

CHEHALIS BASIN STRATEGY

Governor's Chehalis Basin Work Group

2014 Recommendation Report

Final November 25, 2014

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This report was prepared by the William D. Ruckelshaus Center (Center), a joint effort of the University of Washington and Washington State University (more information available at www.ruckelshauscenter.edu), under contract with the Washington State Office of Financial Management (OFM), using technical information provided by state and federal agencies and other organizations. The Center’s Advisory Board supports the preparation of this and other independent reports produced under the Center’s auspices. The findings and conclusions contained herein may not reflect the individual views or opinions of the Center’s staff, Advisory Board members or organizations they represent.

Executive Summary

The Chehalis Basin is at a turning point. Thanks to the work of Chehalis tribal leadership, citizens, two Governors, the State Legislature, and bipartisan elected officials at the local, state, and federal level, after decades of disagreement and gridlock, more than 830 studies going back to 1933, and hundreds of millions in damages, we are now ready to move forward into permitting and implementation of a credible Basin-wide program to protect families and communities from catastrophic flooding and restore the Basin's salmon resources. The program would significantly reduce flood damages over the next 100 years and increase salmon populations in the Basin by as much as 50 percent.¹

This report documents the most recent steps in a locally-led, state-supported effort to determine how best to reduce flood damage and restore aquatic species in the Chehalis River Basin in southwest Washington state, and presents the recommendations of the Governor's Chehalis Basin Work Group: David Burnett (former Chehalis Tribe Chairman), Vickie Raines (Cosmopolis Mayor and Chehalis Flood Authority Chair), Karen Valenzuela (Thurston County Commissioner and Chehalis Flood Authority Vice Chair), J. Vander Stoep (private attorney and Chehalis Flood Authority Pe Ell Alternate), Jay Gordon (farmer in lower Chehalis Basin and Washington Dairy Federation Executive Director), and Rob Duff (Policy Advisor to Governor Inslee).

When the Work Group started meeting two years ago there was consensus only around the idea that the fishery resource is degraded and that something must be done to protect families, communities, and infrastructure from catastrophic flooding. Each Work Group member had their own flood story – and each had very different ideas about what should and should not be done to address flooding. Through two years of sharing their stories and intensely evaluating the potential benefits, technical feasibility, and costs of numerous flood-damage reduction ideas – from raising bridges and removing constrictions, to reconnecting floodplains, to a series of small projects, to more and better levees, to dredging – the Work Group came to a shared vision for a Basin-wide program to reduce flood damages and restore aquatic species.

The Work Group recommends formal and public evaluation through a programmatic Environmental Impact Statement (EIS) of a comprehensive long-term set of actions to reduce flood damage and restore aquatic species in the Basin. The actions include: restoration of more than 100 miles of habitat for salmon and other species, a water retention structure in the upper Chehalis, local actions to manage floodplains, and smaller-scale projects to provide local flood damage reductions and aquatic species benefits.

The Work Group has not come to these recommendations lightly. They are the result of intensive evaluation and deliberation over at least two years, and they represent significant evolution in individuals' understandings and perspectives. Work Group members who before may have not given much thought to salmon, other aquatic species, and the benefits of a healthy watershed now find themselves arguing for restoration in the Basin quickly, while there is still an opportunity for success. At the other end of the spectrum, those who before had never even considered the possibility of a new dam in western

¹ The increase in salmon populations ranged from 3% to 165%, depending on the dam, habitat, and species of salmon modeled. These increases do not include effects on salmon from potential climate change.

Washington now see its role in an overall package that balances the Basin's needs for flood-damage reduction with the desire to protect its natural resources far into the future.

Over the past two years, Work Group members have worked closely with state agencies, the Chehalis River Basin Flood Authority (representing the 12 local governments in the Basin), and a consultant team to create a common base of understanding about potential flood-damage reduction alternatives and aquatic species restoration, using the best available science and considering uncertainty. More than a dozen workshops and public meetings have engaged local and tribal communities, business, recreation, and environmental groups throughout the Basin; their needs and interests have informed the Work Group and the state team.

The Challenge:

The Chehalis Basin suffers from the dual problems of catastrophic flooding and significant degradation of aquatic species. For almost 100 years, there has been a failure to address these issues in any meaningful manner. Over 830 studies have been conducted of potential actions to address flood damage, with no real change. The Chehalis Basin is the second largest watershed in the State, yet has received far less funding for habitat restoration than any other salmon region.

Flooding is a natural occurrence and supports significant ecological health and functions that benefit people, fish, and wildlife. But periodic major floods also cause disastrous damage to families, communities, and infrastructure. In late 2007 and early 2009 the Chehalis Basin suffered two major floods only 14 months apart. The late 2007 flood was by far the largest on record in the Basin; the 2009 flood was the fifth largest. Two large floods coming so close together extracted an incalculable physical and psychological toll on the Basin's residents. Peak flood levels have been rising in the Basin over the last 30 years and are likely to get worse. The five largest floods in the Basin's history have occurred during the past 30 years. Current "low" estimates of climate change impacts predict an 18% increase in peak flows; the "high" estimates are upwards of 90%.²³ Under the latter scenario, floodwaters in the City of Centralia would be almost eight feet higher than in the peak of the 2007 flood. The specter of catastrophic flooding casts a shadow over the region's future, affecting economic prosperity and the emotional health of the Basin communities.

Aquatic species in the Chehalis Basin are significantly degraded, and if action is not taken, this degradation is expected to continue. Salmon habitat in the Basin already is degraded by 44%–78%, depending on the species. Failure to take action to restore physical and ecological Basin processes and habitat, coupled with potential impacts of climate change, are predicted to result in the complete loss (extirpation) of Spring-run Chinook from the Basin late this century, and a 70% loss of coho. It is very possible that the current trajectory would lead to Endangered Species Act listings and related restrictions, as well as great economic and cultural losses for tribal, commercial, and recreational fishers and others who depend on or enjoy these species.

Implementing the Work Group recommendations also will be challenging. Restoration of over 100 miles of the river will need the voluntary cooperation of many landowners, and the technical skills of scientists at

2 Mantua, N.J., I. Tohver, and A.F. Hamlet, 2009. Impacts of climate change on key aspects of freshwater salmon habitat in Washington State. Chapter 6 of *The Washington Climate Change Impacts Assessment: Evaluating Washington's Future in a Changing Climate*, Climate Impacts Group, University of Washington. Seattle, Washington.

3 Mantua, N. J., I. Tohver, and A. Hamlet. 2010. Climate change impacts on streamflow extremes and summertime stream temperature and their possible consequences for freshwater salmon habitat in Washington State. *Climate Change* 103:187-223.

the local, state, and federal levels of government. Water retention is strongly supported by the local communities in the basin; however, the Work Group acknowledges that recommendation of a new water retention structure—a dam—is controversial. The legacy of dams in the U.S., both their positive impacts for people and commerce, as well as their negative impacts on natural resources, is well known. In Western Washington, in particular, we recently have been celebrating removal of aging, environmentally-damaging dams. The Work Group has heard opposition to consideration of a dam from the Quinault Indian Nation and others. These concerns will have to be taken seriously.

The Opportunity:

Although the challenges in the Chehalis Basin are significant, there is opportunity, momentum, and foresight among Basin leaders and residents, legislators, the Governor, and state agencies, to address the two related opportunities of aquatic species restoration and flood-damage reductions.

This most recent effort to address flooding and aquatic species in the Chehalis Basin began in 2011 with an analysis of flood-damage reduction alternatives. This was followed by creation of the Governor’s Chehalis Basin Work Group in summer 2012. The Work Group, Basin leadership, and residents rallied around a Basin-wide approach to reducing flood damages and restoring aquatic species. In response to this momentum generated inside the Basin, the state supported substantial investments, including \$28 million in the 2013–2015 biennial budget, to begin implementation of that Basin-wide approach.

Over 2013 and 2014, the Governor’s Chehalis Basin Work Group worked in partnership with state agencies (particularly the Department of Ecology, Department of Fish and Wildlife, Conservation Commission, Department of Natural Resources, and Office of Financial Management) to continue developing the long-term strategy for flood-damage reduction and aquatic species restoration in the Basin. This included significant work to explore the potential for a water retention structure on the upper Chehalis and other actions to reduce flood damage, and to evaluate and develop a habitat restoration plan for aquatic species.

The dam being proposed for evaluation as part of the programmatic EIS is a next generation dam. While it will undoubtedly have negative impacts on some aquatic species—and those impacts will need to be fully identified, accounted for, and mitigated—there is a commitment to use the best science in designing the dam and mitigating its impacts. There is also a commitment to a basin-wide aquatic species restoration program that will restore the fishery across the basin at a level dramatically greater than any negative impacts seen from the dam.

Our Recommendations:

The Governor’s Work Group, in consultation with the state agencies and the Flood Authority, recommends an integrated package of flood-damage reduction and aquatic species restoration including:

1. Initiation of the permitting process for a concrete flood retention structure on the upper Chehalis River, paired with improvements to the Chehalis-Centralia Municipal Airport Levee. This will include development of a project-specific mitigation plan to address impacts from a dam, with a recommendation about whether this structure should also include the ability for flow augmentation to be made in 2015.

2. An unprecedented Basin-wide effort to restore aquatic species and reverse the decline of Spring Chinook, including restoration of over 100 miles of Spring Chinook spawning and rearing habitat, repair of priority fish passage barriers, restoration of off-channel habitat for aquatic species, and a comprehensive strategy to address bank erosion. The restoration effort needs to start immediately and be completed within 15–20 years, and maintained adaptively over the long-term, to ensure effective restoration for aquatic species in the Basin.
3. Continued investment in the highest-priority, smaller-scale flood-damage reduction projects including raising homes, and floodproofing businesses and public structures, with an emphasis on projects with multiple benefits.
4. Local governments' land use management actions to protect remaining floodplain function, alongside floodproofing to provide additional protection for residents and structures that are already located in harm's way.

After careful evaluation, and in consultation with the Washington State Department of Transportation, the Work Group has concluded that additional efforts to protect Interstate 5 from flooding through walls, levees, or raising the road bed from flooding are not cost-effective. With water retention and improvements to the Airport Levee, I-5 would be closed less than one day in a 100-year flood, compared to the current five days. WSDOT has created a detour route in the case I-5 is closed. WSDOT estimated that the direct cost of closing down I-5 in a 100-year flood event is \$21.0 million based on detour costs. If a dam is built, the direct cost of closing down I-5 in a 100-year flood event is reduced to \$4.8 million, or a net-benefit of \$16.2 million assuming a portion of the traffic detours.⁴ Given these factors, the significant expense (\$90– \$110 million) associated with an I-5 levees and walls project outweighs the incremental benefit of one less day of flooded interstate highway.

It is vital to realizing the anticipated benefits that the plan outlined here for flood-damage reduction and aquatic species restoration move forward as one project, with implementation efforts sequenced so they are linked in time and benefit.

- The formal program-level evaluation process should begin at the start of the 2015–2017 biennium with the programmatic Environmental Impact Statement (EIS).
- Additional engineering design, environmental assessments, and preparations for a water retention structure permitting process should commence formally upon completion of the programmatic EIS. We cannot be certain that all necessary permits will be issued but, after our research to date, we have found no fatal flaws that prevent the approval and construction of the dam. If permitted, construction could begin in five to eight years.
- Major habitat restoration efforts need to begin immediately and should be completed in the first 15 to 20 years, to reverse the decades-long decline in salmon populations and protect against the potential adverse impacts of climate change and water retention.
- Small-scale local projects should continue over the next 10 years, with an emphasis on projects that provide multiple benefits.
- Efforts to protect natural floodplains, ensure new development does not increase flood damages, and help people already located in harm's way through floodproofing should move forward immediately.

⁴ Cost estimates are 100-year net present value in 2014 dollars.

To move this package forward, the Work Group also recommends next steps and priorities for the 2015–2017 biennium state capital budget.

In addition to this new work, existing efforts through the Chehalis Basin Flood Authority and local jurisdictions to help Basin residents understand flood risks and prepare for future floods must continue. Large floods will continue to come. The Basin must be ready.

Benefits and Costs:

Taken together, this suite of actions has a conservatively predicted benefit of \$721 million. It is predicted to prevent a minimum of \$650 million in flood damage over the next century and has the potential to increase returning adult salmon in the Basin by 50%, which has an estimated \$71 million in economic value to tribal, commercial, and recreational fishers. Equally important, these actions represent an opportunity to achieve a long-term vision for a healthy watershed that also supports vibrant human communities. The costs are estimated to be \$500–\$600 million (depending on which type of water retention structure is constructed), providing a net-benefit of \$100–\$200 million.

The Work Group emphasizes that the benefits contemplated here are conservatively described.

- Despite repeated requests over the past two years, the Work Group was unable to get damage estimates (costs) associated with flood-related rail closures from Burlington Northern Santa Fe or Tacoma Rail. These damages have the potential to be substantial. Flood damage reduction efforts will provide benefits to the railroad; however, we have been unable to get the information needed to quantify those benefits.
- The damage estimate is based on the assumption of one 100-year flood each 100 years, and the depth of the 100-year flood is based on the past 100 years of flood history, not the potential increases in flooding from climate change. This is a very conservative estimate. In the past 20 years, the Chehalis Basin has experienced two floods at the “100-year” depth. Changes in climate have the potential to accelerate increases in flood severity; as floods get bigger, the benefits of this package (which reduces flood damages) increase.
- The benefit estimate associated with potential increases in returning adult salmon is based on direct benefits (i.e. commercial, recreational, and tribal fisheries) only. Indirect benefits from salmon restoration, such as cultural, tourism, and inherent value benefits, and avoided costs resulting from preventing an endangered species listing, are not included. Other efforts similar to the Chehalis Basin effort, such as the Yakima Basin Partnership, have incorporated “non use” or “intrinsic” values to describe the benefits of increased fish runs. Using intrinsic values, the environmental value of the recommendations is estimated at \$2.4 billion.
- Finally, economists often estimate the multiplier effect through the economy of construction and other actions. If this approach were used here, the multiplier effect would add almost \$680 million to the benefits of the flood damage reduction recommendations alone.

If all the additional benefit estimates described above were considered, the value of the recommendations would be approximately \$3.8 billion, in contrast to the estimated costs of \$500–\$600 million. And this still would not account for benefits to the railroad.

The Work Group acknowledges the uncertainty inherent in the benefit-cost numbers. As described above the benefit-cost analysis is conservative, likely resulting in an underestimate of the flood damages and therefore also underestimating the benefits of reducing flood damages. On the other hand, the aquatic species restoration may not work as well as planned or estimated, or a dam may cost more to build than currently estimated. On balance, even with the conservative estimates used here, the benefit-cost ratio of the project is positive.

Key Analyses Supporting Work Group Recommendations:

Over the last three years there has been a significant effort to collect new data and conduct detailed technical analyses, all of which has contributed to a common base of understanding of the effects of flooding and the productivity of aquatic species habitat under different potential futures. This work was done in an objective and transparent manner involving experts from tribes, state agencies, environmental groups, and a consultant team.

Alternatives to Reduce Flood Damages – A report was prepared in 2012 by the William D. Ruckelshaus Center at the request of the Governor that summarized previous efforts to address flood damage. Past efforts have evaluated a full range of alternatives to reduce flood damages. This includes detailed evaluation of barrier removal, reducing bridges and constrictions, dredging, changing logging practices, buying flood easements from land owners, multiple smaller water retention facilities, protection of I-5 through raising the freeway, and various combinations of walls and levees. None of those measures provide the Basin-wide flood protection of the water retention facility and floodproofing proposed here, and none pass the state or federal benefit-cost test. For more information on alternatives analysis, see the *Chehalis Basin Flood Hazard Mitigation Alternatives Report*, available from the Publications page of the Ruckelshaus Center website at www.ruckelshauscenter.wsu.edu.

Focusing on Water Retention – Water retention, in combination with floodproofing and land use management, emerged from the alternatives analysis as the action most certain to provide Basin-wide flood-damage reductions. The objectives of the water retention studies were to (a) evaluate the benefits of water retention, (b) identify any fatal flaws that would limit or preclude construction of a water retention structure on the mainstem of the Chehalis River, and (c) to develop technically feasible options for a flood retention or a multi-purpose dam at the identified site upstream of Pe Ell on the upper Chehalis River. A fish passage study team was tasked to evaluate potential fish passage technologies, establish design criteria, and develop options for upstream and downstream passage of adult and juvenile fish that could be integrated with feasible water retention (dam) structures. For more information on the water retention and fish passage analysis see the Chehalis Basin Project page of the Ruckelshaus Center website at www.ruckelshauscenter.wsu.edu.

Aquatic Species Impacts and Restoration – The objective of the aquatic species restoration studies, jointly led by the Washington Department of Fish and Wildlife and Anchor QEA, was to examine several options for improving habitat for several species within the Chehalis Basin. One component of the work analyzed the potential effects of flood-reduction alternatives, notably water retention, and future climate variability on aquatic resources, and combinations of these alternatives. Another component of the work examined restoring aquatic species in the entire Chehalis Basin independent of the flood-reduction alternatives being

evaluated as part of this project. This effort took a more holistic look at the status of ecosystem structures, functions and processes, which includes aquatic species in the Basin, habitat factors limiting aquatic species populations, and actions that could be taken to increase the populations of those aquatic species. For more information on the aquatic species restoration analysis see the Chehalis Basin Project page of the Ruckelshaus Center website at www.ruckelshauscenter.wsu.edu.

Hydrology and Hydraulic Model Improvements – The objectives of the hydrologic and hydraulic analyses were to better define baseline conditions and support evaluation of alternative designs in the Basin to reduce flood damage. Updated hydrologic data was needed to quantify the potential impacts and benefits of prospective flood-mitigation alternatives such as water retention and I-5 protection. For more information on the hydrology and hydraulic modeling see the Chehalis Basin Project page of the Ruckelshaus Center website at www.ruckelshauscenter.wsu.edu.

Survey of Structures in the Floodplain – The objective of the survey of structures in the floodplain was to refine inventories of structures in the Chehalis floodplain and improve estimates of potential future flood damages. The updated analysis used actual structure locations and depth of water in buildings. This now allows for estimates, based on the actual development in the Basin, about potential impacts and benefits of alternatives on particular structures in the floodplain. For more information on structures in the floodplain see the Chehalis Basin Project page of the Ruckelshaus Center website at www.ruckelshauscenter.wsu.edu.

Alternatives to Protect Interstate 5 and the Chehalis/Centralia Airport – The objective of the I-5 protection analysis, led by the Washington State Department of Transportation (WSDOT), was to evaluate possible alternatives that potentially protect I-5 from flood waters between the 13th Street (Exit 76) and Mellen Street (Exit 81) interchanges near the cities of Centralia and Chehalis. The primary alternative evaluated, I-5 Levees and Walls, is a combination of earthen levees and structural walls along I-5, including improvements to the existing Chehalis-Centralia Airport levee, a new Chehalis Avenue Levee (CAL), and bridge replacements over Dillenbaugh and Salzer Creek. For more information on protection of I-5 see the Chehalis Basin Project page of the Ruckelshaus Center website at www.ruckelshauscenter.wsu.edu.

Comparison of Alternatives – The objective of the comparison of alternatives was to analyze the potential economic impacts (positive and negative) of alternative flood reduction and aquatic species restoration projects to the Chehalis Basin. The analysis did not attempt to forecast chronological outcomes; rather, it assessed the expected value of flooding impacts and aquatic species effects under different project alternatives for a 100-year period. For more information on the benefit-cost analysis see the Chehalis Basin Project page of the Ruckelshaus Center website at www.ruckelshauscenter.wsu.edu.

Taking the Next Steps:

Now marks a key point for investment in the Chehalis Basin. The Work Group, with the support of state agencies, recommends a set of integrated investments over the next two years including: (a) initiation of a programmatic Environmental Impact Statement (EIS) to evaluate and further vet the timing and cost of the recommended package of flood-damage reduction and aquatic species restoration actions in preparation for permitting the individual components of the project, (b) further investment in laying the technical groundwork for successful implementation of water retention and aquatic species restoration efforts, and

(c) further investment in near-term, on-the-ground projects such as smaller-scale flood damage reduction, floodplain management, floodproofing, and flood warning and preparedness.

Future success will require a continued partnership with Basin leaders and the state team. This collaboration will need to expand to better include the Quinault Indian Nation, federal agencies, and the environmental community. Basin landowners and residents will need to be increasingly engaged if the restoration actions are to move forward, and political support will be needed for water retention and other flood-damage reduction efforts. Creative, informed, committed, and collaborative leadership will be needed, alongside a durable, locally-led, basin-wide organization and governance structure.

While this effort will not be simple or easy, it is both critical and timely. We have an opportunity to act, and act boldly, now. Failure to do so guarantees ever-increasing suffering from future floods and predicts the further degradation, and potential loss, of salmon and other species in the Basin. The Work Group is fully engaged in this effort and committed to continuing the work with Basin leaders, state and federal agencies, and others to see a successful outcome.

Introduction and Background

This report contains the recommendation of the Governor’s Chehalis Basin Work Group: David Burnett (former Chehalis Tribe Chairman), Vickie Raines (Cosmopolis Mayor and Chehalis Flood Authority Chair), Karen Valenzuela (Thurston County Commissioner and Chehalis Flood Authority Vice Chair), J. Vander Stoep (private attorney and Chehalis Flood Authority Pe Ell Alternate), Jay Gordon (farmer in lower Chehalis Basin and Washington Dairy Federation Executive Director), and Rob Duff (Policy Advisor to Governor Inslee). The Work Group was tasked first by Governor Gregoire and then by Governor Inslee with recommending a set of actions that would restore aquatic species and reduce the risk of catastrophic flooding for families, communities, and vital infrastructure in the Chehalis Basin. The Legislature endorsed this effort by passing a capital budget in 2013 funding the research and public dialogue necessary to create this recommendation.

The Work Group is recommending an integrated program of long-term flood-damage reduction and aquatic species restoration in the Chehalis Basin. This includes:

1. Initiation of the permitting process for a concrete flood retention structure on the upper Chehalis River, paired with improvements to the Chehalis-Centralia Municipal Airport Levee. This will include development of a project-specific mitigation plan to address impacts from a dam, with a recommendation about whether this structure should also include the ability for flow augmentation to be made in 2015.
2. An unprecedented Basin-wide effort to restore aquatic species and reverse the decline of Spring Chinook, including restoration of over 100 miles of Spring Chinook spawning and rearing habitat, repair of priority fish passage barriers, restoration of off-channel habitat for aquatic species, and a comprehensive strategy to address bank erosion. The restoration effort needs to start immediately and be completed within 15–20 years, and maintained adaptively over the long-term, to ensure effective restoration for aquatic species in the Basin.
3. Continued investment in the highest-priority, smaller-scale flood-damage reduction projects, with an emphasis on projects with multiple benefits.
4. Local governments’ land use management actions to protect remaining floodplain function, alongside floodproofing to provide additional protection for residents and structures that are already located in harm’s way.

What are the benefits of this effort? Taken together, this suite of actions is predicted to prevent at least \$650 million in flood damage and has the potential to increase returning adult salmon in the Basin by up to 50%, which has a predicted \$71 million in economic value to tribal, commercial, and recreational fishers.

The rest of this report describes the Chehalis River Basin and the history of flooding; the Work Group’s recommendations; the information and process the Work Group used to reach these recommendations; and proposed next steps for the 2015–2017 State Biennium.

THE CHEHALIS RIVER BASIN

The Chehalis River flows approximately 125 miles, and drains an area of approximately 2,700 square miles in eight counties, including large portions of Grays Harbor, Lewis, and Thurston counties. It is the second largest river basin in Washington. It begins in the Willapa Hills, which are relatively low-lying, un-glaciated foothills and low mountains, and follows a relatively low gradient. Along its length, it draws water from three additional ranges: the Black Hills, the Cascade Foothills, and the southern Olympic Mountains. It is bounded by the Pacific Ocean to the west, the Deschutes River Basin and the Cascade Foothills to the east, the Olympic Mountains to the north, and the Cowlitz River Basin to the south.

In the upper portion of the Chehalis Basin, the river valley is relatively narrow and has less natural floodplain area. Development and major infrastructure, including both Interstate 5 (I-5) and the main rail lines, cut through the middle of the Basin and the river's floodplain. As with most American communities located in proximity to a river system, most development in this basin has historically occurred in or near the floodplain. In the lower Basin below Centralia, the valley is much wider, less populated, and more predominantly in agriculture, except for the cities of Aberdeen, Hoquiam, and Cosmopolis at the Grays Harbor estuary.

The total population in the Chehalis Basin is approximately 140,000, including four population centers: Chehalis (7,815) and Centralia (15,570) in the upper Basin, and Aberdeen (16,440) and Hoquiam (8,765) at the mouth of the Chehalis. The Confederated Tribes of the Chehalis Reservation are located near the mouth of the Black River on the mainstem of the Chehalis. The Quinault Indian Nation is located on the southwestern corner of the Olympic Peninsula, in Grays Harbor County.

The natural resources of the Chehalis Basin have supported the native people for millennia and continue to provide value to both the tribal and non-tribal people of the Basin. Farming, forestry, shellfish, and fishing continue to be central to the Chehalis Basin economy. Salmon play a major cultural, recreational, and economic role, and the protection and restoration of salmon habitat is a primary goal for many in the Basin. Over 94,000 salmon (Chinook, coho, and steelhead) return to the Basin annually (ten year average).



Figure 1: Chehalis River Basin

FLOODING IN THE BASIN IS REAL AND INCREASING

Floods are the most destructive natural hazard in the U.S., causing more deaths and financial loss in the 20th century than any other type of natural disaster. In the past century, major flood events have occurred on an average of twice a decade on the Chehalis River and its tributaries. The 1990, 1996, 2007, and 2009 floods are the largest on record and caused massive damage to private property, public buildings, roads, and bridges. Each of the recent floods closed I-5 for days. The estimate for a statistical 100-year flood which, has a one percent chance of occurring every year, has increased by 33% in the last 30 years.

The benefit-cost evaluation conducted as part of the research to develop these recommendations estimates that the costs of future floods will exceed \$3.5 billion⁵ in the next 100 years if no action is taken. These numbers are derived from a carefully-constructed and broadly-vetted statistical model, based on the estimate of floods and their frequency. However, we already know that these assumptions may underestimate the frequency and severity of floods. The 100-year flood used for estimates is smaller in some reaches of the Basin than the observed floods in 2007 or 2009.

As part of its analysis, the Work Group evaluated the potential impact of climate change in the Chehalis Basin. Climate change models predict an increase in peak flows, hotter and drier summers, and wetter winters. The Work Group looked at “high” and “low” climate change scenarios. In the “low” climate change scenario, there is a potential 18% increase in Chehalis River peak flows. In the “high” scenario, peak flows could increase by 90%.

AQUATIC SPECIES IN THE BASIN ARE SERIOUSLY DEGRADED

The Chehalis Basin supports five species of salmon and numerous other aquatic species, including the most diverse collection of amphibians in Washington State. All of these species are significantly degraded from their historic levels, with the amount of degradation varying by species and location. Modeling of salmon populations shows Spring-run Chinook populations reduced by 78%, Fall-run Chinook by 45%, coho by 69%, and steelhead by 44%.

At the same time, the Basin has a high potential for aquatic species restoration. As part of the research used to develop these recommendations, a team of state, tribal, and consulting natural resource managers and scientists identified a series of actions to remove fish passage barriers, restore riparian habitat, stabilize banks, and improve channel complexity and off-channel habitat that could increase all salmon species by up to 50%, with the greatest percentage increases in Spring-run Chinook. Under a “low” climate change scenario, and a “high” level aquatic species restoration program, Spring-run Chinook are predicted to increase 110%. Even under a “high” climate change scenario, with a “high” level aquatic species restoration program, Spring-run Chinook are still predicted to increase 53% from current levels.

A LOCAL-STATE PARTNERSHIP TO RESPOND TO FLOODING & RESTORE AQUATIC SPECIES

In 2011, as part of the capital budget (ESHB 2020, Section 1033), the Washington State Legislature required the Office of Financial Management (OFM) to prepare a report on alternative flood-damage reduction projects and—in coordination with tribal governments, local governments, state and federal agencies—to recommend priority flood-hazard mitigation projects in the Chehalis River Basin for continued feasibility and design work. OFM retained the William D. Ruckelshaus Center to coordinate the preparation of the report. That report was finalized in December 2012 and provided the Legislature and other decision makers with information to set the course for effective solutions to reduce the adverse impacts of flooding in the Basin and restore fish populations and other natural resources.

⁵ 100-year net present value of expected damages in 2014 dollars.

In August 2012, then-Governor Christine Gregoire tasked a diverse work group of Chehalis Basin leaders to develop recommendations for flood-damage reduction projects.⁶ The group was asked to develop recommendations that other Basin leaders and the Governor could consider for endorsement and action. Each member also was asked to interact with his/her respective constituents to inform the small group's discussions. The Governor challenged the group to work together to solve the problem of flood damage in the Basin—she offered support if the group could come together, but also acknowledged that without successful leadership from the Basin, significant investment was unlikely.

The Work Group took up the Governor's challenge. The result of the 2012 process was a commitment to a Basin-wide approach to flood-damage reduction. The Work Group described the hallmarks of a Basin-wide approach:

- It will not stop all flooding in the Basin, but it will measurably reduce the impacts of catastrophic flooding for families and communities across the Basin.
- It will maximize benefits and avoid or minimize adverse human and environmental impacts of flood-damage reduction actions.
- It will protect key community infrastructure and maintain public services during emergencies.
- It will not solve one community's flooding problems by making another community's problems worse.
- Flood-damage reduction will go hand-in-hand with improvements in the environmental health and resiliency of the Basin, and restoration of aquatic species, so that the harvestable fish resources of the Basin are increased as flood damage is reduced.

Building on the Work Group's recommendations, Governor Inslee included a request for funding in his FY 2013–15 capital budget proposal, and the Legislature approved an investment of \$28 million to begin to implement the Basin-wide approach. The Governor's Work Group agreed to Governor Inslee's request that it continue to meet and oversee the initial implementation of the Basin-wide approach.

BEGINNING TO IMPLEMENT THE BASIN-WIDE APPROACH

Over the past two years, the Governor's Work Group—working with a team of natural and water resource experts in the Washington Department of Ecology, Washington Department of Fish and Wildlife, Conservation Commission, and Washington Department of Natural Resources—has overseen extensive technical analyses to support decision making on long-term, large-scale actions and, along with the Chehalis Basin Flood Authority, implementation of a number of smaller-scale projects to provide near-term flood damage reduction in the Basin. Throughout the process, care was taken to analyze and describe the costs and potential impacts (positive and negative) of different flood-mitigation and aquatic species restoration projects, and combinations of these projects. Technical analyses and the benefit-cost evaluation are available on the Chehalis Basin Project page of the Ruckelshaus Center website at www.ruckelshauscenter.wsu.edu.

⁶ Rob Duff (Senior Policy Advisor to Governor Inslee) replaced Keith Phillips as a Governor's office representative on the Work Group in 2014.

As the outcomes of technical and benefit-cost work became available, the Work Group and state team evaluated a number of scenarios including: different types of water retention structures, different approaches to aquatic species restoration, and different climate change scenarios. State team members participated actively in the evaluations and provided valuable advice and direction, to ensure that studies were well-conducted and that their conclusions were fairly and accurately presented.

The work of the past three years has been intense and fruitful. After decades of study without conclusion, the Work Group has come to a set of actions that, taken together, embody a Basin-wide approach to flood-damage reduction and aquatic species restoration. These efforts are built around a core set of principles shared among participants:

- Fidelity to the Basin-wide approach – a package of actions that will provide gain for all communities in the Basin.
- Integration of actions – so reduction of catastrophic flood damage and restoration of aquatic species are linked in time and benefit.
- Preservation of current ecological functions and prevention of further damage to Basin floodplains.
- Durable, local-state leadership to guide implementation.

Our Recommendations for the Future

The Work Group is recommending an integrated program of long-term, flood-damage reduction, and aquatic species restoration in the Chehalis Basin. Taken together, this suite of actions is predicted to prevent at least \$650 million in flood damage over the next century and increase returning adult salmon in the Basin by up to 50%, which has a predicted \$71 million in economic value to commercial and recreational fishers. These actions have other benefits that are less easy to measure, but no less tangible or important to people who live and work in the Basin. The Chehalis Basin is the only major river basin in Washington State where salmon species are not listed under the federal Endangered Species Act. There is an opportunity, by investing in aquatic habitat restoration now, to potentially avoid such listings and the societal and economic upheaval and restrictions they can involve. A dam on the Chehalis not only provides measurable reductions in flood surface water elevations and concomitant reductions in flood damages, it also provides a measure of confidence and predictability for Basin residents, so when they hear heavy rain storms coming, they know there will be more protection for their communities. It provides confidence and predictability for potential investors in the Basin's economic development, vitality, and self-sufficiency.

The Work Group has not come to these recommendations lightly. When the Work Group started meeting two years ago there was consensus only around the idea that something must be done to protect families, communities, and infrastructure from catastrophic flooding. Through two years of intensely evaluating the potential benefits, technical feasibility, and costs of numerous flood-damage reduction ideas—from raising bridges and removing constrictions, to reconnecting floodplains, to series of small projects, to more and better levees, to dredging—and through numerous conversations with many interested parties throughout the Basin, the Work Group came to a shared vision for a Basin-wide program to reduce flood damages and restore aquatic species.

The Work Group recommends a concrete flood retention structure on the upper Chehalis River (with a recommendation to be made in 2015 about whether this structure should also include the ability for flow augmentation), paired with improvements to the Chehalis-Centralia Municipal Airport Levee.

The Work Group evaluated three main types of water retention structures: a flood retention only roller-compacted concrete dam, a multi-purpose roller-compacted concrete dam, and a multi-purpose rockfill dam. The guiding principles for a water retention structure were to provide flood reduction in downstream areas and, to the extent possible, minimize fish and downstream environmental impacts.

The difference between roller-compacted concrete (RCC) and rockfill dams is primarily the materials used for construction. RCC dams use a blend of concrete with different ratios of ingredients and generally less water, making it much less susceptible to slump; preliminary geotechnical evaluations suggested that materials suitable for construction of an RCC dam are contained within or relatively close to the dam site. Rockfill dams are an embankment of compacted soil combined with an impervious zone. A rockfill dam's footprint would be much larger than an RCC dam in the Chehalis, and significantly more expensive to construct. Preliminary geotechnical work points to the feasibility of a RCC dam at the identified site. Because of this, the Work Group quickly moved away from a rockfill approach in favor of roller-compacted concrete, provided geotechnical studies confirm that an RCC dam can be safely and effectively constructed.

A flood retention-only dam retains water only temporarily. The intent of a flood retention-only structure is to pass Chehalis River flows unimpeded under normal conditions and during smaller flood events, transitioning to flood retention operations only during floods that would otherwise cause serious damage in downstream areas. In the Chehalis Basin, it is estimated that flood retention operations would be required only for a 10-year flood or greater. Advantages of this type of approach include lower costs than a multi-purpose dam, a smaller dam footprint, and the ability to allow the Chehalis River to flow naturally except in major flood events.

In contrast, a multi-purpose dam would retain a winter pool and be designed to provide flood retention and water storage, and the ability to enhance certain aquatic species habitat by increasing summer flows. The multi-purpose structure would store water during the winter and release it during the summer for potential fisheries and water quality enhancement. While a multi-purpose dam is more expensive than a flood retention-only dam, and has a larger footprint, model simulations show that it would increase summer low flows by a factor of three to six. It is not clear with current data for spring Chinook how much benefit there would be from increased summer flows and lower water temperatures.

An upstream water retention structure is the only approach that provides significant flood-damage reduction throughout the Basin, and it provides the highest level of flood-damage reduction of all explored alternatives. Flood-damage reduction benefits would be the same for both a flood retention-only and a multi-purpose dam; only the cost, dam footprint, and potential impacts to aquatic species would be different. Figure 2 highlights changes in the predicted peak-water surface elevations throughout the Basin—in a simulated 100-year flood event and in the December 2007 flood—if the flood retention and Airport Levee improvements are constructed.

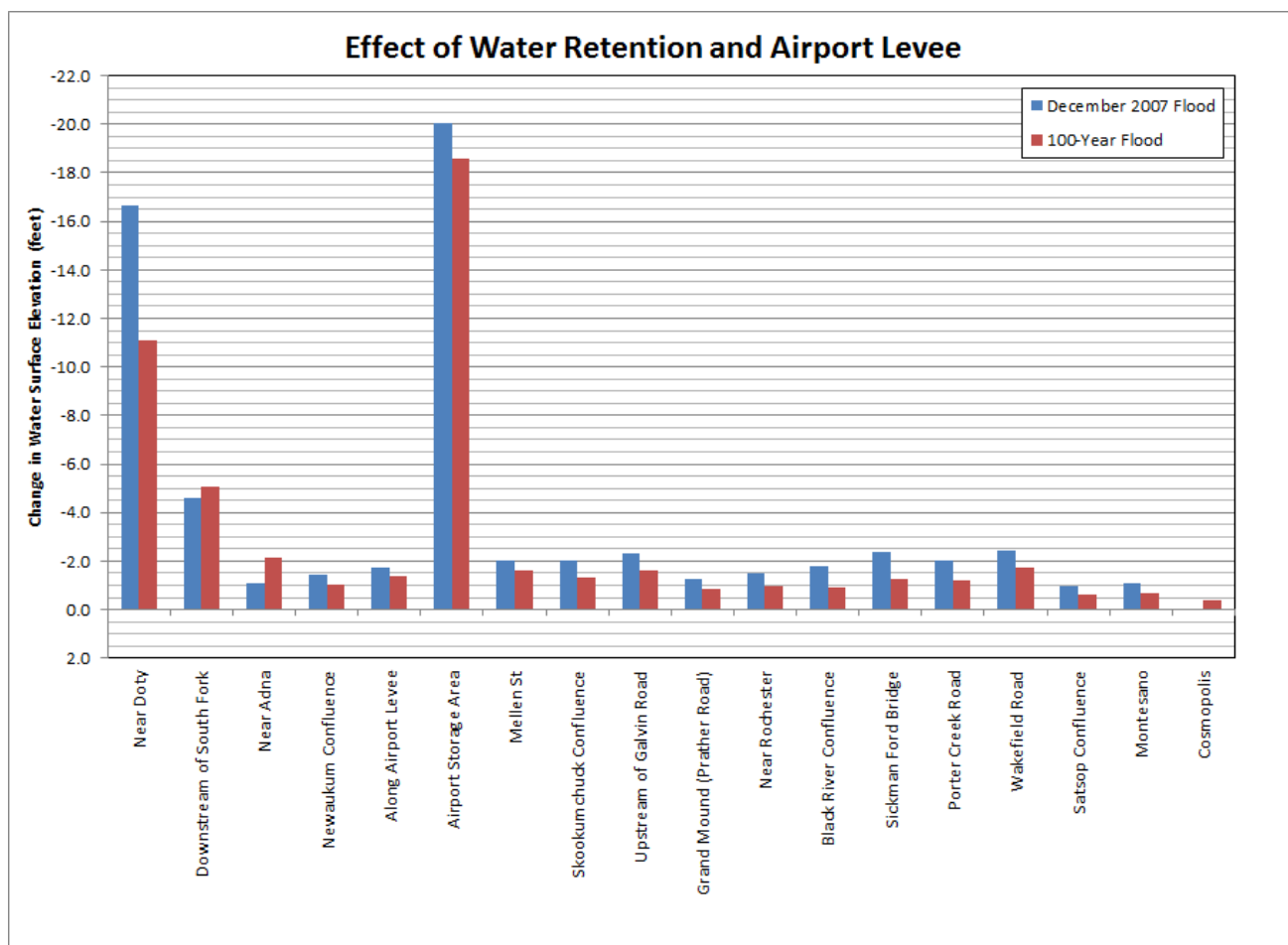


Figure 2: Predicted Changes in Water Surface Elevations from Water Retention and Airport Levee

The technical team also explored the impacts of water retention alternatives on aquatic species. Table 1 shows the estimated population changes due to the implementation of a flood retention only or multi-purpose dam. The impacts of both dam alternatives on aquatic species were generally negative. Effects of dams on aquatic species were greatest in the upper Basin (i.e., above the proposed dam site) and largest on Spring-run Chinook salmon and steelhead. Based on the assumptions in the model, the negative effects on salmon (particularly Spring-run Chinook) are estimated to be greater from a flood retention-only dam in contrast to the multi-purpose dam that stores water for release during the summer months. However, the habits of Spring-run Chinook in the Basin are not well-known and different assumptions about their habits would change the estimated impacts from a multi-purpose dam.

Table 1: Fish Population Changes with Water Retention (% Change from Projected Populations)

SPECIES	% CHANGE IN FISH POPULATION WITH FLOOD RETENTION FACILITY	% CHANGE IN FISH POPULATION WITH MULTIPURPOSE FACILITY
Spring Chinook	-8.1%	6.5%
Fall Chinook	-1.1%	0.3%
Steelhead	-4.0%	-7.4%
Coho	-1.9%	-0.6%
Total	-2.1%	-1.1%

As part of this effort, the Work Group also recommends raising the Chehalis-Centralia Municipal Airport Levee. Consideration of the Airport levee was included as part of various studies of flood-damage reduction projects and was most commonly evaluated as part of a suite of walls and levees project that might be undertaken to ensure protection of I-5; however, the Work Group, in consultation with the Washington State Department of Transportation (WSDOT), is not recommending additional efforts to protect I-5 if a dam is built. If the Airport levee is improved and a dam is built, models show that I-5 would be closed for at the most one, instead of five days in a 100-year flood event. Smaller-scale multi-benefit flood-damage and aquatic species restoration projects under consideration, particularly realignment of Dillenbaugh Creek, have potential to further reduce flood pressure on I-5.

Protection of Interstate 5

The combination of construction of a dam in the upper Chehalis with raising the Chehalis-Centralia Airport Levee recommended by the Work Group is predicted to reduce closure of I-5 during 100-year flood events from five days to, at most, one day. WSDOT evaluated a number of options to provide additional flood-protection to I-5 including multiple configurations of walls and levees ranging in cost from \$90–110 million. WSDOT estimated that the direct cost of closing down I-5 in a 100-year event is \$21.0 million based on detour costs. If a dam is built, the direct cost of closing down I-5 in a 100-year flood event is reduced to a \$4.8 million, or a net-benefit of \$16.2 million assuming a portion of the traffic detours. These estimates do not include the direct cost associated with cars and trucks that delay or miss trips. Given that alternate detour routes are available, the Work Group, in consultation with WSDOT, has concluded that the benefit-cost evaluation does not support additional action to protect I-5 if construction of a dam in the upper Chehalis and raising the Airport levee move forward.

The Work Group recommends restoration of over 100 miles of Spring Chinook spawning and rearing habitat, repair of priority fish passage barriers, restoration of off-channel habitat for aquatic species, and a comprehensive strategy to address bank erosion. The restoration effort needs to start immediately, be completed within 15–20 years, and be maintained adaptively over the long-term, to ensure effective restoration for aquatic species in the Basin.

Aquatic species habitat in the Chehalis Basin is significantly degraded. Looking only at salmonid populations, degradation varies from 78% for Spring-run Chinook, 45% for Fall-run Chinook, 69% for coho, and 44% for steelhead. If climate continues to change as described in some of the models, there is the possibility for total extirpation of Spring-run Chinook from the Chehalis Basin in our lifetimes.

The aquatic species restoration evaluation sought to understand the current status of aquatic species in the Basin, the potential for successful restoration, and potential outcomes of restoration actions. The effort took a holistic look at the status of ecosystem structures, functions, and processes, including assessment of aquatic species in the Basin, habitat factors limiting aquatic species populations, and actions that could be taken to increase species abundance, productivity, and distribution. The primary habitat enhancement and restoration actions evaluated include removal of barriers to fish passage (culverts), riparian maturation in managed forests, riparian enhancement and installation of wood in other lands, and off-channel reconnection.

Combinations of restoration scenarios were modeled, which included both high and low levels of effort for restoration, and high and low assumptions for the benefits of specific restoration actions. Table 2 shows the estimated population changes from restoration activities in a “low” and “high” scenario for the four key salmonid species in the Basin. Model results predict that Spring-run Chinook and coho would see the largest benefits from restoration efforts, with a potential for a 180% and 60% increase in abundance, respectively. There were synergistic effects from combining restoration actions. To achieve the largest improvements, a high level of habitat restoration had to be both effective and extensive.

Table 2: Population Changes with Restoration (% Change from Projected Populations)

SPECIES	LOW RESTORATION	HIGH RESTORATION
Spring Chinook	49.6%	184.3%
Fall Chinook	8.4%	25.2%
Steelhead	14.3%	34.6%
Coho	23.0%	60.9%
Total	20.1%	54.8%

The Work Group recommends continued investment in the highest priority, smaller-scale flood-damage reduction projects, with an emphasis on projects with multiple benefits.

In addition to oversight of the work associated with development of a long-term strategy for flood-damage reduction and aquatic species restoration, the Work Group, along with the Chehalis River Basin Flood Authority, has guided implementation of a series of smaller-scale flood-damage reduction projects to provide near-term benefits including protecting key infrastructure, reducing shoreline erosion, and improving water conveyance and drainage at key points in the Basin. Figure 3 provides a map of the Basin highlighting on-the-ground projects completed or currently underway.

During the past two years, a study team also worked with the Flood Authority, local governments, the Chehalis Tribe, conservation districts, and other interested parties to identify additional small-scale local projects. An evaluation and prioritization process was initiated through meetings with members of the Flood Authority and other stakeholders within the Basin, and a new list of small projects was developed for consideration by the Work Group, which included previous small projects identified by the Flood Authority and the State Team (the Washington Department of Ecology and the Washington Department of Fish and Wildlife). Conceptual-level designs were developed for 10 of these potential small flood-damage reduction projects. For more information on the Chehalis Basin small flood-damage projects see the Chehalis Basin Project page of the Ruckelshaus Center website at www.ruckelshauscenter.wsu.edu.

Continued investment in high-priority, smaller-scale projects is a key to robust flood-damage reduction in the Basin. Many of the smaller projects also provide opportunities to provide restoration or enhancement for aquatic species. These projects also have the advantage of providing flood-damage reduction in the short-term, whereas other recommended elements are more medium- or long-term in scope.

CURRENT PROJECTS UNDERWAY IN THE CHEHALIS BASIN

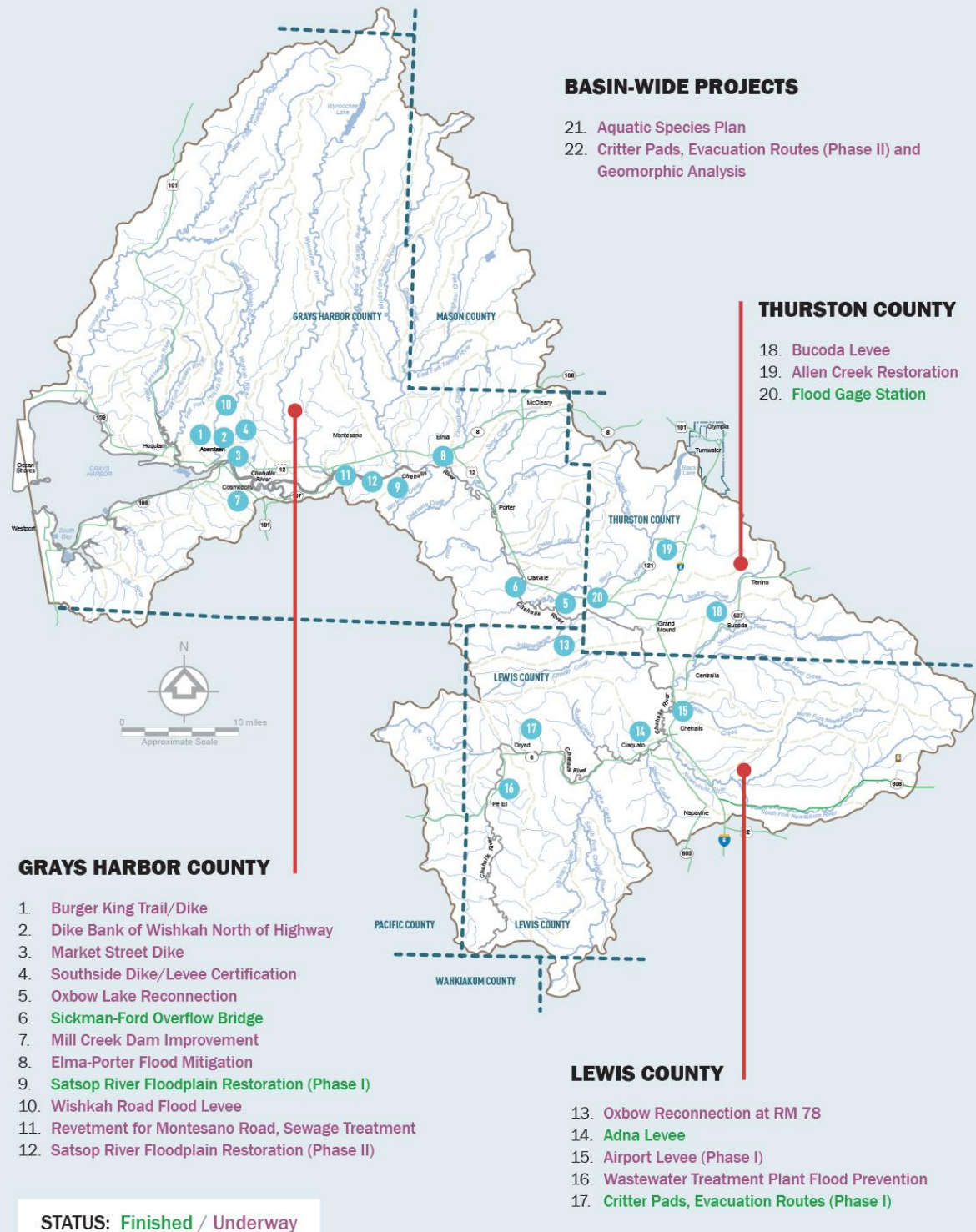


Figure 3: Current Projects Underway in the Chehalis Basin

The Work Group recommends that local governments consider a series of land use management and floodproofing actions to protect remaining floodplain function and provide additional protection for residents and structures that are already located in harm's way.

The land use management effort will involve local jurisdictions acting to improve and revise local land use regulations and practices to protect natural functions and prevent more flood damage. A series of recommendations were provided to local jurisdictions through a recent analysis of local floodplain management programs. Through a combination of actions by local jurisdictions, the Flood Authority, and technical contractor assistance, steps should be made towards:

- Cities and counties correcting land use maps and updating or regulating to the flood of record. Current federal maps used for local floodplain management are over 30 years old for some jurisdictions, while the 100-year flood estimate has increased by more than 30% over the same period of time.
- Addressing new development with locally-appropriate regulatory standards and plans that guide development to safer areas.
- Adopting procedures and training staff to ensure proper administration of the updated standards.
- Educating, involving, and assisting property owners to help them protect their homes from future flood damage.
- Providing technical assistance and on-call help to support local floodplain management staff.
- Providing training, templates, checklists, and model procedures for property owners and local floodplain management staff.
- Providing financial support to property owners to mitigate flood problems.
- Coordinating and supporting Basin-wide efforts to improve land use regulations and practices.
- Ensuring each county's critical area ordinances protect existing functions via voluntary means such as the Voluntary Stewardship Program.
- Encouraging new structures to be elevated without new fill.
- Not allowing new lots wholly in the floodplain.
- Not allowing city annexations of floodplain that could increase potential development.

The floodproofing effort will involve raising residential homes and floodproofing businesses and public structures within the 100-year floodplain that would not be fully protected through the construction of a water retention structure or smaller flood control projects. With this effort, all damage-prone parts of the structures are elevated above the flood protection level on a foundation intended to resist flood damage.

CLIMATE CHANGE

The Work Group evaluated two different climate change scenarios to understand how projected changes associated with climate may affect peak flows during storm events and how conditions related to water temperature and other factors could influence salmonid populations. The analysis considered the impacts of climate change in the Chehalis Basin based on projections from the Climate Impact Group (CIG) at the University of Washington, and evaluated both "high" and "low" climate change scenarios.

Model simulations evaluated the impact of these climate change scenarios on potential water retention structures and aquatic species restoration actions, as well as combinations of water retention and aquatic species restoration. For example, in the “low” climate change scenario, there is a potential 18% increase in Chehalis River flows necessitating a 10,000 acre-foot increase in flood retention storage and increasing the cost of a flood-retention only RCC dam by \$23 million. In the “high” climate change scenario, there is a 90% increase in Chehalis River flows, necessitating at least a 65,000 acre-foot increase in flood retention storage and increasing the cost of a flood-retention only RCC dam by \$123 million. Note that the “high” scenario represents such an increase in flows that the hydrologic model does not fully cover flood impacts because floodwaters would cover more of the valley floor than is currently modeled.

Both climate change scenarios have adverse impacts on aquatic species in the Basin. In the “high” climate change scenario, total extirpation of spring-run Chinook is predicted. Aquatic species restoration efforts can lessen the potential impacts of climate change on aquatic species and make the Basin more resilient to changing climate, just as water retention and other flood-damage reduction efforts can lessen the potential impacts of climate change on people and human infrastructure.

COSTS AND BENEFITS OF THE WORK GROUP’S RECOMMENDATIONS

The Work Group recommendations would cost approximately \$500–600 million and provide approximately \$720 million in benefits over the next 100 years. It is estimated that with no action, flood damages in the Basin will exceed \$3.5 billion over the next 100 years.

The Work Group emphasizes that the benefits contemplated here are conservatively described.

- Despite repeated requests over the past two years, the Work Group was unable to get damage estimates (costs) associated with flood-related rail closures from Burlington Northern Santa Fe or Tacoma Rail. These damages have the potential to be substantial. Flood damage reduction efforts will provide benefits to the railroad; however, we have been unable to get the information needed to quantify those benefits.
- The damage estimate is based on the assumption of one 100-year flood each 100 years, and the depth of the 100-year flood is based on the past 100 years of flood history, not more recent floods or the potential increases from climate change. This is a very conservative estimate. In the past 20 years, the Chehalis Basin has experienced two floods at the “100-year” depth. Changes in climate have the potential to accelerate increases in flood severity; as floods get bigger, the benefits of this package (which reduces flood damages) increase.
- The benefit estimate associated with potential increases in returning adult salmon is based on direct benefits (i.e. commercial, recreational, and tribal fisheries) only. Indirect benefits from salmon restoration, such as cultural, tourism, and inherent value benefits, and avoided costs resulting from avoiding an endangered species listing, are not included. Other efforts similar to the Chehalis Basin effort, such as the Yakima Basin Partnership, have incorporated “non use” or “intrinsic” values to describe the benefits of increased fish runs. Using intrinsic values, the environmental value of the recommendations is estimated to be \$2.4 billion.

- Finally, economists often estimate the multiplier effect through the economy of construction and other actions. If this approach were used here, the multiplier effect would add almost \$680 million to the benefits of the recommendations.

Figure 4 shows a breakdown of anticipated costs and expected benefits of the Work Group’s recommendations. If all the benefit estimates above were considered, the value of the recommendations would be approximately \$3.8 billion in contrast to the estimated costs of \$500–\$600 million. And this still would not account for benefits to the railroad.

The Work Group acknowledges the uncertainty inherent in the benefit-cost numbers. As described above the benefit-cost analysis is conservative, likely resulting in an underestimate of the flood damages and therefore also underestimating the benefits of reducing flood damages. On the other hand, the aquatic species restoration may not work as well as planned or estimated, or a dam may cost more to build than currently estimated. On balance, even with the conservative estimates used here, the benefit-cost ratio of the project is positive.

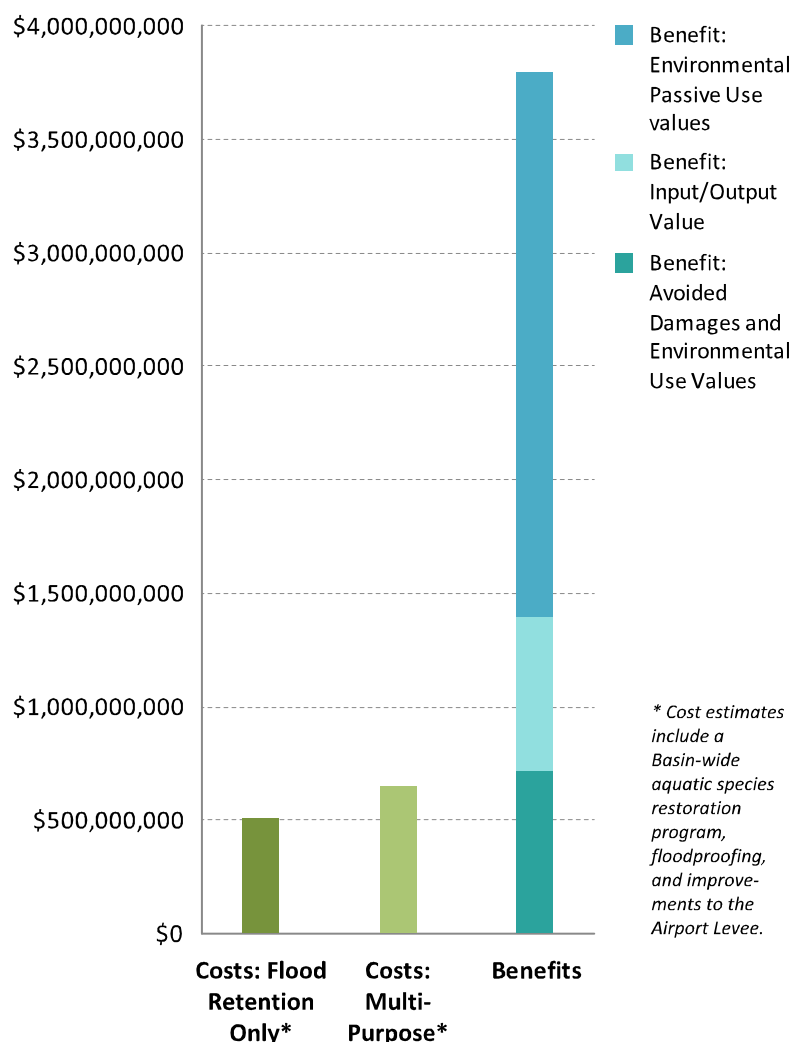


Figure 4: Benefits and Costs Summary

SEQUENCING

It is vital to the Basin-wide approach that actions to reduce flood damage and restore aquatic species habitat proceed together over time. The Work Group has discussed the following milestones to be reached by 2020:

- Local land use plans should be revised to protect natural functions and prevent more flood damage.
- Aquatic species habitat restoration is 30% or more completed.
- Floodproofing of structures in the 100-year floodplain that would not be fully protected by a water retention structure is 20% or more completed.

- The formal evaluation of the package of flood-damage reduction and aquatic species restoration actions recommended should begin in 2015 with the development of the programmatic EIS. The water retention permit process (if determined appropriate) should be initiated later in the 2015–2017 biennium and a permit decision (approval or denial) should occur in five years or less.

The sequencing of actions is vital to successful long-term actions in the Basin. Work Group members have concluded that:

- Major habitat restoration efforts should begin now and be completed in the first 15 years to minimize the potential impacts of climate change.
- The final preparation for a water retention permit process should be initiated near the end of the 2015–2017 biennium, with permitting, if appropriate, commencing upon completions of the programmatic EIS, with a potential for construction in five to eight years.
- Floodproofing efforts should initially be focused in areas that would not be fully protected with a water retention structure.
- Small projects should continue over the next 10 years, with an emphasis on projects that provide multiple benefits.

CREATING A LOCAL/STATE PARTNERSHIP FOR THE FUTURE

The successful implementation of these long-term recommendations for the Chehalis Basin requires a durable, locally-led, Basin-wide organization and governance structure. Figure 5 summarizes the proposed structure, which would include:

- Leadership Committee – made up of the Governor’s Work Group and potentially others, to oversee implementation and direct project management.
- Implementation Committees – made up of consultant and state agency staff to oversee the staff work to conduct the analyses, produce technical reports, and advise the Leadership Committee.
- Flood Authority – to oversee small projects and floodplain management action, and to advise the Leadership Committee.
- Project management staff, consultant team, and state/federal agency staff – to provide the overall coordination and management of the process, conduct public and stakeholder outreach, and ensure the Leadership and Implementation Committees’ work is on schedule.

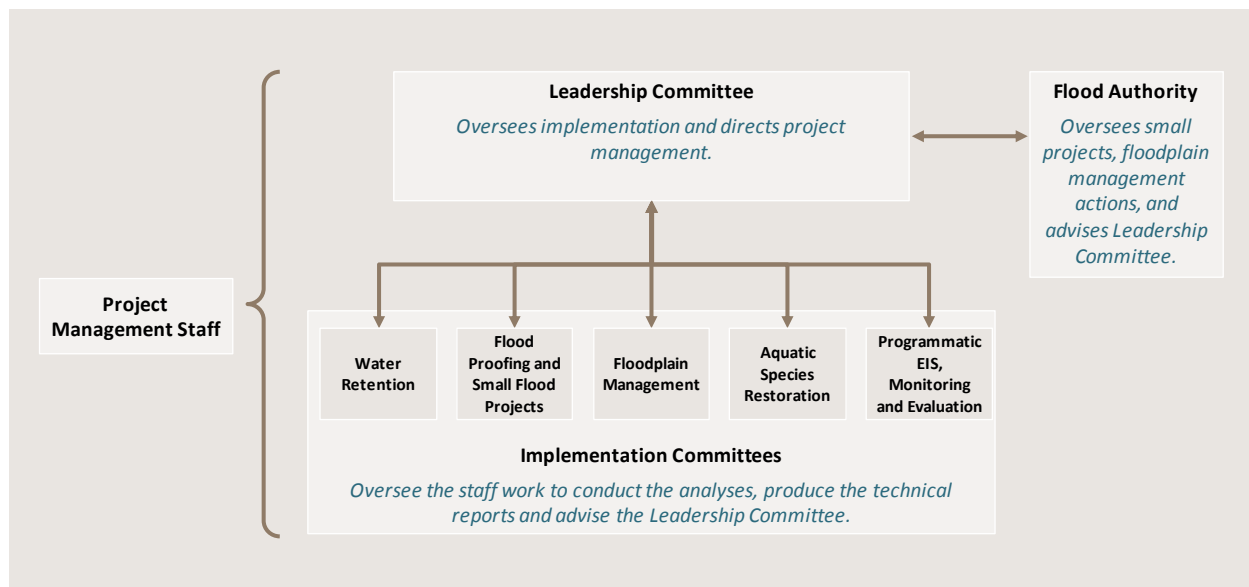


Figure 5: Chehalis Basin Strategy - Potential Organizational Structure

MOVING AHEAD ON LONG-TERM ACTIONS

This section describes proposed work to be completed in the 2015–2017 biennium. The next steps are a combination of actions necessary to move forward on the long-term recommendations, creation of the Basin-led governance structure, and investment in smaller projects to provide near-term reductions in flood damage and restoration for aquatic species.

Overall Strategy Analysis and Programmatic Environmental Impact Statement (EIS)

The Work Group is recommending a programmatic EIS under the National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA). The development of a programmatic EIS will provide Indian tribes, federal and state agencies, stakeholders, and other interested parties with a formal and systematic forum in which to evaluate the action alternatives to meet flood-damage reduction and restoration goals in the Basin. The programmatic EIS will further analyze the potential environmental, social, and economic impacts associated with the recommended package of flood-damage reduction and aquatic species restoration actions as well as a “no action” alternative for the Basin.

The technical studies to support the programmatic EIS will be prepared under the direction of the Leadership Committee. If the program moves forward, project-level evaluations which identify the environmental impacts from specific projects (such as a water retention structure) will be required after completion of the programmatic EIS for the permitting process for individual elements of the recommendations.

Water Retention Design, Analysis, and Initial Permit Process

In preparation for completion of the programmatic EIS and the initiation of the project permitting process (if appropriate), the next phase of engineering and environmental evaluation of a flood retention structure on the Upper Chehalis River is required. The consultant team, in coordination with state agency staff, has provided study scopes, schedules, and estimated budget ranges for the 2015–2017 biennium and for

following years until 2020 when the design of the projects should be complete. The design work 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.

The second biennium of the analysis (July 2015–June 2017) will include design work needed to refine the conceptual designs prepared in 2014. Once a dam type and overall configuration (flood retention-only vs. multi-purpose) is determined, 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.

Advancing the Aquatic Species Restoration Plan

The Washington State Department of Fish and Wildlife, in coordination with a consultant team, have provided study scopes, schedules, and estimated budget ranges for the advancement of the Aquatic Species Restoration Plan (ASRP). This includes the development of riparian and culvert restoration plans, better understanding the Chinook and steelhead population structure, continuation of 2013–15 riverscape studies, identifying how temperature and habitat are connected to fish distributions, and an extensive evaluation of off-channel habitat. These actions will provide more certainty of the impacts and benefits of restoration activities for consideration in the programmatic EIS and project-level permitting, and guide an effective restoration program for the long-term.

Early Implementation of the Aquatic Species Restoration Plan

The Leadership and Implementation Committees, in close coordination with the Salmon Recovery Lead Entity, Washington State Department of Fish and Wildlife, and the Conservation Commission will begin early implementation of prioritized aquatic species habitat restoration projects including culvert replacement and riparian and bank restoration projects. Early work on restoration is necessary to engage landowners and prepare for the extensive restoration needed to achieve the desired results.

Floodproofing and Farm Pads

A basin-wide floodproofing effort will be developed in consultation with local jurisdictions, and the Conservation Commission will continue construction of “farm pads” (livestock and equipment pads and evacuation routes) with interested landowners. The floodproofing effort will raise residential homes and floodproof businesses and public structures within the 100-year floodplain that would not be fully protected through the construction of a water retention structure or local, small flood-control projects.

In addition to the floodproofing program, the Conservation District will work with willing landowners on the construction of farm pads. The farm pads provide an area elevated above the flood level to hold livestock and critical farm equipment during a flood event, reducing livestock mortality and economic loss to landowners and local communities.

Small Flood Projects

A series of small, local flood projects across the Basin are recommended for construction focused on protecting key infrastructure, reducing 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 2013–2015 biennium, and created a prioritized list of projects to recommend for construction during the 2015–2017 biennium.

Before construction begins, there will be 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.

Agency, Tribal, and Environmental Participation

Active project management, government-to-government coordination with Tribal nations, and technical and permit assistance from state agencies will ensure that all projects and programs related to the Chehalis Basin are successfully coordinated and implemented.

Agency staff will continue to participate in a technical assistance role which includes attending meetings, providing advice on technical products, and ensuring agency coordination and timely delivery of recommendations. Once permit applications are submitted, agency staff will review the project proposals and provide official comments during the applicable permitting processes.

Project Management and Public Involvement

Effective management of technical, policy, and community interests is necessary to move the suite of actions forward within the overall organizational structure, including management and facilitation of the Leadership Committee, Implementation Committees, and Flood Authority. Regular opportunities for public involvement in all aspects of the work also will be provided throughout the biennium.