chehalis and Centralia, though smaller than would otherwise be needed. As the evaluation of a large upstream water retention facility is conducted, there will be a simultaneous evaluation of I-5 protection alternatives with and without water retention.

WSDOT has conducted a preliminary evaluation of potential projects to protect I-5 and the Chehalis-Centralia Airport, and improve access to critical facilities during flooding. In the 2013–15 biennium, WSDOT will conduct additional work to select a “recommended alternative for budgetary purposes” to protect I-5, the Airport, and improve access to critical facilities.

Four concepts will be considered when selecting a recommended alternative for budgetary purposes: (1) levees and walls, (2) raising I-5, (3) Interstate express lanes, and (4) an Interstate emergency by-pass. The decision to move into the permitting phase for a dam and/or other projects will be made by December 1, 2014; however, entering the permitting phase would not guarantee a dam will be built. Therefore, WSDOT will identify a recommended I-5 alternative for budgetary purposes and will develop a scope, schedule and estimate for the recommended alternative in both a “with dam” and “without dam” scenario.

#### E. FLOOD RISK MANAGEMENT & SURVEY OF FLOODPLAIN STRUCTURES

Over the past three years, the flood warning system in the Chehalis Basin has significantly improved, and individual Basin governments continue to improve their emergency preparedness efforts. Progress on floodplain management policies and programs also has been made, though additional improvements are possible. Further enhancements to state and local land use policies will help ensure new development and other land management activities do not increase the risk of additional flood-related damages and, to the extent possible, reduce damages and costs to existing development affected by flooding. A detailed analysis will be conducted of each local government’s floodplain management program. Recommendations will be developed to improve the consistency and effectiveness of floodplain management across the Basin.

As part of this effort, the number of buildings and other structures in the Chehalis River floodplain will be determined, and a representative sample will be surveyed to help quantify flood damages under existing

conditions and with potential flood damage reductions projects. The limits of the structure survey will be the Chehalis River floodplain between Pe Ell and the northern city limits of Centralia.

## F. COMPARISON OF ALTERNATIVES TO REDUCE FLOOD DAMAGE

Based on the results of the water retention structure feasibility work, I-5 flood mitigation alternatives, and small projects scenario feasibility research, analyses will be conducted to compare the value of different alternatives against each other. These analyses will include:

- A benefit/cost analysis
- An environmental benefit/cost analysis
- Transportation benefit analysis
- A preliminary assessment of funding sources and strategies

## G. AQUATIC SPECIES ENHANCEMENT PLAN

The Chehalis Basin is the second largest watershed by area in Washington, with culturally and economically significant salmon runs; however, environmental degradation has contributed to major reductions in those runs. Despite significant efforts by many to restore some of the environmental conditions in the Basin, there is no comprehensive strategy for enhancement of aquatic species. Leaders in the Basin, the Governor, and state agencies are committed to enhancing aquatic species in the Basin hand-in-hand with projects to reduce future flood damages. The goal of this work is to significantly enhance the aquatic environment and dramatically increase salmon runs. A comprehensive aquatic species enhancement plan, focused on the upper Chehalis, Water Resource Inventory Area 23, will be developed to include:

- The current and historical population structure of salmon, steelhead, sturgeon, lamprey and other key fish populations in the Chehalis Basin.
- Viable Salmonid Population (VSP) analysis of Chehalis River Basin fish populations and the goals for enhancement of key species.
- Identification of data gaps for both fish and habitat to identify data that should and could be collected to fill these gaps.
- Descriptions of habitat factors currently limiting fish populations in the Chehalis Basin.
- Identification of restoration, protection, and enhancement strategies and actions (including measures already identified and/or implemented) to address limiting factors and to improve the status of fish populations in the Chehalis Basin.
- An ecosystem-based analytical framework to characterize the impacts of a dam and reservoir system on the Chehalis Basin.
- Assessment of the potential effects of alternative flood control actions on the status of habitat and fish populations in the Chehalis Basin.
- Qualitative and quantitative descriptions of how climate change may exacerbate existing stressors on fish populations in the Chehalis Basin.

## H. CONSTRUCTION OF KNOWN, SMALLER FLOOD RISK REDUCTION & ENVIRONMENTAL ENHANCEMENT PROJECTS

With or without large-scale water retention, local projects will be needed to protect key infrastructure, control shoreline erosion, and improve water conveyance and drainage at key points in the Basin. A program of smaller projects aimed at protecting key infrastructure and priority areas through the Basin may provide a measureable reduction in damages from major floods. As the evaluations of large-scale water retention and I-5 protection



alternatives are completed, a combination of smaller projects will be explored across the Basin, and there is funding to construct over 20 projects now (see Appendix 1). Further analysis of a suite of smaller-scale projects will help determine how much damage reduction is possible, and at what cost, and provide additional context for considering large-scale projects. There is also funding to construct three important projects that improve ecosystem functions and have direct benefits for aquatic species (see Appendix 1).

## Opportunities for Engagement

A critical component for the success of the overall Chehalis Basin effort is effective engagement of technical, policy and community interests. A technical committee of experts from state agencies and other organizations will be created to provide frequent direction to the selected contractor and confirm the assumptions that are used in the different technical analyses. The process is designed to provide effective and efficient opportunities for the engagement of other technical, policy and community interests. There will be three separate technical and policy workshops in fall 2013, winter 2014 and late summer 2014. Each of the workshops will be open to the public. Each technical workshop will be followed by a policy workshop and decisions by the Work Group as it forms its recommendations to the Governor and Legislature. In addition, there will be two series of public meetings; one in February 2014 and the other in September 2014.

## Schedule

### FALL 2013

- Review research on potential dam and fish passage designs, and provide input into the range of alternatives that should be considered.
- Identify small project opportunities to reduce flood damage in concert with or without larger projects like the potential dam and Interstate 5 options.
- Survey the elevation of structures in the floodplain and estimate of the total number of structures that are affected by flooding now and could be affected in the future with the alternatives.
- Identify the criteria for the benefit/cost analyses and other evaluation criteria for comparing alternatives.
- Perform hydrologic and hydraulic analyses to better define flooding conditions in the Basin.
- A technical workshop will be held in late October and a policy workshop in early November.

### WINTER 2014

- Identify the objectives of the potential dam operation plan.
- Select the dam and fish passage designs for detailed analysis.
- Determine the enhancement goals for key species.
- Assess the Interstate 5 alternatives and the objectives for more detailed analysis.
- Agree on the assumptions to be used in the modeling of the dam, Interstate 5 alternatives, suite of small projects and aquatic species enhancement plan.

### SPRING/SUMMER 2014

- Review and provide direction on preliminary results from the modeling and other analyses.
- Provide guidance on the strategies to be evaluated for species enhancement.
- Technical, policy and public workshops will be held in the Spring.

## FALL 2014

- Review of final technical documents.
- Technical, policy and public workshops will be held in the Fall.
- Develop recommendations to the Governor and Legislature.

# Appendix 1: Priority Local Flood Protection Projects and Multipurpose Projects

([http://www.ezview.wa.gov/site/alias\\_1492/34489/projects.aspx](http://www.ezview.wa.gov/site/alias_1492/34489/projects.aspx))

SPONSOR	PROJECT	BENEFICIARY	2012 \$\$	2013 \$\$
Aberdeen	<u>Burger King Trail/Dike</u>	<ul style="list-style-type: none"> <li>• Residents.</li> <li>• Businesses.</li> <li>• Travel.</li> <li>• Flood insurance premiums.</li> </ul>	\$ 24,600	\$ 140,000
Aberdeen	<u>Dike Bank of Wishkah North of Highway</u>		\$ 47,000	\$ 270,000
Aberdeen	<u>Market Street Dike</u>			\$ 670,000
Aberdeen	<u>Southside Dike/Levee Certification</u>		\$ 50,000	
Bucoda	<u>Bucoda Levee</u>	<ul style="list-style-type: none"> <li>• Water system.</li> </ul>	\$ 42,000	\$ 305,000
Cosmopolis	<u>Mill Creek Dam Improvements</u>	<ul style="list-style-type: none"> <li>• Residents.</li> <li>• Businesses.</li> </ul>		\$ 737,750
Grays Harbor County	<u>Elma-Porter Flood Mitigation Project</u>	<ul style="list-style-type: none"> <li>• Residents.</li> <li>• Travel.</li> </ul>		\$ 584,000
Grays Harbor County	<u>Satsop River Floodplain Restoration</u>	<ul style="list-style-type: none"> <li>• Bank stability.</li> <li>• River meander.</li> </ul>	\$ 500,000	
Grays Harbor County	<u>Wishkah Road Flood Levee</u>	<ul style="list-style-type: none"> <li>• Residents.</li> <li>• Travel.</li> </ul>	\$ 125,000	\$ 690,000
Lewis County	<u>Adna Levee</u>	<ul style="list-style-type: none"> <li>• Residents.</li> <li>• Businesses.</li> </ul>	\$ 244,145	
Lewis County	<u>Airport Levee (Phase I)</u>	<ul style="list-style-type: none"> <li>• Residents.</li> <li>• Businesses.</li> <li>• Travel.</li> </ul>	\$1,239,829	
Montesano	<u>Revetment for Montesano Rd., Sewage Treatment Plant, Mary's River Lumber</u>	<ul style="list-style-type: none"> <li>• Residents.</li> <li>• Businesses.</li> <li>• Travel.</li> </ul>	\$ 102,426	\$ 6,000,000
Pe Ell	<u>Wastewater Treatment Plant Flood Prevention Dike</u>	<ul style="list-style-type: none"> <li>• Treatment plant.</li> </ul>		\$ 521,000
WA Cons. Comm.	<u>Critter Pads, Evacuation Routes</u>	<ul style="list-style-type: none"> <li>• Livestock.</li> </ul>	\$ 500,000	\$ 850,000
Chehalis Tribe	<u>Flood Gage Station</u>	<ul style="list-style-type: none"> <li>• Flood warning.</li> </ul>	\$ 50,000	
Chehalis Tribe	<u>Sickman-Ford Overflow Bridge Project</u>	<ul style="list-style-type: none"> <li>• Residents.</li> <li>• Travel.</li> </ul>	\$2,075,000	

SPONSOR	PROJECT	BENEFICIARY	2012 \$\$	2013 \$\$
TBD	<u>Multipurpose Project: Allen Creek Restoration Project</u>	• Ecosystem.		\$ 990,000
TBD	<u>Multipurpose Project: Oxbow Reconnection RM 78</u>			\$ 861,000
TBD	<u>Multipurpose Project: Oxbow Lake Reconnection</u>			\$ 1,149,000
TBD	<u>Multipurpose Project: Basin-wide Salmon Recovery Strategy</u>			\$ 1,350,000
<b>Totals →</b>			\$5,000,000	\$15,117,750