

# THE WILLIAM D. RUCKELSHAUS CENTER

UNIVERSITY OF WASHINGTON

December 19, 2012

Dear Interested Party,

Attached please find the final report on the impacts of flooding in the Chehalis River Basin and potential flood hazard mitigation alternatives. The report provides the Washington State Legislature and other decision makers with information to aid decisions that will set a course for effective solutions to reduce the adverse impacts of flooding in the Basin and, at the same time, support the economic prosperity of Basin communities and the protection/restoration of fish populations and other natural resources.

The William D. Ruckelshaus Center, a joint effort of the University of Washington and Washington State University (more information available at [www.ruckelshauscenter.edu](http://www.ruckelshauscenter.edu)), developed the report under contract with the Washington State Office of Financial Management (OFM) using technical information provided by state and federal agencies and other organizations.

In 2011, as part of the capital budget (ESHB 2020, Section 1033), the Washington State Legislature required OFM to prepare a report on alternative flood damage reduction projects and—in coordination with tribal governments, local governments, and state and federal agencies—to recommend priority flood hazard mitigation projects for continued feasibility and design work. In response to the Legislative directive, this report compiles existing information on the potential flood hazard mitigation projects that seem of most interest to Basin leaders and decision makers at this time. Potential flood hazard mitigation benefits, adverse impacts, costs and implementation issues are summarized for each project where the information was available.

A draft report was made available for public review and comment from July 16– August 31, 2012. A separate report, The Washington State Department of Transportation (WSDOT) draft *I-5 Protection from 13th Street to Mellen Street near Centralia and Chehalis* report describes I-5 protection options in more detail and was available for public comment from August 17–31, 2012. Forty-nine comment letters or emails were received on the two reports; thirty-six on this report and thirteen on the WSDOT report. Of the 36 comments received on this report, 28 were personal reflections and stories on the impacts of flooding in the Chehalis Basin or brief comments on a preferred flood mitigation alternative. The majority of commenters expressed support for a water retention project on the upper mainstem Chehalis and expressed the opinion that such a facility is needed to provide flood protection for residents in the Basin. Fewer commenters expressed opposition to water retention, and instead advocated for other measures such as prohibiting new development in the floodplain, raising or buying out structures already in the floodplain, improving local government land use management practices, and improving forest practices to provide flood protection. Comments on both reports are included as Appendix E. The WSDOT I-5 alternatives report is included as Appendix F.

In June 2012, local community leaders and representatives of tribal governments met to discuss progress to date in flood hazard mitigation and additional potential flood hazard mitigation projects. One of the primary

outcomes of this discussion was an overwhelming sense that policy makers and leaders are interested in a Basin-wide approach for the Chehalis.

In November 2012, a small work group of Chehalis Basin leaders convened by Governor Gregoire recommended a series of actions that, taken together, would represent a significant investment to reduce flood damages in the short term, enhance natural floodplain function and fisheries, and put the Basin on firm footing to make critical decisions about large scale projects. These include investments in (1) large-scale capital projects affecting a broad geographic area like a water retention facility, and/or improvements to protect Interstate 5; (2) smaller-scale capital projects with more localized benefits; (3) environmental projects to enhance overall conditions, aquatic habitat, and abundance of fish 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.

Governor Gregoire endorsed the recommendations from the work group, and recommended \$28 million to implement them in her 2013–15 biennium budget proposal to the Washington State Legislature. The Governor's leadership has been noted by many in the Basin as critical to the recent progress to move beyond study to action, protecting people and reducing future flood damage to the communities in the Basin.

Future floods will come; based on their history, the residents of the Basin will pull together to respond as they always have. The question people in the Basin are asking now is whether they and their leaders will build on the work of the last two years to make difficult decisions and invest in Basin-wide flood hazard mitigation for a better future.

Respectfully,



Jim Kramer  
Chehalis Report Project Manager, Ruckelshaus Center  
Principal, Kramer Consulting  
206-841-2145  
Jkramer.consulting@gmail.com



# Chehalis Basin Flood Hazard Mitigation Alternatives Report

---

*December 19, 2012*

# Chehalis Basin Flood Hazard Mitigation Alternatives Report

DECEMBER 19, 2012

Unless otherwise noted, all photos in this report are courtesy of  
*The Chronicle*, Centralia, Washington.

# TABLE OF CONTENTS

<b>Executive Summary .....</b>	<b>1</b>
Report Contents .....	5
Potential Flood Hazard Mitigation Approaches Addressed in the Report.....	6
Water Retention Project on the Mainstem .....	7
Protection of I-5 and the Chehalis-Centralia Municipal Airport .....	8
US Army Corps of Engineers Levee System around Centralia and Chehalis.....	8
Potential Flood Hazard Mitigation Project Combinations: Large Capital Projects .....	9
Other Flood Hazard Mitigation Alternatives .....	9
Looking Forward: A Basin Wide Approach .....	10
A Basin-Led Process to Develop Recommendations .....	10
Recommended Actions .....	11
Goals for This Report .....	<b>Error! Bookmark not defined.</b>
Public Review of Draft Report .....	<b>Error! Bookmark not defined.</b>
Navigating the Report.....	<b>Error! Bookmark not defined.</b>
<b>Section 1: The Problem.....</b>	<b>Error! Bookmark not defined.</b>
Flood Causes and Variability.....	<b>Error! Bookmark not defined.</b>
Flood Impacts .....	<b>Error! Bookmark not defined.</b>
People and Homes.....	<b>Error! Bookmark not defined.</b>
Farms/Agricultural Lands/Livestock .....	<b>Error! Bookmark not defined.</b>
Business.....	<b>Error! Bookmark not defined.</b>
Transportation.....	<b>Error! Bookmark not defined.</b>
Interstate 5 .....	<b>Error! Bookmark not defined.</b>
<b>Section 2: The Chehalis Basin.....</b>	<b>Error! Bookmark not defined.</b>
Sub-areas.....	<b>Error! Bookmark not defined.</b>
<b>Section 3: Responding to Flooding.....</b>	<b>Error! Bookmark not defined.</b>
Work Already Underway .....	<b>Error! Bookmark not defined.</b>
Additional Potential Flood Hazard Mitigation Projects .....	<b>Error! Bookmark not defined.</b>
The Potential for Flood Hazard Mitigation through Upstream Water Retention Facilities .....	<b>Error! Bookmark not defined.</b>
The Current Alignment and Design of the Federal Flood Levees Proposed at Centralia and Chehalis ...	<b>Error! Bookmark not defined.</b>
<b>defined.</b>	
Alternative Projects that Could Protect the Interstate Highway and the Municipal Airport ...	<b>Error! Bookmark not defined.</b>
Other Alternatives that Could Provide Flood Relief and Protection in the Basin .....	<b>Error! Bookmark not defined.</b>
Crafting a Basin-Wide Approach.....	<b>Error! Bookmark not defined.</b>
Potential Capital and Construction Project Combinations .....	<b>Error! Bookmark not defined.</b>
Local Projects and Programmatic Approaches .....	<b>Error! Bookmark not defined.</b>
Benefit-Cost Analyses in the Chehalis Basin .....	<b>Error! Bookmark not defined.</b>
<b>Section 4: Recommendations and Next Steps.....</b>	<b>Error! Bookmark not defined.</b>
Large-Scale Capital Projects.....	<b>Error! Bookmark not defined.</b>
Smaller-Scale Local Projects .....	<b>Error! Bookmark not defined.</b>
Fish and Ecosystem Enhancement Projects .....	<b>Error! Bookmark not defined.</b>
Land Use, Flood warning, and Emergency Response .....	<b>Error! Bookmark not defined.</b>
Moving Ahead to Realize the Work Group’s Framework .....	<b>Error! Bookmark not defined.</b>

**Appendix A: Flood Hazard Mitigation Alternatives – Project Descriptions** ..... Error! Bookmark not defined.

**Appendix B: Final Recommendations to the Governor** ..... Error! Bookmark not defined.

**Appendix C: Potential Capital and Construction Project Combinations**..... Error! Bookmark not defined.

**Appendix D: Individual Stories and Reflections on Flooding in the Chehalis Basin** ..... Error! Bookmark not defined.

**Appendix E: Comments and Responses on the Draft Chehalis Basin Flood Mitigation Alternatives and Draft WSDOT I-5 Flood Report** ..... Error! Bookmark not defined.

**Appendix F: WSDOT Report: I-5 protection from 13th Street to Mellen Street near Centralia and Chehalis** Error! Bookmark not defined.

**Appendix G: Chehalis River Basin – Forest Practices** ..... Error! Bookmark not defined.

**Appendix H: Evaluation of Benefit-Cost Work Regarding Chehalis River Flood Control** ..... Error! Bookmark not defined.

**Appendix I: Chehalis River – Salmon Runsizes and Escapements** ..... Error! Bookmark not defined.

**Appendix J: Chehalis River Hydraulic Model Development** ..... Error! Bookmark not defined.

**Appendix K: Bibliography** ..... Error! Bookmark not defined.

# Executive Summary

Flooding is a common occurrence in the Chehalis River Basin in southwest Washington. In 2007 and 2009, the Basin suffered two major floods only 14 months apart. The 2007 flood was by far the largest on record in the Basin; monetary damages alone topped \$900 million. The two large flood events coming so close together extracted an incalculable physical and psychological toll on the Basin's residents. Flooding is a natural occurrence and supports significant ecological functions that benefit people, fish, wildlife, and the ecosystem as a whole. Flooding can also cause disastrous damage to human communities and infrastructure. It is not possible to stop flooding, but it is possible to reduce the negative impacts to human communities.

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. The purpose of this report is to provide the Washington State Legislature and other decision makers with information to aid their decisions to set the course for effective solutions to reduce the adverse impacts of flooding in the Basin and, at the same time, support the economic prosperity of communities in the Basin and protection/restoration of fish populations and other natural resources.



The William D. Ruckelshaus Center, a joint effort of the University of Washington and Washington State University (more information available at [www.ruckelshauscenter.edu](http://www.ruckelshauscenter.edu)), developed the report under contract with OFM using technical information provided by state and federal agencies and other organizations.

## Report Contents

In response to the Legislative directive, this report describes the Chehalis Basin, the flooding it has experienced, and work already underway to address flooding impacts. This work includes creation of a hydraulic model for the Chehalis mainstem, land management activities to control building and new fill in the floodplain, flood proofing, home elevation, and buyout programs, livestock and farm evacuation and sanctuary areas, and the early flood warning program.

The Report also describes potential future flood hazard mitigation options and approaches, and provides a series of recommendations for moving forward with flood hazard mitigation developed by Basin leaders.

Over the years many different flood hazard mitigation approaches have been suggested and studied, and individuals in the Basin have developed perspectives about which projects might be the most effective, based both on studies and their personal experiences with flooding. The potential flood hazard mitigation projects summarized in this report were included based on the Legislative requirements and the current focus of interested parties in the Basin. They are predominately oriented around the Twin Cities area because of the extensive work there by the U.S. Army Corps of Engineers (the Corps) and state and local governments over the past several decades. Other areas of the Basin have not been analyzed in as much detail with respect to flood relief, such as the areas downstream of the Twin Cities and upstream on the mainstem, South Fork, Bucoda and Napavine.

Potential flood hazard mitigation benefits, adverse impacts, costs and implementation issues where available are summarized for each project. Potential projects addressed by this report include:

- A multi-purpose water retention dam on the mainstem Chehalis River located upstream of Pe Ell;
- Improvements to the levee around the Chehalis-Centralia Airport;
- Flood walls and levees to protect Interstate 5 in the Chehalis/Centralia Area;
- Raising/improving the levee system around Centralia and Chehalis, (the Corps “Twin Cities Project”);
- Other potential construction projects and programmatic approaches, such as land use management, flood proofing, home elevations and buyouts, and livestock evacuation and sanctuary areas, and multiple local levee or other flood hazard mitigation construction projects and a number of additional alternatives to protect Interstate 5.

Projects and benefit/cost information are described in Section 3 of the report and, in detail, in the appendices.

In November 2012, a work group of Chehalis Basin leaders convened by Governor Gregoire recommended a series of actions that, taken together, would represent a significant investment to reduce flood damages in the short term, enhance natural floodplain function and fisheries, and put the Basin on firm footing to make critical decisions about large scale projects. These include investments in (1) large-scale capital projects affecting a broad geographic area like a water retention facility, and/or improvements to protect Interstate 5; (2) smaller-scale capital projects with more localized benefits; (3) environmental projects to enhance overall conditions, aquatic habitat, and abundance of fish 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.



## Chehalis River Basin



## Potential Flood Hazard Mitigation Approaches Addressed in the Report

The report summarizes a number of potential flood hazard mitigation approaches and projects as directed by the Legislation. Basin leaders considered these projects when they developed their recommendations for how to move forward with flood hazard mitigation in the Chehalis.

## WATER RETENTION PROJECT ON THE MAINSTEM

One of the main flood hazard mitigation options being considered is the potential for using water retention—a dam—on the Chehalis to control flood waters and mitigate flood damages. A number of locations were considered in the early analysis of potential water retention facilities. Although some residents, especially in the Boistfort valley, would still like to see a water retention project on the South Fork Chehalis, the project site still under consideration in the Basin is upstream of Pe Ell, on the upper mainstem Chehalis River. Two options for the structure are being considered: a flood control-only dam and a multi-purpose dam that could include power generation and water storage to augment summer flows in the mainstem. Either structure would have 80,000 acre-feet of dedicated flood control storage.

The conceptual cost estimate for construction of a flood control-only dam is \$165 million; a multi-purpose dam is \$245 million. This estimate is based on preliminary information and designs. Potentially significant cost considerations have been raised during studies conducted after the preliminary cost estimates, and in public comment.

In events such as the December 2007 flood, the dam currently under consideration is predicted to lower flood elevations in the upper watershed by six to twelve feet, by three to four feet in the Twin Cities, by two to three feet on the Chehalis Mainstem downstream of the Twin Cities, and by almost 2 feet at Montesano. Different levels of protection would be provided in different types of storm events.

Preliminary 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 would be to refine the engineering designs, further study dam safety, and identify more specifically the implications for water quality, quantity, and aquatic species. When this additional information is available, the assessment of the economic benefits weighed against the cost of large upstream water retention will need further refinement.

It is known from the studies done over the last year that there would be environmental impacts, as well as the potential for environmental benefits, from a large upstream water retention structure. It is necessary 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 one holding a permanent reservoir allowing the release of water during summer months with the potential to improve water quality downstream. It is also critical to better understand how and where fish currently use the river and to know what it will take to fully offset any risks to fish and water quality from water retention. Given the potential of large-scale water retention to significantly lower peak flood elevations during major floods and thereby provide Basin-wide flood damage reductions, answering these questions is an essential next step.

A dam would reduce flood elevations throughout the Basin, but it would not eliminate all flooding or fully protect Interstate 5 in all flood events considered. At the north end of the Airport levee, I-5 is lower than the levee. Constructing a dam and raising the airport levee together would not have kept I-5 open during the 2007 flood. In that situation, I-5 would still be under several inches of water north of the airport levee. This water would flow south down to the low point of I-5 at Chamber Way and cover the Interstate there with more than six feet of water. Water also would have been a few inches over I-5 at the SR 6 Interchange during another 2007 flood if a dam were built and the airport levee raised.

Although a dam on the upper Chehalis and raising the airport levee would not have kept I-5 open during the 2007 event, they would significantly reduce the chance of I-5 closing during a major flood. There are many other major flood scenarios (less severe than the 2007 flood) where a dam would provide enough protection to keep I-

5 open when it may have closed without a dam. In addition, a dam would reduce the duration of the closure of I-5 if it were overtopped by flood waters.

In summary, based on the studies to date and a technical workshop held May 21 and 24, 2012, a dam on the Chehalis mainstem would result in the greatest reduction of flooding Basin-wide of any considered project; it also has the highest risk for damage to ecological functions. The monetary calculation of benefits and costs for a dam may change significantly as additional information is developed, resulting in either an increase or decrease in the benefit-cost ratio.

## PROTECTION OF I-5 AND THE CHEHALIS-CENTRALIA MUNICIPAL AIRPORT

Consistent with the Legislative requirements, WSDOT evaluated a number of potential projects intended to protect I-5 and the Chehalis-Centralia municipal airport. These included: raising I-5 using fill material, raising I-5 using a viaduct, relocating I-5 outside the flood area, using express lanes or temporary bypass lanes to route transportation around flooding on I-5, and protecting I-5 with walls and levees. The fill, viaduct, and relocation projects had cost estimates ranging from \$350 million–\$2 billion. The I-5 protection option summarized below would use walls and levees to protect the Interstate. It would involve building earthen levees and structural walls, replacing bridges with bottomless arches at Dillenbaugh and Salzer Creek, and providing stormwater treatment systems. It has a projected cost of \$80–100 million. Protection of I-5 and the airport also may provide protection to homes and businesses in some parts of the Twin Cities, and may increase flood elevations in some other parts.

The airport levee part of the project would raise the existing 2.3 miles of earthen levee to an elevation three feet above the adopted 100-year flood level, as recently identified by FEMA. This is accomplished by widening the base of the levee and constructing it higher in a way that maintains existing side slopes. In addition to the improvements to the existing levee, the project would elevate Airport Road along the south side of the Airport and replace all utility infrastructure. The cost estimate for this project is approximately \$3.2 million, with the roadway improvements responsible for the majority of the cost.

According to model results, protection of I-5 and the airport may provide protection to homes and businesses in some parts of the Twin Cities and may increase flood elevations in some other parts. Based on a preliminary analysis, in events such as the 2007 flood, it is predicted to completely protect (i.e., make dry) 460 residences and 140 commercial structures and lower flood elevations at 300 more residences and 140 more commercial structures. It is predicted to raise flood elevations by zero to one foot at the Newaukum confluence, Dillenbaugh Creek, and Mellen Street and one to two feet along the Airport levee, which would raise flood levels at a total of 120 residences and 30 commercial structures. Flood elevations downstream are predicted to increase by up to 0.1 feet (2007 and 100-year event) and 0.1 to 0.2 feet (1996 event). Increases in flood elevation that would be caused by the I-5/airport project would need to be addressed through mitigation efforts such as raising buildings, moving buildings, buyouts, and other measures. Impacts to fish and other natural resources have not been fully assessed and will need to be analyzed in more detail and fully mitigated. Cost estimates include funding for flood and natural resource mitigation.

## US ARMY CORPS OF ENGINEERS LEVEE SYSTEM AROUND CENTRALIA AND CHEHALIS

In the 1980s, the Corps began to evaluate a plan to build 11 miles of new levees in the Chehalis River floodplain through Chehalis and Centralia. The basic plan was authorized for further analysis by Congress as the Corps of Engineers Centralia Flood Damage Reduction Project (aka the "Twin Cities Project"), but not funded for construction. The project evaluated by the Corps included levees on the Chehalis River, the lower two miles of Dillenbaugh and Salzer Creeks, and the lower Skookumchuck River.

Work on the Corps Twin Cities project was largely stopped in 2011, after it was determined that the proposed project, in the design as currently authorized by Congress, would not have protected I-5 during an adopted 100-year flood event, would have increased flooding upstream and downstream of the Twin Cities and, at a cost of \$205 million, would not pass the Corps cost-benefit test. The Corps has issued a draft close-out report for the project that has four options for how to proceed. The Corps could decide to re-frame the project and move forward with individual pieces, or they could re-evaluate the project and conduct additional feasibility study work to determine if a different project approach might provide better benefit to cost ratios. The latter would require a local sponsor; either would require additional funding. Decisions on how the State of Washington will respond to the Corps close-out report will be made after the Legislative decisions for the next biennium.

## POTENTIAL FLOOD HAZARD MITIGATION PROJECT COMBINATIONS: LARGE CAPITAL PROJECTS

Because of the complex hydrology and diverse geography and human communities in the Chehalis Basin, no single project can completely alleviate the adverse impacts of flooding. It is likely a combination of projects will be needed to maximize the benefits, address concerns, and resolve implementation issues. Even with combinations of projects, flooding will continue to impact people and property in the Basin. As an example, the proposed dam on the upper mainstem of the Chehalis would reduce flood scope (the “inundation area”) and depth throughout the Basin, but would not completely eliminate flooding in the upper watershed, or reduce flooding enough to reliably prevent overtopping of I-5 under all flood scenarios. Some projects decrease flood elevations in some places, but increase them in others. Some projects cause natural resource or other impacts, and some have the potential to improve natural resources and ecosystem function in some ways.

To show how potential flood hazard mitigation benefits might change if various projects were combined, spark conversation, and illustrate some of the potential trade-offs between large capital projects, the draft report described three example project combinations. Each provided a different mix of potential flood hazard mitigation benefits, potential natural resource risks and impacts, and costs. They were not presented as preferred or recommended options, only as examples. Comments on the project combinations described in the draft report were mixed, and none of the exact combinations described in the draft report are reflected in the recommendations forwarded to the Governor.

## OTHER FLOOD HAZARD MITIGATION ALTERNATIVES

In addition to water retention, alternatives to protect I-5 and the municipal airport, and the Corps Twin Cities project, numerous other alternatives have been discussed that could provide flood relief and protection in the Chehalis Basin. These include additional capital/construction projects, such as building floodwater bypasses at Mellen Street and near Scheuber Road, numerous programmatic alternatives such as land use regulation, home elevation, flood proofing and buyout programs, and projects to increase the “natural capital” of the area through improvements to riparian buffers and floodplain function and storage. These projects are described in Appendix A, including, to the extent information is available, descriptions of their potential benefits, adverse impacts, costs and implementation issues.

The report describes an approach that relied on leveraging local projects to remove key obstructions in the floodplain and using programmatic changes to address potential future flood damages. Such an approach could include addressing culverts, bridges that cause localized flooding, prohibiting new development in the flood plain, raising or buying out structures already in the flood plain, improving other land use management practices, and improving forest practices to incentivize longer logging rotations. It also might include completing smaller construction projects in localized areas such as the Bucoda levee, and the Centralia-Chehalis Airport levee, protecting livestock and farm investment with farm/critter pads, and ensuring effective detour routes

around I-5 to accommodate periodic closures during flooding. This kind of approach could be implemented and funded over time, throughout the Basin. The scope of such an approach, as well as the associated flood hazard reduction benefits and costs, have not, to date, been evaluated.

## Looking Forward: A Basin Wide Approach

There is a long history of floods and studies in the Chehalis Basin. People in the Basin along with local, state, federal and tribal governments have been very successful in the immediate response and clean up of floods, and have initiated a number of actions to reduce flood damages in the future. There have been significant improvements in the flood warning system and understanding of how different storms affect flooding in the Basin as well as what different projects and programs can do to reduce flood damage. Local actions such as elevating homes, improving land use management and creating evacuation routes for livestock have been taken and continue. Community leaders and other interested parties see that now is the time to make decisions on next steps for the major structural flood hazard mitigation projects and any significant changes to programs that would more dramatically reduce future flood damage. They hope the 2013 Legislature will make decisions on funding for priority projects and programs that build on local actions.

In June 2012, local community leaders and representatives of tribal governments met to discuss progress to date in flood hazard mitigation and additional potential flood hazard mitigation projects. One of the primary outcomes of this discussion was an overwhelming sense that policy makers and leaders are interested in a Basin-wide approach for the Chehalis. Hallmarks of a Basin-wide approach include:

- Maximize benefits from flood damage reduction projects and minimize negative impacts throughout the Basin.
- Work for everyone in the Basin and not shift impacts from one community to another.
- Include a combination and sequence of projects in different places to address different aspects of the flooding; there are different perspectives on what combinations and sequences of projects are most appropriate.
- Include continued progress on many of the programmatic actions such as land use management.
- Protect and where possible restore floodplain function, while acknowledging and working with historical development within the floodplain.
- Do more than simply protect I-5; communities and people beyond the Interstate must be helped too.

### A BASIN-LED PROCESS TO DEVELOP RECOMMENDATIONS

In August 2012, as a follow up to the draft report, and in recognition that a time for decision making has come, the Governor tasked a work group—David Burnett (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 President) and Keith Phillips (Policy Advisor to Governor Gregoire)—to develop recommendations for flood damage reduction projects. 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 group set out to make recommendations consistent with a Basin-wide approach to flood damage reduction. They believe a successful Basin-wide approach 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.

The group recognized that a Basin-wide approach to flood damage reduction must go hand in hand with improvements in the environmental health and resiliency of the Basin. Flood damage reduction projects must avoid or fully mitigate environmental impacts. Floodplains, water, and shorelines must be managed in ways that reduce future flood damage and enhance overall environmental conditions and habitat for aquatic species. Fish mitigation and enhancement projects must be implemented in concert with flood damage reduction projects. It is critical that harvestable resources of the basin are increased as flood damage is reduced.

The group also acknowledged that even with efforts to reduce flood damages, 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 intelligently, Basin communities can reduce the risks from future floods.

## RECOMMENDED ACTIONS

The work group recommended a five-part strategy for the 2013–2015 budget cycle based on a common understanding of how floods affect the Basin. The recommendations call for real improvements through implementation of a series of known smaller-scale projects and investments to reduce flood damage, and completion of the analysis needed for decisions about the best mix of additional large- and small-scale projects to significantly reduce flood damages in the future.

1. Finish the analysis necessary to determine the best option for large-scale capital projects that could significantly reduce flood damages across a large geographic area, and make a decision by December 2014 whether to move into project permitting. The large capital projects under consideration include upstream water retention and I-5 improvements. The analyses needed to support feasibility assessments for large-scale projects have many collateral benefits in the Basin, including benefits to the other work areas recommended by the work group.
2. Design and construct local projects that will provide immediate flood damage reduction including the protection of critical infrastructure, wellheads, wastewater treatment plants, roads, homes, and businesses. Concurrent with these projects, develop and implement a long-term strategy for localized flood damage reduction actions. 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, the benefits from a combination of smaller projects across the Basin also should be explored, and we should continue to construct projects that provide near-term local flood damage reduction benefits. Further analysis of such a program will help determine how much damage reduction is possible, at what cost, and provide additional context for considering large-scale projects.
3. Implement projects that improve fish habitat and populations and floodplain functions in the Basin. Concurrent with initial projects, develop and implement a coordinated long-term strategy with goals and objectives for improving ecological function, aquatic habitat and abundance of fish in the Basin in conjunction with flood damage reduction actions. Appropriate management of floodplains, water, and shorelines can and must play a role in flood damage reduction, and must enhance the overall

environmental conditions and habitat for aquatic species, particularly salmon, in the Basin. It is critical that harvestable resources of the Basin are increased as flood damage is reduced.

4. Reduce the cost of repetitive damage to residences in the floodplain through a strategic program of buyouts and flood proofing, and encourage a comprehensive effort to prevent new development in the Basin from increasing flood damages. Progress on floodplain management policies and programs has been made, though additional improvements are both needed and 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. It will also be important to continuously improve the information base and tools needed to understand flood impacts and to optimize actions to reduce flood damage while improving the environmental health of the Basin.
5. Ensure flood warning and flood preparedness systems remain ready and effective for the public and emergency responders.

There are differences of opinion 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 substantially reduce flood damage. There also is agreement that it is possible to act now with certainty to implement some actions; other actions, including large-scale capital projects, need more feasibility analysis before decisions about the best way to proceed can be made.

The Governor's work group recognized that support would be needed for continued project management, technical work, and policy decisions to refine and implement a Basin-wide approach and coordinate capital investment.

The group recommended that the next Governor appoint a policy task force in spring 2013 to oversee initial implementation of this framework and make future recommendations to the Governor and Legislature about the feasibility of a water retention structure, preferred alternative for I-5, and next expenditures needed to continue implementation of the framework beyond 2015. They recommend that the Flood Authority should continue to serve as a sounding board, oversee implementation of the local capital projects funded in the 2013–15 biennium, and recommend local capital projects for the 2015–17 biennium. The Flood Authority should also oversee the strategy for reducing repetitive flood loss and land use management, evaluate a suite of local flood damage reduction projects, and implement and maintain the flood warning system. Finally, they recommended a technical steering committee should be convened to oversee the ecosystem enhancement and fish studies and dam scoping work, and make recommendations to the policy task force as necessary.

The group's recommendations were endorsed by the Chehalis Flood Authority.

Governor Gregoire also endorsed the recommendations of the work group. She included \$28 million in her recommended 2013–2015 state capital budget to move forward with the recommended work.

## Conclusion

The Chehalis Basin is poised to take important actions to invest in flood hazard mitigation now and for the future. Recent progress has been made in understanding the potential benefits, impacts, and costs of flood hazard mitigation project options, and creating a shared set of ideas about how to go about flood hazard mitigation and what a Basin-wide approach would mean.

The state is set for future decision making. Over the next two years significant investment will continue to be needed in actions to mitigate future flood hazards in the Chehalis Basin, improve natural resource function and conditions for fish populations, complete the assessments and studies needed to make decisions about which (if any) large-scale projects to move forward into permitting, and support collaboration and governance in the Basin. No single project, or even set of projects, will ever completely eliminate flooding in the Chehalis Basin, but the path is now clear for steps to be taken to significantly reduce the damages flooding visits on people and communities throughout the Basin now and in the future.